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FOREWORD

I am pleased to put into the hands of readers Volume-5; Issue-4: Apr, 2019 of **"International Journal of Advanced Engineering, Management and Science (IJAEMS) (ISSN: 2354-1311)"**, an international journal which publishes peer reviewed quality research papers on a wide variety of topics related to Science, Technology, Management and Humanities. Looking to the keen interest shown by the authors and readers, the editorial board has decided to release print issue also, but this decision the journal issue will be available in various library also in print and online version. This will motivate authors for quick publication of their research papers. Even with these changes our objective remains the same, that is, to encourage young researchers and academicians to think innovatively and share their research findings with others for the betterment of mankind. This journal has DOI (Digital Object Identifier) also, this will improve citation of research papers.

I thank all the authors of the research papers for contributing their scholarly articles. Despite many challenges, the entire editorial board has worked tirelessly and helped me to bring out this issue of the journal well in time. They all deserve my heartfelt thanks.

Finally, I hope the readers will make good use of this valuable research material and continue to contribute their research finding for publication in this journal. Constructive comments and suggestions from our readers are welcome for further improvement of the quality and usefulness of the journal.

With warm regards.

Dr. Uma Choudhary
Editor-in-Chief
Date: May, 2019

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Searching Ground Water Sources by Geoelectric Method for Tourism Developmentin Taman Harmoni Bali Bukit Asah Bugbug Karangasemregency, Bali Propince

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Abstract— *Taman Harmoni Bali Bukit Asah (THB-BA) is place located in Bugbug Village, KarangasemRegency, BaliProvince. Geographically located at $8,5005748^0$ S, $115,6004593^0$E. This tourism place has a beach, the name is Bias Putihbeach, people call it Virgin beach. The visitor from month to month continue to increase. This place also has a camp with an axotic view. Even though this exotic destination is so exotic, it still has weaknesses, namely the lack of water availability. While this is still riding in a local water supply group, so the water is still very far from enough, especially for camping, visitors in general, and plant maintenance. For this reason, it is necessary to find a solution so that the Taman Harmoni Bali Bukit Asah (THB-BA) can grow rapidly. One method that is often used to find groundwater sources is the geoelectric method. Research on the search for groundwater sources in THB-BA has been carried out from March 2018 to July 2018. The geological state of the study area is mostly in the form of rocky aluviun soils, which makes it difficult for site selection. Based on the surface geological conditions, a survey was carried out near the Bias Putih beach. A good source of water was found at a depth of 22 m. Later drilling, water was found starting at a depth of 9.5 m. Then drilling continues to a depth of 31 m with a screen starting at a depth of 23 m because the position of good water is estimated at a depth of 22 m. The existence of this water has also been tested, it turns out that it is true that there is water*.

Keywords— *groundwater, geoelectric method, Taman Harmoni Bali Bukit Asah.*

I. INTRODUCTION

Taman Harmoni Bali Bukit Asah(THB-BA) is place located in Bugbug Village, KarangasemRegency, BaliProvince. Geographically located at $8,5005748^0$ S, $115,6004593^0$E. Geologically, it is dominated by alluvium rocks(Hadiwidjojo, 1971). This tourist destination also has a beach, the name is Bias Putihbeach, people call it Virgin beach.Thevisitor from month to month continue to increase. This place also has a camp with an axotic view. Even though this exotic destination is so exotic, it still has weaknesses, namely the lack of water availability. While this is still riding in a local water supply group, so the water is still very far from enough, especially for camping, visitors in general, and plant maintenance. For this reason, it is necessary to find a solution so that the Taman Harmoni Bali Bukit Asah (THB-BA) can grow rapidly. One method that is often used to find groundwater sources is the geoelectric method(Simpen, Redana, Pujianiki, & Umratul, 2017; Adi Susilo, Sunaryo, & Fitriah, 2018).

The geoelectric method is one of the geophysical methods that works based on physical parameters in the form of rock resistivity. In principle, the electric current is injected into the soil and then the potential difference is measured(Sudha, Israil, Mittal, &Rai, 2009; Adi Susilo et al., 2018). Based on the magnitude of the injected current, the potential difference caused and the distance between electrodes, it can be calculated the resistivity (ρ) of the rock at the measurement site(Looke, 2000). Geoelectric methods have long been used for mineral exploration, determining rock structures and looking for aquifer structures and even for searching the distribution of leachate pollutants(A. Susilo et al., 2017; Telford, Geldart, & Sheriff, 1990). The use of geoelectric to find groundwater sources is very satisfying. Thus in this study the search for groundwater sources for the development of the Taman Harmoni Bali Bukit Asah tourism object uses the geoelectric method. The problems that can be raised in this study are: where is the best position of groundwater

sources based on geoelectricdata for the development of Taman Harmoni Bali Bukit Asah? The purpose of this study was to find the best position of groundwater sources based on geoelectric data for the development of Taman Harmoni Bali Bukit Asah.

II. RESEARCH METHOD

2.1 Place and time of research

The research was conducted at the Taman Harmoni Bali Bukit Asah in Bugbug Village, Karangasem Regency, Bali Province. Geographically located at around $8,5005748^0$ S, $115,6004593^0$E. The location of the research can be seen in Figure 1. Bukit Asah geologically is a hilly area with rocky alluvium soil, so it is rather difficult in choosing a location, but there are also areas with low parts. Based on the surface geological conditions, a survey was carried out near the Bias Putihbeach. In this low area geologically dominated by alluvium(Hadiwidjojo, 1971), with the hope that if the water has been obtained, later the water can be raised with a pumping system. Research has been conducted from March 2018 to July 2018.

Basic map: *https://www.google.com/maps/@-8.5005748,115.6004593,1462m/data=!3m1!1e3!5 m 1!1e1*
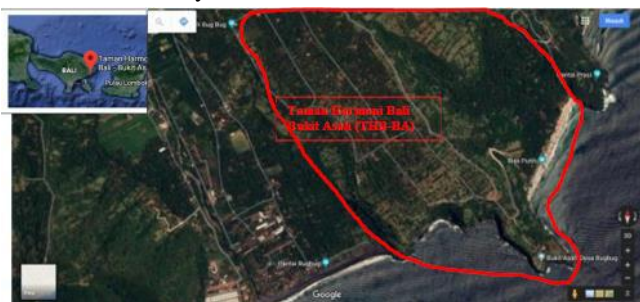
Fig.1: Taman Harmoni Bali Bukit Asah (THB-BA) Area

2.2 Data Collecting Method

Data is measured by geoelectric method, so the instrument needed is a set of Skill Pro geoelectric devices. Tool sets consist of electrodes, connecting cables, alligator-clamped cables, batteries, hammers, meters, compasses, laptops. To prove the existence of water, drilling is done, the instruments needed is a set of drilling tools. The equipment includes drill bits, water and clay. Measurements were made in areas that were estimated to have a flow of aquifers. The measurement stages are as follows:

a. Make a measurement line.
b. Installation of electrodes
c. Connecting electrodes with resistivity.
d. Take measurements.

Measurements begins by making five measurement lines. The measurement lines is shown in Figure 2.

Electrodes are installed at this linesby a distance between 4.75 m electrodes. There are 48 electrodes, so the line length becomes 47 x 4.75 m = 223.25 m. The electrodes are then connected to the resistivimeter, finally a measurement is did. The magnitude measured is in the form of the magnitude of the injected current and the potential difference caused. This research uses Werner's configuration. The Skill Pro geoelectric tool set can directly record the magnitude of the current and the magnitude of the potential difference in the measurement results.

Basic Map:https://earth.google.com/web/@-8.50069798,115.61014835,12.74004927a,511.6141234d, 35y,-0h,0t,0r

$L_{1...5}$: measurement lines

Fig.2: Measurement lines

2.3 Data Analysis Method

The measurement results are in the form of current magnitude and potential difference as well as the relationship between the two quantities that produce apparent resistivity analyzed by the Res2dinv program. The analysis output is in the form of contour cross section resistivity, this contour is interpreted. After the position of the aquifer is obtained, proceed with drilling and installation of a test pump to prove that there is water in the area. If there are water, that means the data analysis is correct.

III. RESULT AND DISCUSION

3.1 Research data

Data retrieval is done on the measurement lines. Photographs of measurement activities can be seen in the Figure 3.

Fig.3: Geoelectric Data Measurement

The data obtained was analyzed by the Res2dinv program so that the real resistivity values were obtained for each point in the cross section. The resistivity contours of each cross section can be seen in Figure 4-Figure 8.
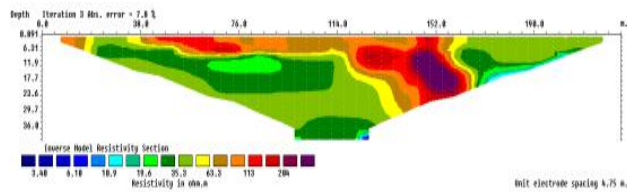
Fig.4: Resistivity Section Contour Line 2
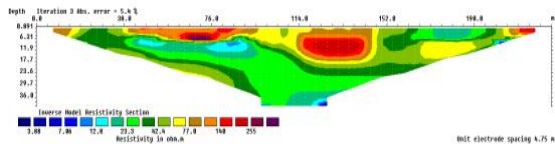
Fig.5: Resistivity Section Contour Line 3
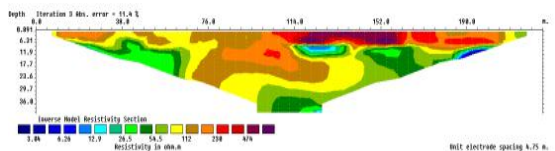
Fig.6: Resistivity Section Contour Line 1
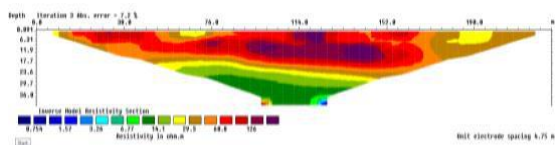
Fig.7: Resistivity Section Contour Line 4
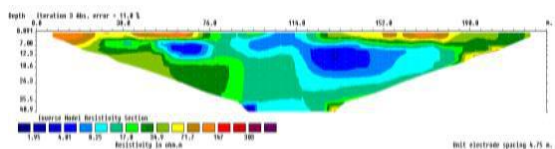
Fig.8: Resistivity Section Contour Line 5

3.2 Interpretation of Geoelectric Data

Based on the contour resistivity of each line, it can be said that in each section there are areas that have very small resistivity with resistivity values between 5-50 Ω.m which are thought to be aquifers. Among the five lines, line 3 is the most likely to be drilling at position 99.75 m, because at this point the water is collected, so that on line 3 drilling is carried out.

3.3 Proofing of the existence of a water source

Based on the results of drilling on line 3 at point 99.75 m (Figure 9), aquifers were obtained at a depth of 12 m, but according to geoelectric data, good water was estimated at a depth of 22 m, so drilling continued to a depth of 31 m. To avoid the presence of unfavorable water contamination, the cassing screen is made from a depth of 23 m. The casing uses paralon pipe AW type 5 '.

After completion of drilling, a pilot installation of the pump is also carried out to ensure that there is actually water in the well. It turns out there is water and can be taken (Figure 10). The well data obtained is a surface depth of 9.47 m and a well depth of 26.92 m.

The presence of water in the well indicates that the groundwater source has been found. Furthermore, this water can be used for tourism development in the Taman Harmoni Bali Bukit Asah.

Fig.9: Drilling on Line 3 Point 99.75

Fig.10: Testing of Pump Installation in Drilling Well

IV.   CONCLUSION

This study uses five lines measurement. From the five lines, , there are visible aquifer grooves. Some of these aquifer grooves are spread, some are gathering. The collecting groove will provide more quantity of water, so the location that is most suitable to be explored as a source of ground water is line 3 at position 99.75 m.

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Free Education in the Philippines: The Continuing Saga

"A nation cannot be built without education." (Taylor-Kamara, 2010)

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Abstract— *One of the most notable milestones in the Philippine education is when the government actively seeks to expand access and participation in higher education through the ratification of RA 10931 or the "Universal Access to Quality Tertiary Education Act". Thus, this study aims to examine and assess the effects of the law in our educational system. Providing sufficient funds is not enough; the government must give meaning to the title of the new law, which is the provision of "quality" tertiary education. This program is an investment in the nation's most precious resource. Quality education empowers people and levels the playing field; it is one of the best tools for poverty alleviation, social equity and inclusive growth. There should be no compromise on the quality of the services provided under RA 10931. Free must not mean substandard. In this study, the researcher used qualitative research method. Qualitative research method was developed in the social sciences to enable researchers to study social and cultural phenomena: observe feelings, thoughts, behaviors and the belief of the mass society.*

Keywords— *Free Education, higher education, Universal Access to Quality Tertiary Education Act.*

I.   INTRODUCTION

A good education is one of the most important things an individual can pursue. There are many aspects of life that a complete education will affect a person. Having a high education meaning a well-paying job, better opportunities, and a better life. It also makes a person smarter than someone without one. There are many ways in which education can benefit people.

Free education is indeed important to many poor families. In the early years, most of our ancestors received no formal training at all because education during those times was only available to the upper class. Tutors and private academies only trained the few that could afford an education, which increased the value of it. Education played a major role in our history it was one of the major issues that separated the wealthy from the poor.

Hence. August17, 2018 is another historic for the country when President Rodrigo RoaDuterte signed Republic Act 10931, to wit:

"AN ACT PROMOTING UNIVERSAL ACCESS TO QUALITY TERTIARY EDUCATION BY PROVIDING FOR FREE TUITION AND OTHER SCHOOL FEES IN STATE UNIVERSITIES AND COLLEGES, LOCAL UNIVERSITIES AND COLLEGES AND STATE-RUN TECHNICAL-VOCATIONAL INSTITUTIONS, ESTABLISHING THE TERTIARY EDUCATION SUBSIDY AND STUDENT LOAN PROGRAM, STRENGTHENING THE UNIFIED STUDENT FINANCIAL ASSISTANCE SYSTEM FOR TERTIARY EDUCATION, AND APPROPRIATING FUND THEREFOR"

After numerous debates, the Free Tuition Fee Act of 2018 was finally signed into law. RA 10931's landmark components include:

1. Free tuition for all required classes during the semester. *These classes must be part of the curriculum and are essential in obtaining a degree. Approved petitioned classes are covered, too, but review or enhancement classes are not covered.*

The free tuition law also covers the fees of Filipino learners enrolled in any TESDA-registered TVET program.

2. Free miscellaneous and other school fees. The law covers payment for fees for the use of libraries, computers and laboratories, school identification card, athletics, admissions, development, guidance services, handbook, entrance, registration, medical and dental services, and cultural activities.

Should you wish to have another copy of your school identification card, library identification card, and student handbook, you will have to pay extra.

3. Affirmative action programs for minorities. The law requires SUCs, LUCs, and TVET program providers to craft programs to make it easier for disadvantaged students to avail of the free tuition law. They may include students who are Lumad, Muslims, indigenous peoples, persons with disabilities, and students from public high schools and depressed areas.

4. Opt-out mechanism. Students with the financial capacity can volunteer to opt out of the free higher education provision. SUCs, LUCs, and TVET providers are therefore required to create a system that would enable students to do so.

Students must decide to opt out of the subsidy during the enrollment period of each semester. They will be required to submit a waiver duly notarized by the institution.

The decision is considered final and irrevocable for that particular semester. Students are allowed to change their decision in the next semesters.

5. Student voluntary contribution mechanism. The law also allows financially-able students to avail of the free higher education provision but also contribute a specific amount to the higher education institution (HEI). SUCs, LUCs, and TVET providers are required to create a proper system so students can make voluntary contributions for their education.

6. Tertiary Education Subsidy (TES). Students and learners may apply to get subsidies to help pay for tuition and fees in private institutions.

Under TES, they may also apply for subsidies to get allowances for books, supplies, transportation, room and board costs, and other expenses. A student with disability will also be given a separate set of allowance. Students whose programs require a professional license or certification will also be given money to fund their application for the first time.

Students and learners, however, must first qualify under the existing admission and retention requirements or other screening and assessment procedures required by the program.

7. Student Loan Program for Tertiary Education. The free tuition law IRR also allows enrolled students to avail of an education loan. The UniFAST Board shall implement the loan program through partner banks or similar institutions.

II. STATEMENT OF THE PROBLEM

Contrary to misperceptions, the new law has built-in mechanisms that would encourage increased participation in the program from all socioeconomic classes, especially the poor. According to Rep. Joey S. Salceda of the Second District of Albay, Republic Act (RA) 10931 would now give poor students the drive to strive further for self-development through free tertiary and technical-vocational education, the high costs of which had previously demoralized and forced them to settle for low-paying jobs to survive.

The breakthrough legislation of Republic Act 10931 is estimated to cost the government P10.486 billion in tuition and P6 billion in miscellaneous expense for 984,000 students in SUCs in 2018. Budget Secretary Benjamin E. Diokno said that funding for the program will either be sourced from within the budget or requested through supplemental budget, since the 2017 appropriations have already been approved.

RA10931 will have the effect of further constraining, if not totally eradicating, whatever latitude administrators of State and local colleges and universities have. With full subsidies not only on tuition but even on specific expenses such as ID and dental and medical fees, and even computer and lab fees, all of the budget needed for operations, and not only personnel services, will be downloaded from the DBM. Some Presidents of SUCs have expressed their misgivings about the serious consequences of this system, for it will surely tie their hands even more.

Has the government considered the fact that no developing country has ever attempted to make public tertiary education totally free, not even in the most developed United States of America.

The huge amount of investment for the implementation of the universal access to quality tertiary education raises several questions.Can the Philippine Government sustain the funding for the said program? Is there an expected output as return of investment from the said program? Will RA 10931 certainly benefit each and every young Filipino who wanted to finish college for the betterment of their living?

The economic managers raised valid points our lawmakers need to consider before the legislation is passed. This issue definitely deserves thorough study since the nation's budget is not that huge and we definitely need to be prudent about our spending priorities. Education is very important, more reason the limited money should go to those who need it most.

III. RESEARCH METHODOLOGY

Generally, research design means a structure to plan and execute a particular research. Research design is

the crucial part of the research as it includes all the four important considerations: the strategy, the conceptual framework, the identification of whom and what to study on and the tools and procedures to be used for collecting and analyzing data.

The research design basically is divided into several types for example qualitative research and quantitative research.

In this study, the researcher used qualitative research method. Qualitative research method was developed in the social sciences to enable researchers to study social and cultural phenomena: observe feelings, thoughts, behaviors and the belief of the mass society. Examples of qualitative methods are action research, case study research and grounded theory. Qualitative data sources include observation and participation observation (fieldwork), interviews and questionnaires, documents and texts, and the researcher's impressions and reactions.

Research methodology is basically a process of how a research is being conducted. It encompasses tools and techniques to conduct a particular research or finding. Research method is a range of tools that are used for different types of enquiry. Therefore, it is important to select an accurate method that suits the research objective. In this section, the researcher will break the components into two: data collection method and also data analysis method.

Data Collection Method The researcher applied two methods of data collection techniques. This was done in order to collect adequate and relevant data to address the research objectives of this study. Nonetheless, the researcher used qualitative research method.

Library Research is a process of dealing with the analysis of evidences such as historical records and documents. Similarly, it means gathering data from library materials which includes textbooks, both published and unpublished academic documents such as journals, conference proceedings, dissertations and theses. Library research also includes information gathered from internet search.

IV. THEORETICAL/ CONCEPTUAL FRAMEWORK

As described, the theoretical and conceptual framework explains the path of a research and grounds it firmly in theoretical constructs. The overall aim of the two frameworks is to make research findings more meaningful, acceptable to the theoretical constructs in the research field and ensures generalizability. They assist in stimulating research while ensuring the extension of knowledge by providing both direction and impetus to the research inquiry. They also enhance the empiricism and rigor of a research.

In this research let's take a look at at the three (3) state-run academies here in the Philippines, namely: Philippine Military Academy, Philippine National Police Academy, and Philippine Merchant Marine Academy. Cadets – as they called their students, in these institutions enjoy government subsidies for their training and education. Subsidies provided are not limited to school tuition fees and miscellaneous fees. Perks may include uniforms, board & lodging facilities, food, and/or regular monetary allowances for each cadet. Sounds like a heavy investment, right? However, each of these academies has their own program that can distinctively quantify return of investments for the government. These programs are clearly defined on each of their mandates, as defined by specific Republic Acts that govern the operations of these academies.

The National Defense Act of 1935 provides for the Mandate of the Philippine Military Academy. This Baguio-based institution is tasked to train and educate selected candidates for permanent commission in the regular workforce of the Armed Forces of the Philippines. The full subsidies mentioned above are provided to each cadet during their four (4) years of engagement in the Academy. After obtaining their baccalaureate degree, its graduates are obliged to serve the Armed Forces of Philippines. They may be assigned to either of these three (3) branches of the Armed Forces of the Philippines: military, navy, or air force, where they are mandated to serve 20 years, which includes their period of stay in the academy.

The Philippine National Police Academy has a very similar set-up. The graduates' choices of service include engagement in the police force (Philippine National Police), jail management (Bureau of Jail Management and Penology), or fire fighters (Bureau of Fire Protection).

On the other hand, graduates of the Philippine Merchant Marine Academy have both options to opt for government service or commercial engagement. Both of which have quantifiable return of investments that benefits our country. Going for government service may be either for the Philippine Navy or Philippine Coastguard. Pursuing a career with commercial engagement, where they engage as officers or engineers of merchant marine vessels (both local and international shipping) gives them opportunities to contribute indirectly to national treasury through their dollar remittances, which helps to stabilize peso and dollar exchange rates as well.

In view of the examples mentioned above, we can at least quantify that contributions of the graduates from the institutions mentioned have a direct or indirect return of investment to the government that provided

them subsidies, so they may complete their education program and training. However, we are aware that most of the State Universities and Colleges and Local Universities and Colleges do not implement the same mechanism. And as we all know as well; the Philippines is one of the major suppliers of manpower all over the world. The percentage of brain drain, and brawn drain based on the available labor statics is quite high. It only means that talents, skills, and expertise of most of our countrymen are being enjoyed by other countries more than our country enjoys it. Of course, it is part of people's democratic liberty to choose what and where they would like to work, especially if all education and training supports were shouldered by themselves. However, if the same arrangement would be applied for products of the free education law, it would seem that the Philippine government has invested for the future workforce of other countries. If I am working in a human resource department of a company, I would not engage our company staff on any education or training program if I am aware that other companies (specially my competitors) would be the one benefited with the additional knowledge and skills that my staff have acquired. It is quite illogical to invest on someone that has a high probability to leave your organization, in this case our country, thus, free education would not be that beneficial in the long run.

Filipinos believe that education is the key to success. It is the key to improve the quality of our lives. From grade school to secondary to college. We all know that education can help us to achieve our goals in life. Education is also responsible in providing competent human resources that will be able to carry out day-to-day tasks according to the standards that is set by the society. However, due to financial difficulty we tend to set aside the education and work at the very young age. Some of us won't be able to finish school but some have a degree. Most Filipinos are clever and talented. We can compete to other nationality easily.

Across the years our educational system has been rocked by controversies which have remained unabated up to this day. Amidst the welter of issues, two of them have managed to stand out in importance: quality and relevance. The major difficulty in education in the Philippines is the short-sighted policy of sacrificing the quality and quantity of education for reasons of economy. The quality of education at public schools remains poor. Classes are big, teaching material is lacking and teachers are poorly paid.

Most local Filipino children attend public schools, which are funded by the government and free to attend from grade school to college. Education in the Philippines is managed and regulated by the department of education, commonly referred to as the deed in the country. The Department of Education controls the Philippines education system, including the curriculum used in schools and the allocation of funds. It also regulates the construction of schools and other educational facilities and the recruitment of teachers and staff.

By law, education is compulsory for thirteen years (kindergarten and grades 1–12). These are grouped into three levels: elementary school (kindergarten–grade 6), junior high school (grades 7–10), and senior high school (grades 11–12); they may also be grouped into four key stages: 1st key stage (kindergarten–grade 3), 2nd key stage (grades 4–6), 3rd key stage (grades 7–10) and 4th key stage (grades 11–12). Children enter kindergarten at age 5. For the academic year 2017–2018, about 83% of K–12 students attended public schools and about 17% either attended private schools or were home-schooled.

According to Wikipedia - State universities and colleges (SUCs) refers to any public institution of higher learning that was created by an Act passed by the Congress of the Philippines. These institutions are fully subsidized by the national government, and may be considered as a corporate body.SUCs are fully funded by the national government as determined by the Philippine Congress. The University of the Philippines System, being the "national university",receives the biggest chunk of the budget among the 456 SUCs, and has likewise been strengthened by law through Republic Act 9500. SUCs are confronted by annual budget cutbacks. As a result, these schools impose enrolment quotas and increase fees. In recent years, tuition and miscellaneous fees in the SUCs have seen huge increases.

You may attend technical schools, vocational schools or higher education institutions such as Universities. At the age of 16, if you did well enough during your High School education, you can start working at a higher education, vocational or technical school, but you must be accepted for it first. Courses last between one year and up to as many as seven years. PH education gets the biggest chunk of the national budget. The 2018 budget allocation for government agencies handling education amounts to P672.41 billion. This year's budget is a P10-billion increase from 2017's P543.2 billion.

President Duterte signed RA 10931 in August 2017, while its implementing rules and regulations (IRR) were launched in March 2018.

The law covers the tuition and fees of students enrolled in 112 state universities and colleges (SUCs), 87 accredited local universities and colleges (LUCs), and all technical-vocation education and training (TVET) programs registered under the Technical Education and Skills Development Authority (Tesda).

Table 4.1 as shown below are the state-funded schools, colleges and universities in the Philippines. The list includes national colleges and universities system, region-wide colleges and universities system, province-wide colleges and universities system, and specialized schools. This list does NOT include locally funded schools, colleges and universities.

Table 4.1

Name	Region
Abra State Institute of Science and Technology	Cordillera Administrative Region
Adiong Memorial Polytechnic State College	ARMM Region
Agusan del Sur State College of Agriculture and Technology	Caraga
Aklan State University	Western Visayas
Apayao State College	Cordillera Administrative Region
Aurora State College of Technology	Central Luzon
Basilan State College	ARMM Region
Bataan Peninsula State University	Central Luzon
Batanes State College	Cagayan Valley
Batangas State University	CALABARZON
Benguet State University	Cordillera Administrative Region
Bicol State College of Applied Sciences and Technology	Bicol Region
Bicol University	Bicol Region
Bohol Island State University	Central Visayas
Bukidnon State University	Northern Mindanao
Bulacan Agricultural State College	Central Luzon
Bulacan State University	Central Luzon
Cagayan State University	Cagayan Valley
Camarines Norte State College	Bicol Region
Camarines Sur Polytechnic Colleges	Bicol Region
Camiguin Polytechnic State College	Northern Mindanao
Capiz State University	Western Visayas
Caraga State University	Caraga
Carlos Hilado Memorial State College	Western Visayas
Catanduanes State University	Bicol Region
Cavite State University	CALABARZON
Cebu Normal University	Central Visayas
Cebu Technological University	Central Visayas
Central Bicol State University of Agriculture	Bicol Region
Central Luzon State University	Central Luzon

Central Mindanao University	Northern Mindanao
Central Philippines State University	Western Visayas
Compostela Valley State College	Davao Region
Cotabato Foundation College of Science and Technology	SOCCSKSARGEN
Cotabato State University	SOCCSKSARGEN
Davao del Norte State College	Davao Region
Davao Oriental State University	Davao Region
Don Honorio Ventura Technological State University	Central Luzon
Don Mariano Marcos Memorial State University	Ilocos Region
Dr. Emilio B. Espinosa Sr. Memorial State College of Agriculture and Technology	Bicol Region
Eastern Samar State University	Eastern Visayas
Eastern Visayas State University	Eastern Visayas
Eulogio "Amang" Rodriguez Institute of Science and Technology	NCR and Cavite
Guimaras State College	Western Visayas
Ifugao State University	Cordillera AdministrativeRegion
Ilocos Sur Polytechnic State College	Ilocos Region
Iloilo Science and Technology University	Western Visayas
Iloilo State College of Fisheries	Western Visayas
Isabela State University	Cagayan Valley
J.H. Cerilles State College	Zamboanga Peninsula
Jose Rizal Memorial State University	Zamboanga Peninsula
Kalinga State University	Cordillera AdministrativeRegion
Laguna State Polytechnic University	CALABARZON
Leyte Normal University	Eastern Visayas
Mariano Marcos State University	Ilocos Region
Marikina Polytechnic College	NCR
Marinduque StateCollege	MIMAROPA
Mindanao State University	ARMM Region and other locations
Mindanao State University - Buug College	Zamboanga Peninsula
Mindanao State University – Iligan Institute of Technology	Northern Mindanao
Mindanao State University – Tawi-Tawi College of Technology and Oceanography	ARMM Region
Mindoro State College of Agriculture and Technology	MIMAROPA
Mountain Province State Polytechnic College	Cordillera AdministrativeRegion

Naval State University	Eastern Visayas
Negros Oriental State University	Central Visayas
North Luzon Philippines State College	Ilocos Region
Northern Iloilo Polytechnic State College	Western Visayas
Northern Negros State College of Science and Technology	Western Visayas
Northwest Samar State University	Eastern Visayas
Northwestern Mindanao State College of Science and Technology	Northern Mindanao
Nueva EcijaUniversity of Science and Technology	Central Luzon
Nueva Vizcaya StateUniversity	Cagayan Valley
Occidental Mindoro State College	MIMAROPA
Palawan State University	MIMAROPA
Palompon Polytechnic State University	Eastern Visayas
Pampanga State Agricultural University	Central Luzon
Pangasinan State University	Ilocos Region
Partido State University	Bicol Region
Philippine Merchant Marine Academy	Central Luzon
Philippine Military Academy	Cordillera AdministrativeRegion
Philippine Normal University	NCR and other locations
Philippine State College of Aeronautics	NCR and other locations
Polytechnic University of the Philippines	NCR and other locations
President Ramon Magsaysay State University	Central Luzon
Quirino State University	Cagayan Valley
Rizal Technological University	NCR
Romblon State University	MIMAROPA
Samar State University	Eastern Visayas
Siquijor State College	Central Visayas
Sorsogon State College	Bicol Region
Southern Leyte State University	Eastern Visayas
Southern Luzon State University	CALABARZON
Southern Philippines Agri-Business and Marine and Aquatic School of Technology	Davao Region
Sultan Kudarat State University	SOCCSKSARGEN
Sulu State College	ARMM Region
Surigao del Sur State University	Caraga
Surigao State College of Technology	Caraga

Tarlac Agricultural University	Central Luzon
Tarlac State University	Central Luzon
Tawi-Tawi Regional Agricultural College	ARMM Region
Technological University of the Philippines	NCR and other locations
University of Antique	Western Visayas
University of Eastern Philippines	Eastern Visayas
University of Northern Philippines	Ilocos Region
University of Rizal System	CALABARZON
University of Science and Technology of Southern Philippines	Northern Mindanao
University of Southeastern Philippines	Davao Region
University of Southern Mindanao	SOCCSKSARGEN
University of the Philippines	NCR and other locations
Visayas State University	Eastern Visayas
West Visayas State University	Western Visayas
Western Mindanao State University	Zamboanga Peninsula
Western Philippines University	MIMAROPA
Zamboanga City State Polytechnic College	Zamboanga Peninsula
Zamboanga State College of Marine Sciences	Zamboanga Peninsula

Since they're already benefiting from the government, why do students from state-run universities still go against the state?

They are the hope of our nation, those especially studying in state universities who need to maintain an average grade. These are considered as the cream of the crop already. If they are the cream of the crop, they should be the hope of the land.

These youth are given education no less than the government. In state universities, you are given free education by the government and yet they have not graduated and they are already going against the government that gives them free education.

If the students have to learn something, if they have questions or doubts, maybe we can shed light on what a student should learn. Maybe this is also to develop our sense of nationalism and love of country. Comparing it to PMA scholars, where back then they were required to work for the government after their graduation. All cadets get free tuition and even receive salaries all while lodging and eating for free inside the academy's barracks. State university students, meanwhile, have differing levels of grants, with some being forced to take part-time jobs to make do and graduate. All cadets get free tuition and even

receive salaries all while lodging and eating for free inside the academy's barracks. State university students, meanwhile, have differing levels of grants, with some being forced to take part-time jobs to make do and graduate.

I truly believe that the education is the only way our country Philippines will prosper if children are getting a good education. This is the only way things will bring a change for the better to our lives and the better of our Philippine society today. The shortages of classrooms and textbooks are particularly severe. The fact that teachers are paid subsistence wages is only half of their sad story. Their daily bout with dilapidated classrooms, overcrowded classes, and lack of teaching materials, among others, make the teachers hardly rewarded work even more difficult.

In lieu of paying the tuition fees of undergraduate students in state universities and colleges (SUCs), Socioeconomic Planning Secretary Ernesto M. Pernia, Finance Secretary Carlos G. Dominguez III and Budget Secretary Benjamin E. Diokno recommended the full funding of the Unified Student Financial Assistance System for Tertiary Education (UniFAST). They said it is a "better alternative because it provides a more coherent

and comprehensive framework to address the educational needs of the students and is better designed to ensure a more efficient and effective use of government funds".

The economic experts cited several reasons, first of which is the fact that only 12 percent of the students in SUCs belong to the bottom 20 percent of the family-income classification. This means that government funding will largely be spent paying for tuition of students who may be able to afford to pay, anyway.

Another reason given was that tuition constitutes only one-third of the annual cost of attending college. Other expenses include living expenses and instructional materials. That said, the poor families would still be unable to send their children to college even if tuition were free, because it would still be difficult to raise the bigger chunk of money (two-thirds) needed to pay for a full college education.

Apart from these important issues, the economic managers are concerned about the possible exodus of students from private higher educational institutions toward the SUCs. This would have an effect on the quality of graduates *and* also affect the government's budget."The budgetary support for free tuition will be difficult to sustain," they said in their position paper. The SUCs would require about P28 billion from the government to cover the tuition of the 1.4 million students currently enrolled. If the enrolments increase in the coming years, this amount would still balloon substantially.

The UniFAST was established in 2014 through Republic Act 10687. Its task is to unify and harmonize all modalities of publicly funded Student Financial Assistance Programs (StuFAPs), like scholarships, grants-in-aid and student loans for tertiary education. The economic experts see it as a wiser, more prudent move to support UniFAST instead so it could do its job efficiently. They all agree that "the UniFAST is better designed to ensure a more efficient and effective use of government funds".

The economic managers raised valid points our lawmakers need to consider before the legislation is passed. This issue definitely deserves thorough study since the nation's budget is not that huge and we definitely need to be prudent about our spending priorities. Education is very important, more reason the limited money should go to those who need it most.

I don't really see our country will overcome its crisis in the next 10 to 20 years. Our country Philippines has fallen behind in in key areas of education. I hope everyone can agrees why our education today is wrong on so many levels, so together we can work jointly and help our students and our country succeed.

Looking at the bright side, it would be a big help to our beloved parents. Huge amount of money will be kept. That money can be used for other household purposes.

It is likewise indicated that students from poorer households had a lower chance of getting into SUC's because of competition and limited slots. To the extent that government surveys typically fail to capture responses from the richest households, the degree of education inequality may actually be larger.

Students has a limited option to choose what course they would like to take advantage with. There were only limited number of students allowed per classrooms. Some students were in doubt because of return of service although it's the only way to help the university clean.

If financial access were the only problem, then free tuition may help the poor access SUCs more. But this is not the case. Public colleges, unlike public elementary and high schools, almost always screen students using other criteria (e.g., admission tests and high school grades). Hence, perhaps a more important policy issue to address is why the richest students can better access SUCs in the first place, and why they edge out their poorer counterparts. If we don't help poor but bright students hurdle other aspects of "accessibility", then free tuitions will do little to help them. In fact, the benefits from free tuitions will only accrue more to the rich than the poor.

V.   FINDINGS

Reports said that as of November 9, only 9 out of 199 public higher education institutions (HEIs) –112 SUCs and 87 LUCs – have been given funds to implement the free tuition law during the first semester, while none has been paid for the second semester.

.In order to guarantee success and to feel secured, Philippine government must invest time and money to education. The government has a responsibility to support and fund the programs required to be done to ensure a quality education for every student.

The economic achievement is based on education. I believe that education is the heart of a nation's success and an aggressive willingness to compete. And that is a fact, no one can argue with that contention.

College is expensive, and the process of applying for and receiving financial is complicated and stressful. Many families do not realize that they will likely pay only a fraction of the sticker price of college. I support the goal of free college. More than ever, a college degree is a ticket to the middle class. The question is how

to get there. College is a financial burden for nearly every family.

The majority of young people who agreed that higher education should be funded by the government and that students should not have to contribute towards the costs of higher education. The main justification for the young people's support of free tuition was in terms of the perceived benefits of widening access. It was felt that the policy helps to encourage more young people to go to university, particularly those young people from more disadvantaged backgrounds.

Young people were proud of this system, not just because, as they noted, they were able to benefit from it, but because it gave people across the Philippines 'equal opportunity' to go to university. Higher education was seen as improving people's life chances and as a means of helping them to become more socially mobile. That this is a universal benefit which treats everyone equally regardless of their background was considered its most important aspect, and interviewees variously described it as 'fair', 'equal' and 'open'. Means testing, or charging students from more affluent backgrounds, was seen as being too complicated to administer by most. Some students from other schools were of the opinion that it would be 'unfair' to charge pupils from richer families.

A frequently expressed argument for universal free tuition was that it was deemed 'fair'. However, students held different understandings of what fairness meant. Those in favour of free tuition tended to describe 'fairness' as everyone treated equally. In contrast, students in favour of targeted contributions tended to hold a view more allied to ideas of social justice and redistribution. Some young people, suggested that it would be 'fairer' if those from richer backgrounds were asked to contribute towards free higher education for the poorest.

The truth is, the poorest students today are edged out in SUCs due to many disadvantages they face in their early years. Rich students usually find themselves being propelled through their education with the full, undivided support of their family, relatives, and community. They are likelier to be enrolled in exclusive schools with top facilities; likelier to be exposed to numerous extracurricular and sports; and likelier to be paired with tutors whenever they encounter difficulties in school.

In contrast, poor students usually find themselves in more challenging situations. They are likelier to be enrolled in public schools with more crowded classrooms and subpar facilities; likelier to take on odd jobs to help in family finances; and likelier to study by themselves without the benefit of expensive tutors.

Such disadvantages are magnified by the relatively poor quality of public education, which has dragged the nation's overall educational quality. Although strides have been made in the past decade, the quality of math and science education in the Philippines still ranks among the worst in the region.

Of course, some public schools are of top-notch quality (e.g., science high schools). But today it is not uncommon to find some very rich families sending their kids to these public schools to boost their chances of admission in the top universities. Even at this level, rich students "crowd out" or compete away slots from poor but bright students.

The inequality extends to college admission preparations: rich parents are usually more aware of college admission processes (forms, fees, schedules) and also enroll their children in specialized review classes where they can take simulated college entrance exams.

In contrast, poor parents in some cases may even be unaware of such admission processes and lack resources to enroll their children in review classes. Without these, poor parents are less able to prepare their children for college the way rich parents can.

We need to address more strongly these disparities between the early lives of rich and poor students. Otherwise, we should not be surprised that rich students are the ones in SUCs, not poor students.

Some programs already aim to bridge such inequalities of opportunity. For instance, this is precisely the rationale behind PantawidPamilya, which incentivizes very poor parents to send their children to school, with the end goal of breaking the transmission of poverty across generations.

The K to 12 program is yet another intervention in basic education, albeit with a slightly different objective: to expand job opportunities and reduce the "education-skills mismatch" in the country. However, K to 12 still suffers from large shortfalls of teachers and facilities, and it will take longer for the program to help students better prepare for college or otherwise.

VI. CONCLUSION

In conclusion, the evidence from this research suggests that young people are becoming increasingly focused on the labour market opportunities that a degree can provide. A number of students, felt that tuition fees might eventually deter people from poorer backgrounds to attend university. Research suggests that this is an unrealistic intention. Young people also differed in their attitudes and this had led some to question the value of going to university. The level of understanding of students were generally poor and worse among the

younger students, and is an area which may require further consideration from relevant bodies in the future.

The biggest challenge facing the country's education system is how to improve access to affordable quality education so that the country can maximize its demographic dividend. Some students tend to take education for granted although it's already free. Their parents are glad though. I was hoping that students will take education seriously. Free tuition is really a big help to us. We know that this is the largest fund that government had to released. Being able to attend to class on a daily basis is so so. In terms of quality education some might be able to exceed the quality but some might not.

Recently, the Philippine Institute for Development Studies (PIDS) illustrated the disadvantages of free tuition through infographics. It was based on a policy paper, "Who benefits and loses from an untargeted tuition subsidy for students in SUCs (state universities and colleges)?"

Giving financial assistance is anti-poor because tuition comprises only one third of college education costs. Most students from SUCs were not poor; in fact, rich households are the ones most likely to benefit from a free tuition law. Free tuition will benefit the rich, but freeing educational expenses, such as tuition, gives monumental relief to the poor. Why not distribute the subsidy of free education to other educational institutions? Assuming they are well-managed, the poor will be more qualified for SUCs.

Whether or not free tuition becomes a long-term investment for SUCs, much needs to be done about the government's budget, as well as the implementation of educational policies.

That Philippine's education system is not a bad one. It has plenty of opportunity for students to get an education. The sequence of events is the same for all students and is mandated by law. The law also dictates how many days and years a child spends in school, with it currently being 12 years with 200 days per year in school.

Students raised the issue as to whether a young person 'deserves' to have their higher education paid for by the government. The idea that young people should work hard and not take their learning for granted was espoused. They worried that where higher education tuition is free this would encourage students to study 'for the sake of it', which might possibly lead them to 'waste' government funding. This was seen as particularly likely where young people studied subjects which did not necessarily lead to a particular career. The intrinsic value of learning came secondary to the discourse of employability. Fears about graduate employment

opportunities and led some to question the value of higher education.

It would be fair to say that indeed the Duterte administration has nothing but good intentions only upon enacting into law the RA 10931. However, the government should have been more prepared in doing so. Bear in mind that it is not just a matter of giving away free education but moreover making education accessible to everyone.

The funding concern, however, cannot be ignored. Economic managers have stressed that the war in Marawi and other expenditures in national defense and law enforcement have been a significant drain on public funds. The government is also providing free kindergarten and two more years of basic education under the K to 12 program. Both Malacañang and Congress must make sure there will be enough funds to support the free tertiary education program.

Without any major reforms in the admissions requirements for entry into public universities and colleges, and with matching support to upgrade the quality of basic education, I am afraid that this law will never provide universal access to quality tertiary education.

In the first place, the very presence of competitive entrance exams is already evidence that access is not universal.

And if the system would operate like a free market, then those who have higher levels of competitiveness, like students who graduate from quality high schools, or those from families who can afford review classes, would have the upper hand. There is a big probability that this will crowd out those who are in fact in need of state support, the poor and who are graduates of less competitive schools.

The story of Philippine Education does not end in the singing of RA 10931 and the saga continues as the government tries better its implementation.

VII. RECOMMENDATION

It would have also been more efficient and could push higher education institutions (HEIs) to enhance their quality had financial assistance been given directly to students, as this will spur HEIs to be more competitive for them to attract students on full scholarships.

But for now, it would be prudent to impose a moratorium on the establishment of SUCs and their local counterparts, and to devise innovative mechanisms to ensure that the quality education which is promised by the law is delivered. It is also imperative to come up with an IRR that will mitigate the law's adverse effects.

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Sales and Operations Planning: *A Business Practice to Align Supply Chains*

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Abstract— Purpose:*To summarize the existing knowledge in the scientific literature about the relationship between Sales and Operation Planning (S&OP) and alignment of the stakeholder in the supply chains.*

Design/methodology/approach:*Bibliometric research using text mining over 37 selected papers,Scimago Journal Rank Q4 or better.*

Findings:*Our findings suggest that the relationship between S&OP and alignment has rarely been studied in the academic literature.*

Research limitations:*These results indicate the need for more studiesto build a theory for alignment based in Sales in Operations Planning practice.*

Practical implications: *This paper presents a research agenda to close the gap between practice and promise in supply chain management.*

Paper type:*Literature review.*

Originality/value: *This paper makes two specific contributions to the literature. First, It provides an agenda for research in functional alignment in the SupplyChain; and next:promotes the need to capitalize on the advantages offered by text mining in the operations planning field.*

Keywords— Sales and Operations Planning; S&OP; alignment; tactical planning; supply chain.

I. INTRODUCTION

To successfully face the current competitive environment, companies need to adjust and detail frequently their operational plans, and S&OPcan perform coordination of the supply chain for a competitive performance (Wang, Hsieh, & Hsu, 2012).

S&OP is a process that integrates tactical plans of different organizational functions such as sales, marketing, product development, supplies, manufacturing and the financial plan (Hulthen et al., 2016; Thomé, Scavarda, Fernandez, & Scavarda, 2012).S&OP is also defined as the process of developing "tactical plans that assist management in strategically directing the business to achieve continuous competitive advantage" (APICS, 2011)-53).Researchers suggest that S&OP is a good practice to make decisions that respond to frequent changes in demand, cost, or other characteristics of market delivery(Coker &Helo, 2016).

S&OP process does not have a consensus definition among researchers andpractitioners. However scientific literature agrees that its main purpose is to align functional plans – even those part of the supply chain– seeking positive impacts in the use of resources, operating costs and response to the market (de Almeida, Marins, Salgado, Santos, & da Silva, 2015; Hollmann, Scavarda, & Thomé, 2015; Kjellsdotter Ivert& Jonsson, 2010; Kristensen & Jonsson, 2018; Moon &Allw, 2015; Sombultawee & Boon-itt, 2018; Steinrücke & Jahr, 2012).

Recent literature considers the vertical and horizontal alignment of functional plans a key element of S&OP in different industrial sectors and companies. This is even extended to the external functions of the supply chain(Wagner, Ullrich, & Transchel, 2014).

The purpose of this article is to summarize the existing knowledge in the scientific literature about the relation between S&OP and alignment of the stakeholder in the supply chains.This research is a bibliometric study on selected academic papers. It finds that the S&OP seeks horizontal and vertical alignment in the supply chain, but it doesn't describe detailed specifications of the way in which the alignment takes place, because,despite the wide literature on S&OP, little has been published on how to enable functional alignment through S&OP practice.
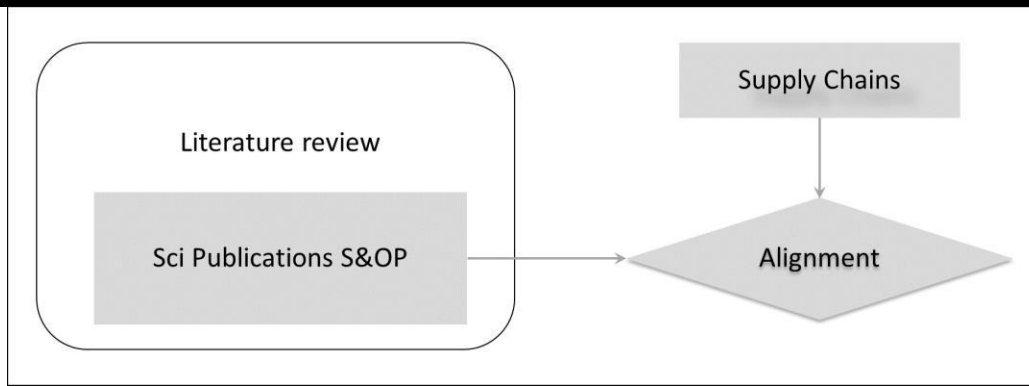
Fig.1: Conceptualization of the construct

Source:Own elaboration, 2018.

Literature makes clear that alignment is mandatory and a quality difficult to achieve in the practice, even if it might seem simple at first sight (Wagner et al., 2014). A better understanding of how alignment occurs would allow managers to react quickly to changes in the competitive environment.

II. LITERATURE REVIEW

The S&OP is part of the disciplines of operations planning(Olhager, 2013), and its first references in the scientific literature date from the end of the last century (Thomé et al., 2012). The selected literature does not refer to a single S&OP model, but to its different interpretations according to the context in which it is applied (Thomé et al., 2012). The characteristic that is shared between the different interpretations, is that it produces alignment among the business stakeholders (Wagner et al., 2014).

2.1- Operations Planning

The focal point in operations planning has evolved from a basic level to a more complex one; from Shop Floor Control in the 1960s, to Supply Chain Planning in 2000s, S&OP practice was the focal point during the 1990s (Figure 2). In their search for greater competitiveness, organizations have increasingly incorporated a greater number of criteria to make the most of their operating resources (Olhager, 2013).
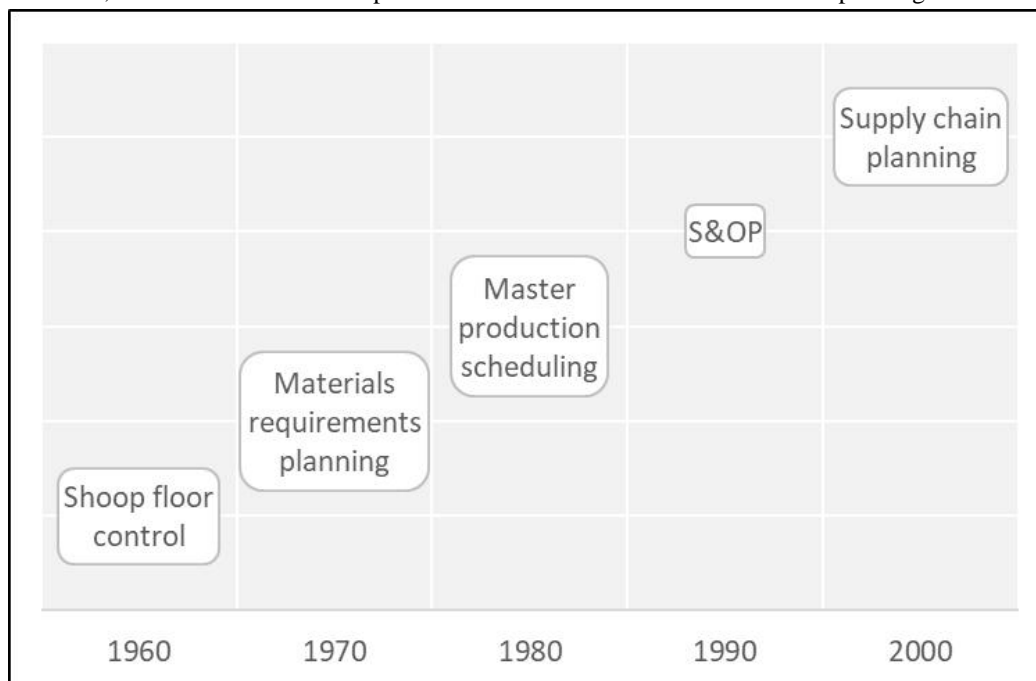
Fig.2: Evolution of the focal point in planning operations

Source: Olhager, 2013.

2.2 Sales and Operations Planning

The Council of Supply Chain Management Professionals –a leading professional association for supply chain and operations–,defines S&OP as a process that "reconciles conflicted business objectives"(Vitasek, 2013). In the same way, Tuomikangas and Kaipia (2014) point out that S&OP is a valuable process for achieving business' strategic objectives. The alignment of tactical plans in different departments of the organization allows establishing a link between the short-term goals and the strategic objectives of the company to maximize results(Wagner et al., 2014).

The practice of S&OP has its background during the 1950s decade, specifically at Holt, Modigliani, Muth and Simon's work on operations management (Noroozi & Wikner, 2012). S&OP literature started in 1998 (Thomé et al., 2012)at an upward in from 1998 to 2010 (Figure 3).
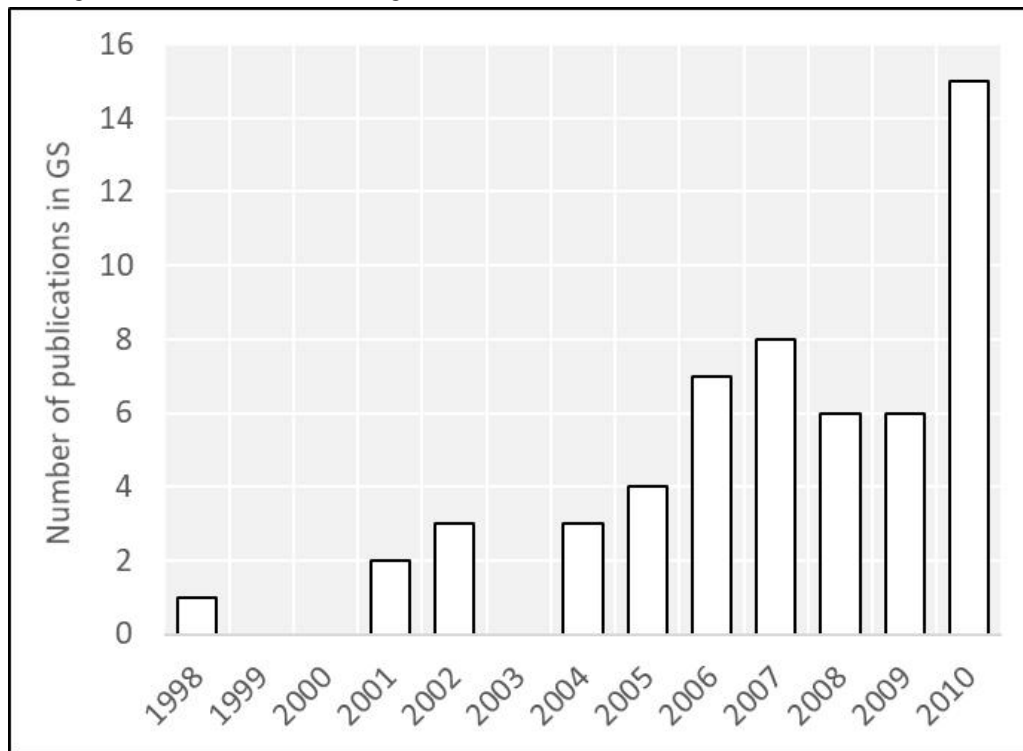
Fig.3: Number of publications on S&OP per year in Google Scholar

Source: Thomé et al, 2012.

2.3 Contextual design

Has been established that S&OP can have different objectives in different companies; and that the process and its activities are also changeable, especially when they respond to the conditions of the industrial sector and the company's strategy(Thomé et al., 2012). The investigation of operational planning and S&OP has been carried out on different industrial sectors (Table 1).

Table 1: Papers by Sector

Automotive	(Lim, Alpan, & Penz, 2014; Plank & Hooker, 2014; Scarvada et al., 2014)
Food	(Christopher & Ryals, 2014; Ivert, Dukovska-Popovska, Fredriksson, Dreyer, & Kaipia, 2015; Ivert et al., 2014)

Dairy	(Nemati, Madhoshi, & Ghadikolaei, 2017)
Cosmetics	(Hulthen et al., 2016; Rojas & Hazin, 2014)
Discrete Manufacturing	(Noroozi, 2017; Noroozi & Wikner, 2016)
Process Industry	(Noroozi & Kumar, R. and Srivastava, 2014; Noroozi & Wikner, 2012, 2017)
Paper	(Naslund & Williamson, 2017)
Reverse Clothing Supply Chain	(Sandberg, Pal, & Hemilä, 2018)
Grocery Retailing	(Dreyer, Kiil, Dukovska-Popovska, & Kaipia, 2018)

Source: Own elaboration, 2018.

Due to the nature of its context-based design(Kristensen & Jonsson, 2018), in literature,S&OP practice is named in various ways through literature (table 2).

Table 2: Names used to refer practice of S&OP

SIOP	Sales operations and inventory planning
IBP	Integrated business planning; profit, sales,and operations planning;
	Supply chain sales and operations planning
	Sales/production sales and operations planning
	Global sales and operations planning
	Executive sales and operations planning
DSI	Demand and supply integration

Source: Own elaboration with information of Kristensen and Jonsson, 2018.

2.4 Alignment

Alignment, together with agility and adaptability, allows organizations to deal favorably with changes in the competitive environment (Dubey, Altay, Gunasekaran, Papadopoulos, & Childe, 2017), linking the long-term strategic goals with the planning of short-term operations (Danese, Molinaro, & Romano, 2017). Alignment is favored by management's commitment to establish incentives (Panahifar, Heavey, Byrne, & Fazlollahtabar, 2015), to provide connectivity to the supply chain and exchange information (Dubey et al., 2017).

The alignment of organizations occurs at three levels: strategic, tactical and operational (Sombultawee & Boon-itt, 2018). Top management must establish an adequate governance structure for executing the customer value creation strategy, by aligning the stakeholders with the clients. There is no generalized theory about alignment that can be applied (Sombultawee & Boon-itt, 2018), it is a non-unidirectional process, involving work and learning (Selviaridis, Spring, & Authors, 2018). Alignment is a complex result, although literature points out that the alignment between stakeholders is important to improve business performance, there are other types of alignment that must be considered (Skipworth, Godsell, Wong, Saghiri, & Julien, 2015) and on which it is necessary to deepen the current knowledge.

Collaboration for alignment in practice planning is affected by different variables (Table 3) on their own reach and

depth(Hollmann et al., 2015; Kristensen & Jonsson, 2018; Nabil, El Barkany, & El Khalfi, 2018).

Table 3: Factors affecting collaboration in planning

- Demand elasticity.
- Market uncertainty and lead times.
- Goals of the process: responsiveness vs efficiency.
- Supply uncertainty.
- Supply Chain spatial complexity: number of partners and geographical distance.
- Company complexity; firm size.
- Hierarchical planning framework: linking strategic planning with tactical planning or tactical planning with the operational plan.
- The maturity of planning framework.
- Organizational characteristics: human, technological and characteristics of the organization: external and internal integration.
- A number of products: same or different products.

Source: Own elaboration, with information ofHollmann et al., (2015); Kristensen & Jonsson, (2018); Nabil et al., (2018); Wagner et al., (2014).

III. RESEARCH METHODOLOGY

The methodology applied is a bibliometric study in 4 steps (Figure 4).In the first step, 37 documents of ProQuest and EBSCOhost Research Databases were selected with the search terms "Sales and Operations Planning"; "Sales &Operations Planning"; "S&OP" and "Supply Chain Alignment". The search was also limited to articles published from the year 2014 onwards and to journals ranked inScimago Journal Rank on Q4 or better.

For steps 2 to 3 the text mining system "Enterprise Miner 14.1"Advanced Analytics Software | SAS https://www.sas.com/)was used processing summary, author, year of publication, journal,and ranking of the journal of selected research.

The second step wasText Parsing and Filter, to quantify selected information about the terms that are contained in abstracts.The third step was Clustering data, classifying and establishing relationships between the concepts contained in the selected documents.

The fourth step was the analysis of the processed information.
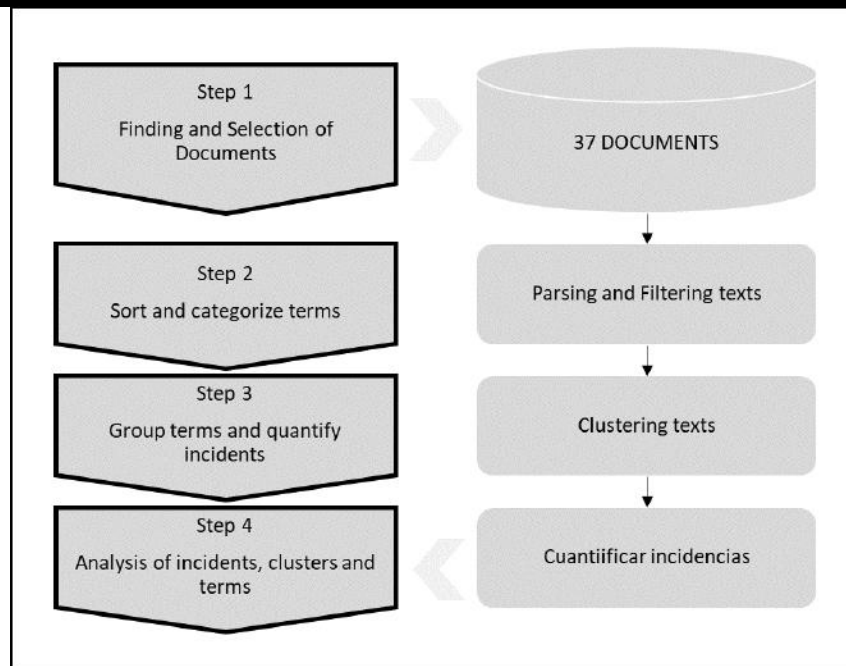
Fig.4: Research Methodology

Resource: Own elaboration, 2018.

IV.   RESULTS

The number of papers from 2013 to 2017 is between 6 and 9, the data from 2018 is partial to March(figure 4).
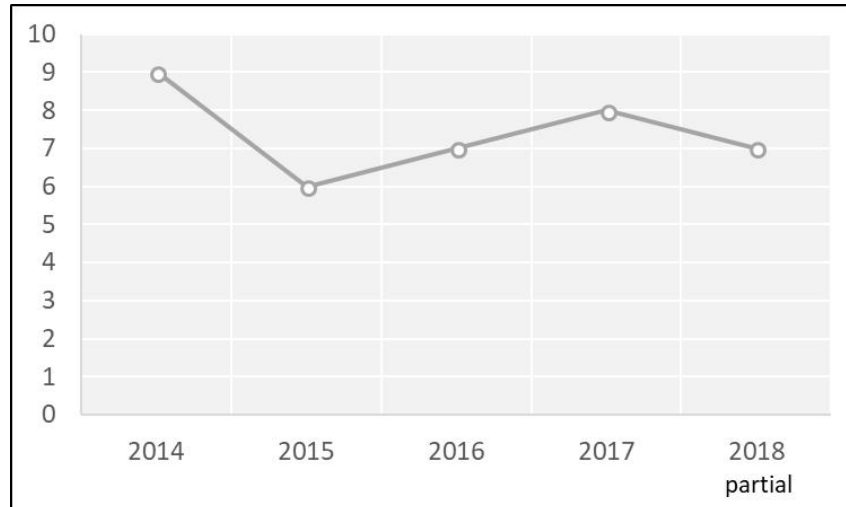
Fig.4: Number of research publications for the year

Source: Own elaboration, 2018.

The documents were selected from 22 journals, 1 of them contributed with 5 papers (International Journal of Physical Distribution and Logistics Management), 16 of them with only 1 (Appendix 1). 14 journals and 28 papers belong to the rank Q1 (Figure 5).

The authors of the papers are 104 and they are in 20 countries (Appendix 2). Most of the contributions are from Sweden (14%), and the USA:(13%) while 66% of the authorship is covered in 6 countries: USA, United Kingdom, Finland, Brazil and Denmark (Figure 6).
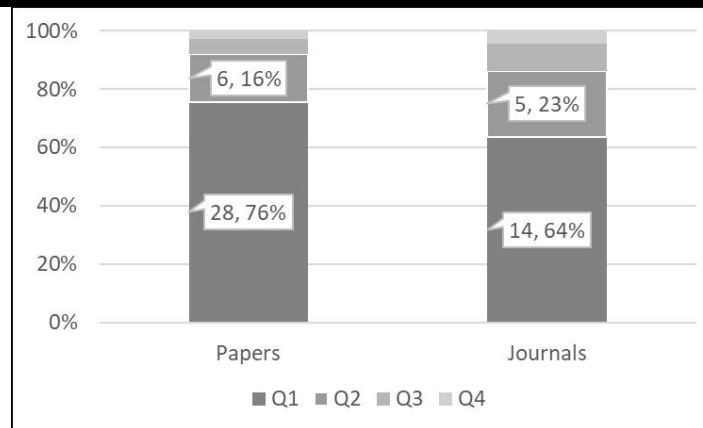
Fig.5: Distribution of papers and journals by SJR Rank

Source: Own elaboration, 2018
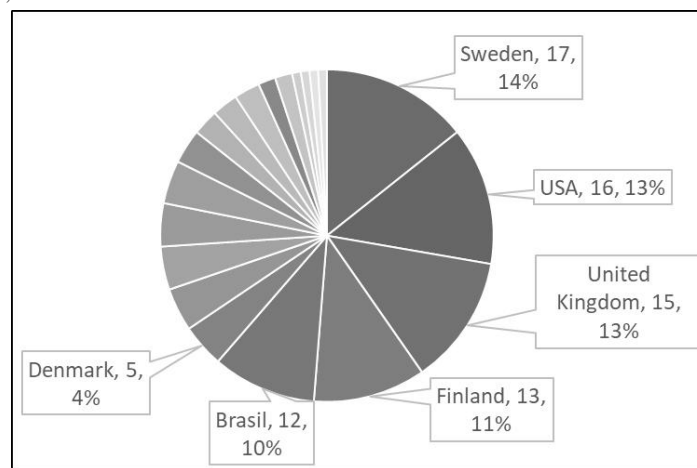
Fig.6: Authorship byCountry

Source: Own elaboration, 2018

The term "Sales and Operations Planning" appears with a frequency of 147 in 20 papers; the term 'alignment' appears with a frequency of 41 in 11 papers and the term 'supply chain' appears 51 times in 19 papers (Figure 7).
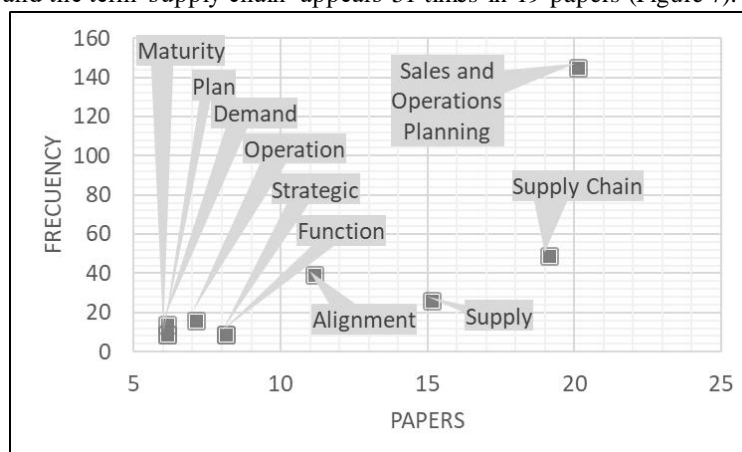
Fig.7: Number of Papers by Frequency of Terms

Source: Own elaboration, 2018

The relationship analysis of concepts, shows that the term 'supply chain' is directly related to the terms 'Sales and Operations Planning' and 'alignment', while these only have an indirect relation to each other (Figure 8).

Cluster analysis, obtained with the Expectation-Maximization clustering algorithm with using a Hierarchical clustering algorithm, with 4 descriptive terms, produced 5 clusters (Table 4).

The relationship of the frequency and quality of the grouping measured with the Root Mean Square Standardized (RMS Std.) is shown in Figure 9, and in Figure 10 the frequency of the clusters in the analyzed documents is shown.
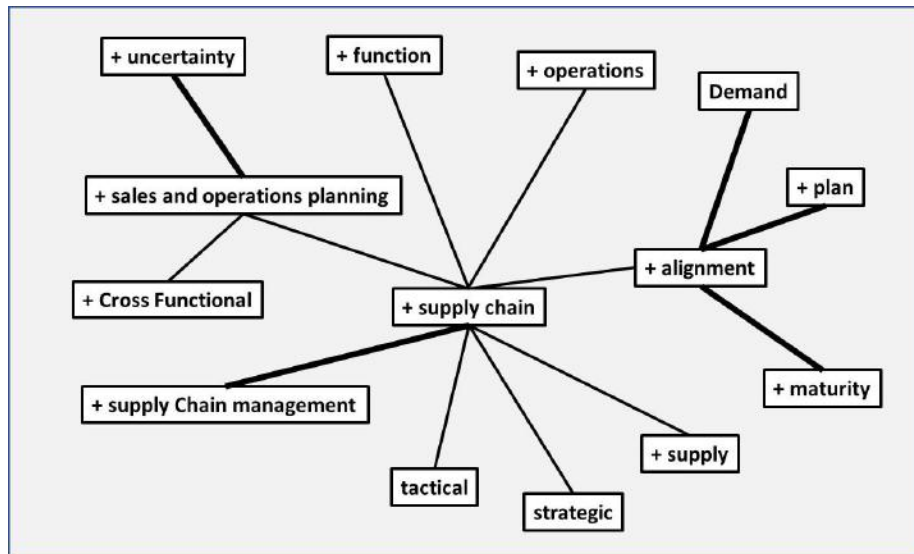
Fig.8: Concept linking between S&OP, Supply Chain and Alignment

Source: Own elaboration, 2018

Table 4: Clusters

Cluster	Descriptive terms	Frequency	RMS Std.
1	[strategic] [tactical] [alignment] [coordination]	8	0.18565
2	[maturity] [Sales and Operations Planning] [plan] [market]	11	0.191357
3	[operations] [function] [Croos Functional] [demand]	4	0.194552
4	[Tactical planning] [integration mechanism] [Supply Chain Management] [supply chain]	9	0.301199
5	[Operations Planning] [contextual] [uncertainty] [Supply Chain Management']	5	0.22495

Source: Own elaboration, 2018.
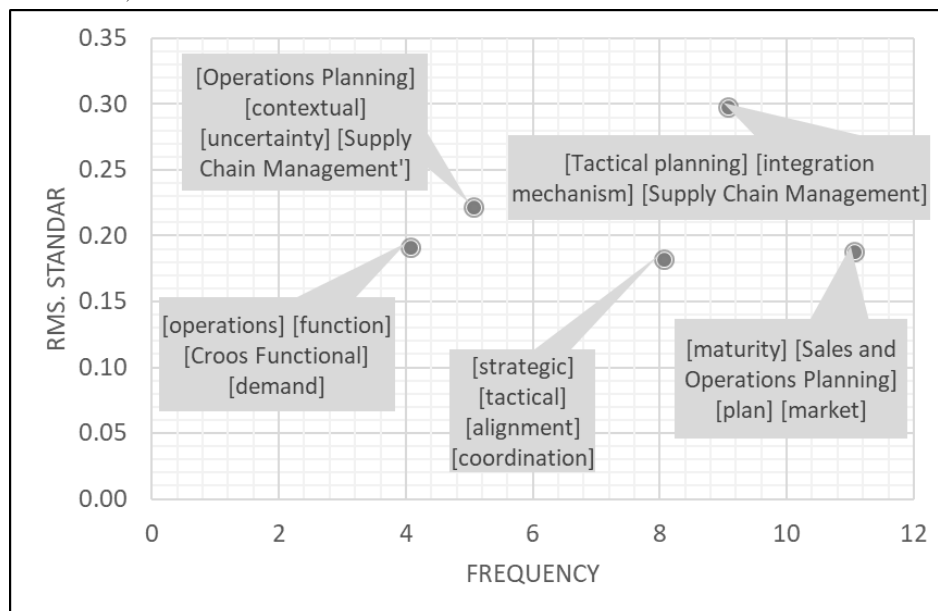
Fig.9: Relationship of the frequency and quality of the clustering

Source: Own elaboration, 2018.
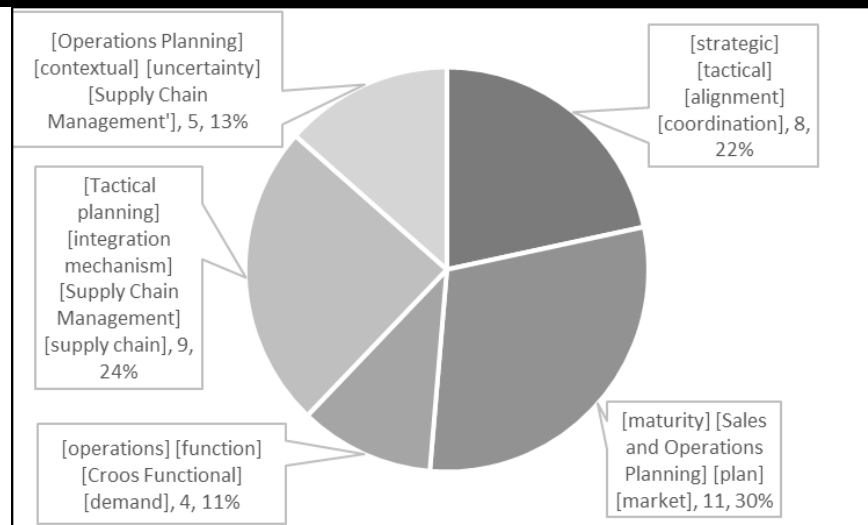
Fig.10: Frequency of clusters

Source: Own elaboration, 2018.

V.   DISCUSSION

Through the analysis of text mining, it was not possible to find a direct relationshipbetween the terms: "alignment" and "S&OP" (figure 8)."Alignment" appears in clusters analysis in the relationship with terms: "Strategic", "Tactic" and "Collaboration", which reveals the areas of interest that academics haverelated with the term alignmentin their researches.

S&OP forms the cluster most frequently with 'maturity', 'plan' and 'market': 30% (figure 10). Maturity is one of the factors that affect collaboration (Table 3), so we can suspect that the research in S&OP has an important orientation to the maturity of the planning process and its relationship with the market.

VI.   CONCLUSION

This manuscript establishes a broad field of research because the alignment of the stakeholders is an important factor for the maintenance and development of competitiveness. The construction of a theory about how the alignment is achieved will allow practitioners to improve the performance of their businesses. This manuscript also opens the way to the use of text mining technology in the field; sparingly used to date. In futures researches, it is convenient to consider a greater number of articles, to expand the amount of text considered in each document, not to limit it to the summaries and to extend the range of years considered to identify trends with greater clarity; and above all: to make a deeper use of the text mining tool.

ACKNOWLEDGMENT

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Appendix 1
Journals, SJR Rank and papers

SJR Rank	Journal	No. Docs.
Q1	International Journal of Physical Distribution and Logistics Management	6
Q1	Journal of Business Logistics	3
Q1	International Journal of Production Research	3
Q1	International Journal of Operations and Production Management	3
Q1	International Journal of Production Economics	3
Q1	International Journal of Logistics Management	2
Q1	Production Planning and Control	1
Q1	Computers in Industry	1
Q1	Business Horizons	1
Q1	Journal of Operations Management	1

Q1	Computers and Chemical Engineering	1
Q1	Supply Chain Management	1
Q1	International Journal of Advanced Manufacturing Technology	1
Q1	International Journal of Productivity and Performance Management	1
Q2	Benchmarking	2
Q2	Operations Research Perspectives	1
Q2	Production and Manufacturing Research	1
Q2	Dyna	1
Q2	Journal of Research in Interactive Marketing	1
Q3	International Journal of Supply Chain Management	1
Q3	Academy of Marketing Studies Journal	1
Q4	International Journal of Engineering Research in Africa	1

Source: Own elaboration, 2018.

Appendix 2
Authors, country paperssorted by number of papers, country and name)

Author	Country	Total	Author	Country	Total
Kaipia, Riikka	Finland/Sweden	5	Nabil, Lahloua	Morocco	1
Dukovska-Popovska, Iskra	Denmark	3	El Barkany, Abdellah	Morocco	1
Dreyer, Heidi Carin	Norway	3	El Khalfi, Ahmed	Morocco	1
Thomé, Antônio Márcio Tavares	Brasil	2	Chabada, Lukas	Norway	1
Holmström, Jan	Finland	2	Kiil, Kasper	Norway	1
Tuomikangas, Nina	Finland	2	Sousa, Rui Soucasaux	Portugal	1
Fredriksson, Anna	Sweden	2	Sandberg, Erik	Sweden	1
Ivert, Linea Kjellsdotter	Sweden	2	Norrman, Andreas	Sweden	1
Da Silva, Andrea Lago	Brasil	1	Näslund, Dag	Sweden	1
da Silva, Sérgio Luis	Brasil	1	Noroozi, Sayeh	Sweden	1
de Almeida, Marly MizueKaibara	Brasil	1	Pal, Rudrajeet	Sweden	1
Do Carmo, Luiz Felipe Roris Rodriguez Scavarda	Brasil	1	Hulthen, Hana	Sweden	1
Salgado, Andréia Maria Pedro	Brasil	1	Johansson, Mats I.	Sweden	1
Scavarda, Luiz Felipe	Brasil	1	Kjellsdotter Ivert, Linea	Sweden	1
Pedroso, Carolina Belotti	Brasil	1	Kristensen, Jesper	Sweden	1
Hollmann, Roberto Luis	Brasil	1	Wikner, Joakim	Sweden	1
Santos, Fernando César Almada	Brasil	1	Wagner, Stephan M.	Switzerland	1
Marins, Fernando Augusto Silva	Brasil	1	Boon-itt, Sakun	Thailand	1
Gaudreault, Jonathan	Canada	1	Sombultawee, Kedwadee	Thailand	1
Thomas, André	Canada	1	Childe, Stephen J.	United Kingdom	1
Wery, Jean	Canada	1	Christopher, Martin	United Kingdom	1
Damgaard, Cecilie Maria	Denmark	1	Selviaridis, Kostas	United Kingdom	1
Sablón Cossío, Neyfe	Ecuador	1	Wong, Chee Yew	United Kingdom	1
Coker, Joakim	Finland	1	Papadopoulos, Thanos	United Kingdom	1
Helo, Petri	Finland	1	Eldrige, Stephen	United Kingdom	1
Rajala, Risto	Finland	1	Godsell, Janet	United Kingdom	1
Hemilä, Jukka	Finland	1	Goh, Shao Hung	United Kingdom	1
Småros, Johanna	Finland	1	Blome, Constantin	United Kingdom	1

Appendix 2

Authors, country paperssorted by number of papers, country and name)

Author	Country	Total	Author	Country	Total
Dubey, Rameshwar	France	1	Ryals, Lynette J.	United Kingdom	1
Penz, Bernard	France	1	Saghiri, Soroosh	United Kingdom	1
Laurent Lim, Lâm	France	1	Spring, Martin	United Kingdom	1
Marier, Philippe	France	1	Skipworth, Heather	United Kingdom	1
Alpan, Gülgün	France	1	Julien, Denyse	United Kingdom	1
Ullrich, Kristoph K R	Germany	1	Tarafdar, Monideepa	United Kingdom	1
Transchel, Sandra	Germany	1	Qrunfleh, Sufian	USA	1
Nemati, Yaser	Iran	1	Roh, Joseph	USA	1
Ghadikolaei, AbdolhamidSafaei	Iran	1	Tate, Wendy Lea	USA	1
Madhoshi, Mehrdad	Iran	1	Ralston, Peter M.	USA	1
Turkulainen, Virpi	Ireland	1	Rutherford, Brian N.	USA	1
Danese, Pamela	Italy	1	Esper, Terry L.	USA	1
Chiarini, Andrea	Italy	1	Whipple, Judith M.	USA	1
Romano, Pietro	Italy	1	Murfield, Monique L.U.	USA	1
Vagnoni, Emidia	Italy	1	Grawe, Scott J.	USA	1
Molinaro, Margherita	Italy	1	Gunasekaran, Angappa	USA	1
Bakar, Abu	Malaysia	1	Plank, Richard E.	USA	1
Hamid, Abdul	Malaysia	1	Richey, R. Glenn	USA	1
Talib, Ab	Malaysia	1	Hooker, Robert	USA	1
Syazwan, Mohamed	Malaysia	1	Scott C. Ambrose	USA	1
Bautista Santos, Horacio	México	1	Swink, Morgan	USA	1
Fernández Lambert, Gregorio	México	1	Stolze, Hannah J.	USA	1
Bernabé Loranca, María Beatriz	México	1			
Sánchez Galván, Fabiola	México	1			
Martínez Flores, José Luis	México	1			

Source: Own elaboration, 2018.

Development of Power Signal Distributor for Electronic Power Meters

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Abstract—The Power Signal Distribution Device is a device that distributes the watt pulse (WP) and the End of the interval (EOI) in real time by receiving the power signal from the electronic power meter installed in a building or factory. It is possible to prevent electrical damage of the electronic power meter due to the abnormally applied back electromotive force. And it is possible to construct a redundant system of demand controller and power surveillance system by calculating and analyzing power consumption through power signal provided by the electronic power meter. It is also applicable to demand response monitoring device.

Keywords— Demand Controller, Demand Response, Electric Power Management, Maximum Peak Power.

I. INTRODUCTION

Signal distributor for digital power meter distributes the watt pulse (WP) and the End of the interval (EOI) signals to multiple equipment such as peak power management devices and demand controllers. It is possible to prevent the electrical damage of the digital power meter due to the counter electromotive force applied abnormally in the power management apparatus and to analyze the power use amount through the data provided in the digital power meter and to establish the redundancy of the maximum power management and power management system. In addition, it is a device capable of providing a power signal with a demand response management terminal.

The peak power is the maximum electric power load in a certain period as the base charge of the electricity charge, and is expressed in kW. Although there is a difference between the method of predicting the power and the method of controlling the load power according to the technical specifications proposed by KEPCO, the functions of the device for managing the maximum power are the same.

As shown in Fig. 1, when the maximum power management device receives a signal from the meter and calculates the amount of load power in real time. If it is predicted that the used power amount exceeds the target power amount, the connected load device is stepwise blocked, and does not exceed the target amount of power. [1][2]
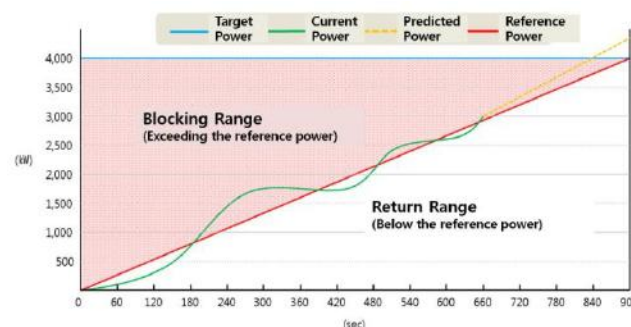
Fig. 1: Management of Peak Power

Demand Response is a sub-concept of demand management as showed in Fig. 2. It refers to activities to maintain balance of supply and demand through adjustment of electricity rate or power reduction by instruction of load reduction in case of supply / demand crisis due to peak of electricity demand. It is a technology that induces the change of electricity usage patterns of electric consumers according to the electricity supply situation such as the peak period through the demand management plan and incentive system.[3]
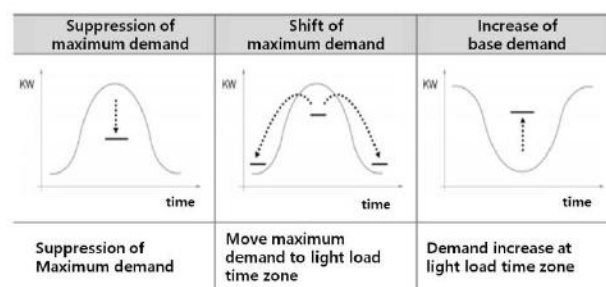
Fig. 2: Demand Response

II. SIGNAL DISTRIBUTOR

1. Overall System Architecture

Power management system using signal distributor is showed in Fig.3.
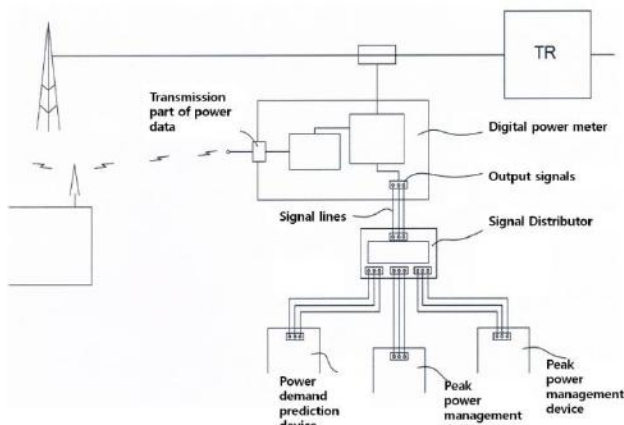
Fig. 3: System Architecture

Signal distributor receives integrating power signal (WP) signal and EOI signals at intervals of 15 minutes from KEPCO digital meter. And then it disperses the signals to various power management devices.

Because this distributor separates signals from meters, we can protect external signal points of meters from the falling of a thunderbolt. Moreover, it helps to make duplex configuration of peak power management system, and to provide synchronization information between power data detected from SCADA and data from KEPCO.

2. Internal Configuration

Fig. 4 and Fig. 5 show internal module and flowchart of signal distributor for each.
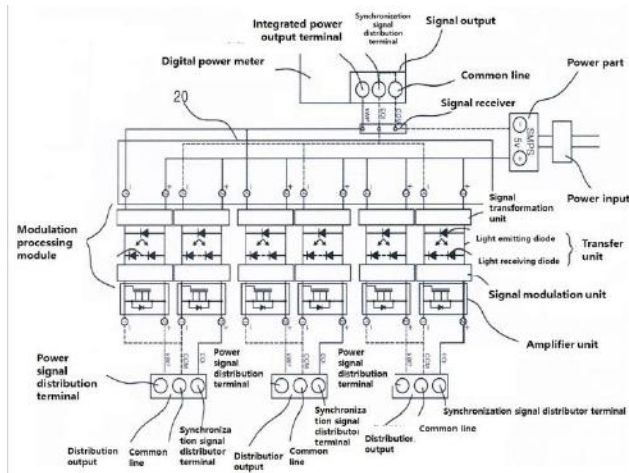
Fig. 4: Internal Configuration of Signal Distributor

Signal distributor consists of signal receiving unit, signal distribution unit, modulation processing unit, and power unit. The signal receiving unit receives kWP signal, and EOI signal from digital power meter. The signal distribution unit distributes the power management signals received at the signal receiving unit through a plurality of distribution circuit paths. The modulation processing unit modulates each of the power management signals distributed in the signal distribution unit and generates a distributed power management signal of the signal strength corresponding to the power management

signal output from the digital power meter, respectively. The power unit provides power for outputting distribution power management signals generated by modulation processing unit through distribution terminals.
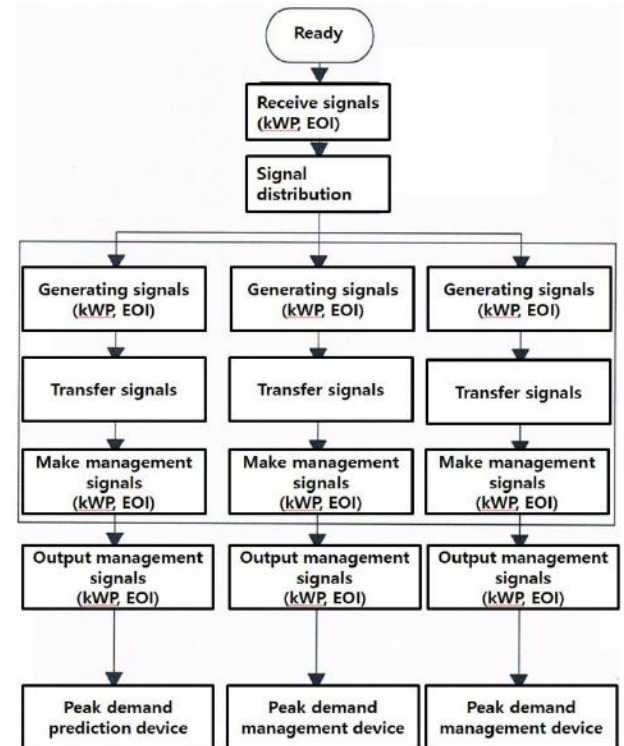
Fig. 5: Flowchart of Signal Distributor

3. Specification

Specification of signal distributor is showed in Fig. 6 and Table 1.
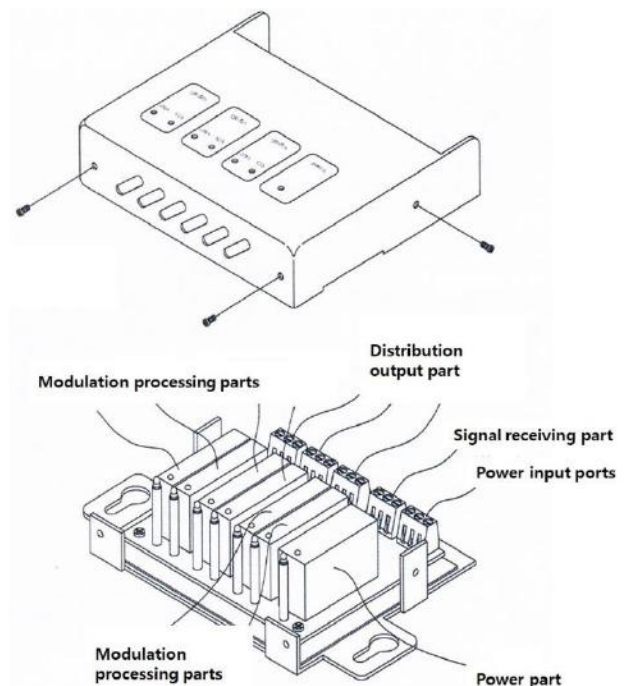
Fig. 6: External view of Signal Distributor

Table 1: Specification of Signal Distributor

Features	Specification
Operating Temp.	-20~45℃
Storage Temp.	0~45℃
Operating Humidity	5~95%RH, No dew should be formed
Storage Humidity	5~95%RH, No dew should be formed
Power Input	AC 100~240VAC, 50~60Hz/ DC 5V, More than 1A
Power Output	5VDC, 1A max
Standby Power	0.15W below
Efficiency	70%

4. Interworking method

Input/output terminal of signal distributor has 3 parts: power part, input part from KEPCO meters and output part to distribute signals showed in Fig. 7.
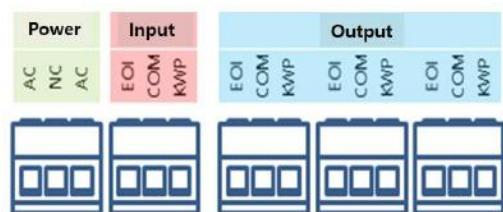
Fig. 7: Input/output Terminals of Signal Distributor

To connect our signal distributor with peak power management device or demand control device, it should be connected as showed in Fig. 6. After signals (EOI, kWP, COM) from power meter are connected to input part of signal distributor, it should be connected to output part(7~9 terminal, 10~12 terminal, or 13~15 terminal) for peak power management device. If an interlocking error occurs, most of all, the terminal connection is often wrong, and then the power calculation in the device received from the output unit is not performed properly.
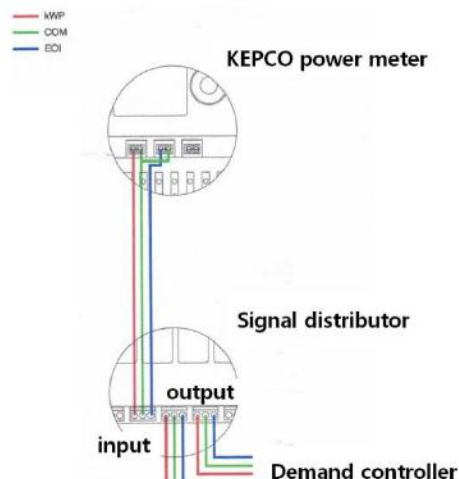
Fig. 6: Connection of Signal Distributor

III.   DURABILITY TESTS

1. Voltage Dip / Surge Immunity Test

Signal distributor for this test blinks kWP LEDs every 2 seconds and EO LEDs every 10 seconds. We use EMS Tester of EMC partner (Model: IMU4000) as measuring equipment, and XBC-DR32H as KEPCO meter signal generator.
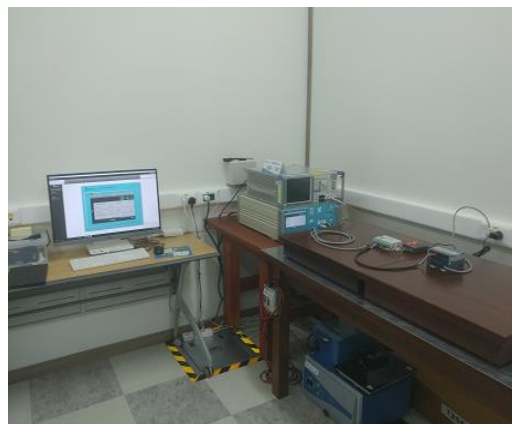
Fig. 9: Voltage Dip/ Surge Immunity Tests

Result of voltage dip immunity test and surge resistance test are as showed in Table 2 and Table 3.

Table 2: Results of Voltage Dip Immunity Test

Input Voltage/ Frequency	Test	Voltage Dip Level	Test Result
AC 220V / 60Hz	Voltage Dip	30% voltage drop of supply voltage during 30 cycles	Pass
		100% voltage drop of supply voltage during 1 cycles	Pass
		100% voltage drop of supply voltage during 0.5 cycles	Pass
	Voltage Sag	100% voltage drop of supply voltage during 300 cycles	Pass

Table 3: Results of Surge Resistance Test

Applied Terminal	Applied Level	Number of Tests	Test Result
L-N	±1 kV	5	Pass

2. Lightning Impulse Test (Voltage Withstanding)

After connecting to digital power meter (EOI output, power output line, common line, and DC line), we apply

lightning impulse withstanding voltage and check whether it normally operates after lightning impulse test.

Fig. 10: Lightning Impulse Tests

Table 4: Results of Lightning Impulse Test

Test Basis	Applied Position	Test Result
-Applied Voltage: 6,000V -Waveform: (1.2/50)μs -Polarity and Frequency: 10 times each positive / negative polarity -Minimum interval of application: 3 seconds -Connection: connected to EOI output line, power output line and common line and signal line providing equipment of electronic power meter -Acceptance Criteria: Check whether the signal line providing equipment and the power meter are in normal operating condition after the test of the lightning impulse withstanding test	Between EOI input and ground	Pass
	Between power input terminal and ground	Pass
	Between common line and ground	Pass
	Between P line of signal providing device and ground	Pass
	Between L line of signal providing device and ground	Pass
Atmospheric condition : 24.7°C, 68.8%R.H., 1,011hPa		

IV. CONCLUSION

In this paper, we designed and implemented the signal distributor for electronic power meters. And we verify our module as results of voltage dip immunity test, surge resistance test and lightning impulse test. Our result helps to improve scalability and stability. For the further works, we try to extend it for real-time peak power monitoring and analysis.

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Web and Android Application for Comparison of E-Commerce Products

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Abstract— E-Commerce websites are currently the most popular sources for shopping all kinds of products online. Currently, users have many different websites to access and search for the desired products available in the market. Nowadays, different kinds of strategies are being implemented to analyze and understand the customer's behavior to increase growth of the business. As, variety of websites are currently available it becomes difficult for the users to purchase the desired product for an affordable price. The paper presents, Comparison of E-Commerce products available on these different websites in order to help users to grab their desired products for the best affordable price. Techniques like Web Crawling and Web Scraping are adopted to collect detailed product information from the websites and MongoDB (NoSql Database) is used to store the scraped details of the products. Libraries like Requests and BeautifulSoup4 were implemented for crawling and scraping techniques using Python and Indexing method is used in MongoDB to acquire best possible results thereby savings customers time, efforts and money.
Keywords— Indexing, MongoDB, Python, Web Crawling, Web Scraping.

I. INTRODUCTION

Nowadays, due to rapid growth and advancement in the upcoming technologies internet has becoming the vital and useful in numerous fields like E-Commerce, Finance, Business, Social Networks, etc. Currently, E-Commerce has benefited many consumers all over the world to buy, sell their products on different available websites on the online platform thus making shopping easier than the traditional way, wherein the consumer needed to manually visit every local store and search for the desired product and buy if for the least affordable price. Due to the recent advancement and demand in E-Commerce, many shopping websites are available with hundred thousands categories of different products to choose from and order on the go. Thus, it becomes a tedious process for the consumers to manually visit and search the same product on different websites, to buy it at an affordable price. Therefore, it was necessary to develop price

comparison systems to help consumers to buy the products with the best deal.

Many Price Comparison systems are now available in the market. Price comparison can be done in multiple ways. Hence, these price comparison sites have made the shopping experience far easier and more convenient for customers in all aspects whether it may be payment, return of the purchased product or and in case of any further queries. Even the consumers are also satisfied with the prices and the deals they get online. The online retailers too, maintain a good relationship with the customers. It has become a common marketing gig now a days that, some of the big electronic firms launch their products directly on the E-commerce websites, because of the large number of consumers shopping/buying products online and trusting the brand.

Moreover, there are systems, extensions available they have shopping assistance which helps you suggests the best products but are not likely to compare the prices from all other E-commerce websites.

The proposed system compares the product details from different websites and provides users with an overview of the complete specifications about the product and their prices on the particular websites. It also displays about the ongoing deals and allows the users to add any desired product to the wish list in order to get notified when price drop occurs. The brand wise filter allows users to view the available products according to the brand category on the website.

II. LITERATURE SURVEY

The Comparison of E-Commerce products proposed by Riya Shah, describes about e-commerce products comparison using web mining. They created a price comparison website which was built using Django which is a Python's web framework. The data was scraped from different websites using Web Crawler and Scraper and stored in MongoDB. Another feature included was user could add same category of products to compare and analyze its details and specifications [1].

Jianxia Chen designed a Price Comparison System Based on Lucene. The system provided consumers with the

price comparison of similar products available on different online shopping malls. They adopted Lucene which is a full-text search library, to search different products based on indexing and rank or query relevance and MySql at the backend to store the data [2].

Lucene and Deep Learning based commodity information analysis system was proposed by Jiangzhong Cao. The system adopted web crawler technology to capture the details of the commodities and used it to build a resource library along with patent information. Based on it's resource library, deep learning techniques and Lucene is used to analyze information of commodities from the respective images and text [3].

Leo Rizky Julian used web scraping for comparing prices in computer parts and assembly. The paper describes about the application which allows to buy computer parts available at the cheapest price and good in quality at the online stores. Pentaho Software was used as a tool for web scraping and the application was build using PHP and javascript with MySql as database [4].

An Evaluation of Lucene for Keywords Search in Large-scale short text storage was proposed by QIAN Liping which describes about mining huge data of the short text generated from blogs, google buzz. It focuses about Lucene indexing and searching the short-text and gives a comparison between Lucene and Oracle Text [5].

Tobias Bruggemann proposed Mobile Price Comparison Services which describes about the importance of price comparison on the electronic commerce back in year 2005. The paper focuses on importance and benefits of price comparison of the products available on the online market [6].

III. METHODOLOGY

The Comparison of products from different e-commerce websites requires the product details to be fetched from those particular websites. Thus, Web Crawling and Web Scraping techniques are adopted to fetch product's details available on different e-commerce websites. The Crawler crawls the products URL's and feed it to the Scraper, further the scraped details of the products are filtered and HTML data is extracted and saved to the local MongoDB using PyMongo. The frontend user interface is designed using PHP with login and signup options to maintain users wish listed product's data. The backend uses MongoDB for storing the user's data and products information.

Thereafter, CRON files are deployed in order to periodically update the product details and price variations on the different websites to the database. The Fig. 3.1, shows the Architecture of the proposed system.
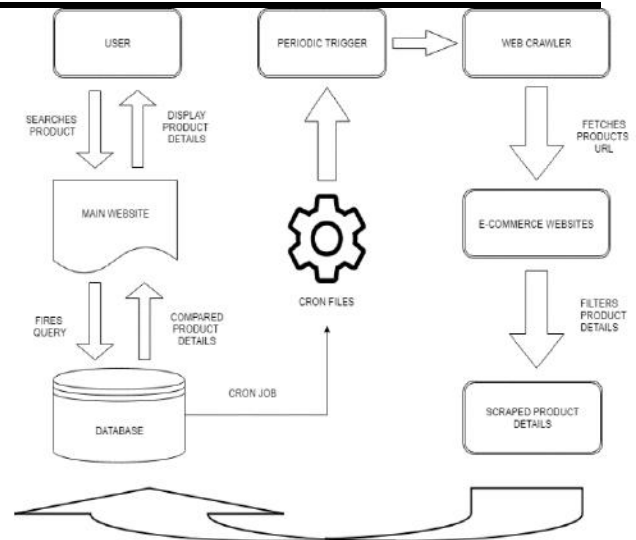
Fig. 3.1: Architecture Diagram.

A. Web Crawling

To compare products data needs to be fetched from different e-commerce websites. The amount of data is very large and cannot be collected manually by visiting the websites. Therefore, building a web crawler is beneficial, as it will automatically fetch URL's data and feed it to the scraper for scraping process. Multi-threaded crawler can be implemented to grab and fetch many URL's simultaneously to the Scraper. Requests library from Python can be used to fetch and load the data from the respective URL's.

B. Web Scraping

The Scraper extracts the text from the HTML data, collected by the crawler from the website's URL. The product's URL fed by the crawler are parsed and all the required data is collected from the websites. The collected data contains HTML tags therefore, Python's BeautifulSoup4 library is used to parse and filter out only the required data which is in the form of text and the extracted data is directly saved into MongoDB.

C. MongoDB

MongoDB is a NoSql database which stores data in document oriented format with keys and values. The JSON format used by it, is beneficial for storing large amount of unstructured data collected during the scraping process. Data extracted from different websites by the scraper is saved into MongoDB.

D. Comparison Logic

The Comparison of E-Commerce products are done on the basis of the different products attributes viz. name, price, specifications, etc. The user searches for the desired product and the query is fired to the local MongoDB database. Separate databases are allotted in MongoDB for storing the product details from different E-Commerce websites according to their categories. Therefore, the query is fired to the different databases simultaneously

and products are parsed according to their above mentioned attributes, categories and the resultant comparison between them is displayed. To make the process more efficient and faster during searching, Indexing Method is implemented in MongoDB. Due to the large amount of data stored in the database, it becomes difficult to search and handle the data during the retrieval. Therefore, indexing is applied on particular attributes of the products to efficiently filter and speed up the search process.

Pseudo Code:

Step 1: Set the URL to the desired E-Commerce website.

Step 2: Crawl and fetch all the data from the website.

Step 3: Scrape the required product details from the fetched data.

Step 4: Create new database according to the names of the E-Commerce website.

Step 5: Save the Scraped data into respective databases in MongoDB.

Step 6: Repeat the process for different E-Commerce Website.

Step 7: User searched query is fired to MongoDB.

Step 8: Product will be searched with name & category wise in the available different databases.

Step 9: If product is available in either of the database compare and display the results else display NA message.

Step 10: Periodic triggers to the CRON files to update the MongoDB with the latest available data of the products.

IV.   CONCLUSION

The paper proposes, Comparison of E-Commerce Products that benefits users by allowing them to compare products available on the different e-commerce websites. Furthermore, users can filter the products according to their categories or brands available thus, allowing them to easily find and compare amongst variety of products available in the market. The wish list option provided, helps users to keep a track on the product prices and get instantly notified in case of price drops on any of the e-commerce websites. This will help to save the customers time, efforts and money. In future, the scope can be extended by including more e-commerce websites thereby providing the finest results with the best affordable deal available in the market.

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Sedimentation Model Area of Lau Kawar Lake from Volkanic Eruption of Sinabung Mountain in Karo District, North Sumatra Province

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Abstract— *Lau Kawar Lake is a VolkanicLake has wide around 200 hectares which below hillside of Sinabungmountain located in Kutagugung Village, District Naman Teran, Karo District, North Sumatera Province. Impact eruption of mount Sinabungis Volkanic material in the form of importantfrom clastic sediment to be donere search. Purpose of this research is HIBAH Dikti 2016 year, item to know type of sediment that is election mean, sorting, skewness and curtos is. and deposition public area of sediment volkanic post eruption of Sinabung.*

Primary data collection activities sediment core with PVC core method. generates data in the form of characters sediment grain size, sedimentary structures, sediment composition and sedimentary depositional environment interpretation presented in the stratigraphic column Lake Lau Kawar.

Calculation method applied that is, Method of Moments (Mathematic) and Folk & Ward (Graphic). Result of sediment material analysis in 15 points , value mean either graphically mathematical and also shows flattening - plane of grain size coarse sand - very fine sand, Value sortasimoderately sorted - poorly sorted, Value skewnwessat smooth and rugged normal same relative distribution like at sample LK 11 LK 12 LK 13 LK 34 and LK 53, Curtosis value from overall of sample included in classification of finite mesokurtic of leptokurtic (Kc = 0,90 - 1,1 and Kc= 1,11 - 1,50). Crossplot between values Y1 and Y2 indicates that deposition area to stay at [shallow/superficial] deposition area at Y2 and y3 stays at fluvial area of marine, at Y3 and Y4 still residing in at fluvial deposition area of marine Data analysis result of screening of sediment sample is done to applies GRADISTAT, a program proposed by Blott and Pye (2011) and developed by Kenneth Pye Associates Ltd. Software GRADISTAT implemented in program Microsoft Excel.

Keyword— Sedimentation, Lau Kawar, Volcanic Eruption, Sinabung mountain, PVC core method.

I. INTRODUCTION

The study discusses about the lake through sedimentology studies in Indonesiais still a bit todo, especially for a lake formed by volcanic or volcanic activity. Lake as a water body shaped hollows on the surface of the Earth can serve as indicators of natural ecosystems and the stability of the surrounding environment. In the case of lakes associated with volcanic activity, the lake also can be used as an indicatortodetermine the activities that took place surrounding volcanoes.

Lake Lau Kawarexample is one example of the lake forming associated with volcanic activity, on Mount Sinabung (Figure 1.1 and Figure 1.2) located in Karo, North Sumatra. Geographcally, the presence of Lau Kawarlake which is right at the foot of Mount Sinabungput this lake as one of the areas affected directly against volcanism especially sediments materials happened. It makes Lake Lau Kawarare the areas most appropriate to be used as a researchlocation.

Geological aspect which addresses specifically about sedimentology will be assessed properly by studying the condition of sedimentation that took place in the Lake Lau Kawar which has an area of approximately 200 hectares located in the village of Kutagu-gung, District Naman Teran, under the foot of the volcano Sinabung, Karo, North Sumatra Province.

Increased volcanic activity of Mount Sinabung in the last 5 years as well as ongoing eruption since 2013 and is currently producing a variety of types and sediment material contained in the waters of Lake Lau Kawar become the main back ground research, especially granulometry. Granulometriis material grain size analysis method so that it can be seen how the transport properties, shape and grain size as well as the deposition environment.

Based on the background of the above, then there is some problem formulation needed to know the history of the depositional environment of the lake Lau Kawar located at the foot of Mount Sinabung among other things, how to determine the distribution of the deposition of sediment material vulkaniklastik the eruption, how to know the texture of the material granulametri the eruption, and environmental factors are influential model of sediment deposition after the eruption of Mount Sinabung. The purpose of research, is to know whatand how to model and characteristics of Sedimentary environments that exist in the region resent Lau Kawarlake. The village is located Kutagugung, District Naman Teran North Sumatra after the eruption Sinabungvolcano. The contribution of this study

support the construction and acquisition of baseline data for the development of science-related volcanic sediment.

Sedimentation process also affects the characters resent sediments deposited in a basin. Media and transport mechanisms will affect sediment grain size, the variation form sedimentary structures. There was also a time factor affecting the length of the process of sedimentation sediment grain size. Sedimentary basin as a place to settle also have different properties related to environmental conditions. General conditions deposited sedimentary basins place called the depositional environment. **Bentl (2001)**, describes the particle sediment is the result of the weathering of rocks, the biological material, chemical deposition, dust, material remains of plants and leaves.

The research objective was to determine the characteristics of sedimentary material resent that granulametri nature, environment sedimentation of the lake, and the history of the deposition from the eruption of volcanoes Sinabung. The contribution of this study support the construction and acquisition of baseline data for the development of science.

Fig.1: Google Earth's image location LauKawar Lake and Volcano Sinabung

II.   METHODOLOGY

1. Location

The research was conducted on Lau Kawarlake area in the village Kutagugung, Sub-District Naman Teran(first Sub-District Simpang Empat), under the foot of the volcano Sinabung, Karo District, North Sumatra Province. The lake extents 2.127,25 km2 with a depth of 22 meters is located the foot of Mount Sinabung, Karo and is part of the Hutan Wisata Delengareas.

2. Type Methods

The method used is research and descriptive. Furthermore, the data were analyzed using four (4) models approaches namely: descriptive approach, historical approach sediment, conceptual approach, and comparative grain size approach. In the implementation of sampling recent sediment cores the field with PVC Coring obtained 15 samples of sediment core resent with varying depths. Megascopics methods and laboratory analysis (granulometri) to determine the physical properties of the sediments. Megascopic sediment analysis using the

parameters of texture and sedimentary structures.Texture analyzed were grain size, grain shape and sorting sediments. Analyzed sedimentary structures analyzed were conditions layering on a sediment core. It also made observations of sediment content such as the existence of a carbonaceous content or calcareous content in the sediment core. Based on the analysis performed on a sediment core obtained physical condition of sediment which is then presented in the statistical data, especially the texture parameters of the sediment, where the results are then analyzed by a laboratory test. Analysis of data from the sifting of sediment samples was performed using GRADISTAT, a program proposed by **Blottanand Pye(2011)** and developed by Kenneth Pye Associates Ltd. Software GRADISTAT run in Microsoft Excel program. Calculation method used, namely, Method of Moments (Mathematical) and Folk &Ward (Graphic) in Sedimen to logical Laboratory of Universtas Gadjah Mada (UGM) in Yogyakarta.

Fig.2: Map of Data Retrieval PVC Core Sediment Samples Lake Lau Kawar

III.   RESULT

Has conducted sampling method coring against Lau Kawarlake sediments resent as much as 15 sample points. Based on the data tabulation description of the sorting of the overall analysis of the sample can be in sorting or level of uniformity of grain sediments are generally a group again sorting poor to moderate because of the layers of sediment are generally prepared by grain - fine grain size of mud to sand as shown in the results analysis of statistical calculations which each sample is dominated by fine sand-sized minerals to mud.

Based on the analysis performed on a sediment core obtained physical condition of sediment which is then presented in the statistical data, especially in sediment texture parameter descriptions PVC Core profile (Figure3).

Sediment grain size indicates that the hydrodynamic flow conditions that work on Lake Lau Kawar environment and surroundings have the power measuring sediment transporting sand to the weak currents which can only move the *silt* sized sediment.
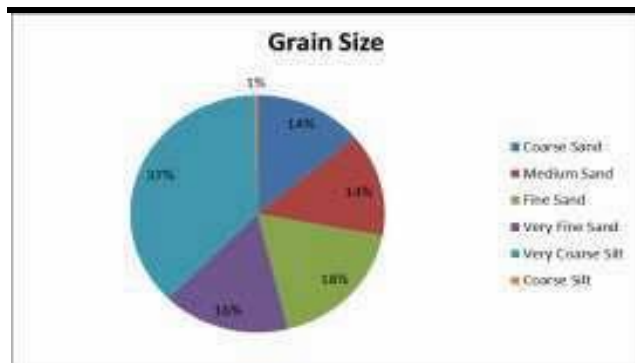
Fig.3: Diagram of Particle Size Distribution of Sediment From PVC Coring

Grain shapes are represented by the type of grain roundness showed sediment from a sediment core obtained from the implementation of the PVC Coring is dominated by rounded shapes and rounded being. It is clear that sediment has been obtained from sources of sediment that have been transported long distances to middle of sedimentary environments that exist in the region Lau Kawarlake and its surroundings. Can be interpreted also that these sediments are generally derived from the rivers that enter to lake system that also serves as a source of sediment in Lake Lau Kawar.

Sorting obtained from the analysis of sediment cores show a trend of poorly sorted, where sorting sediment grains are not uniform due to the instability of currents that carry sediment and during the deposition of sediments. Sorting both the results of the analysis explained that the current instability does not occur in all depositional environments that exist in the lake Lau Kawar.

Further data analysis results using GRADISTAT sieving sediment samples, method of Moments (Mathematical) and Folk & Ward (Graphic) in Sedimento logical Laboratory of Universtas Gadjah Mada(UGM, 2016) Yogyakarta, Indonesia is as follows:

Table.1. Results of the analysis on 15 samples of sediments Granulometric

Sampel	Mean	Sortasi	Skewness	Kurtosis
LK 1.1	1,449	1,297	0,218	0,928
LK 1.2	1,361	1,380	0,337	0,797
LK 1.3	1,456	0,959	-0,036	0,875
LK 1.4	4,447	0,495	-0,305	1,421
LK 2.1	4,589	0,278	-0,070	0,857
LK 3.1	3,644	1,171	-0,408	0,790
LK 3.2	2,964	1,042	-0,170	0,886
LK 3.3	3,842	1,092	-0,528	1,284
LK 3.4	3,298	0,942	-0,055	0,801
LK 3.5	3,421	0,733	-0,097	1,039
LK 4.1	2,785	1,400	-0,392	0,697
LK 4.2	4,555	0,351	-0,181	1,156
LK 5.1	1,658	1,296	0,087	0,930
LK 5.2	1,284	0,929	0,062	0,895
LK 5.3	1,778	1,516	0,112	0,854

Based on the Granulo metric analysis performed, and by analogy that the samples taken on LK at 1 STA has a relationship with LK others. If the sampling is not random but linear then:

a. At LK 1.1 to 1.4 relative occurs reduction of energy deposition shown from LK mean values of 1.1 - 1.4 is decreased, except in LK 1.2 that increased energy deposition, which then decreased energy deposition. Based on analysis of sorting impaired sorting (more well sorted), except in LK 1.2 which has increased the value sorting.

b. At LK 2.1 sediments deposited in low energy deposition, on a relatively quiet environment so that the grain size of silt can be deposited, it is also shown by the sorting value that indicates well sorted. When viewed based on an analysis of grain size can about that LK 1.4, 2.1 LK, LK4.2 deposited on environmental conditions are relatively similar; an environment of the quiet stream, for example in the flood plain on the river morphology.

c. At LK 3.1 - 3.5 LK 1,2,3,4,5 when sorted by grain size (mean) do not reflect a meaningful relationship in which the mean value of random. But when grouped into 2 groups: group 1 consists of LK 3.1 & LK 3.3 and Group 2 consists of LK 3.2, LK 3.4, and LK 3.5, then both groups showed a decrease in the value of the grain size (energy deposition) and impairment sorting (increasingly well sorted).

d. LK 4.1 and 4.2 on a decline in energy deposition shown to increase the fine from the existing sediment grain size (mean). Sorting at 4.1 and 4.2LK relatively impaired sorting (more well sorted).

e. At LK LK5.1 and 5.3 relative decline seen energy deposition of increasingly fine grain size (mean) of the value of the previous LK sorting unlike an increasing rate of sorting (increasingly poorly sorted). LK 5.2 has an energy deposition is relatively the largest among LK 5.1 and5.3 sorting value most sorting relatively low (more well sorted) of the LK 5.1 and LK. 5.3.

In the following picture, is one of the tabulated data showing that quartesic whole of data analysis, statistical calculations and data phi cumulative histogram curve showed two types of diagrams histogram is unimodal and bimodal. In this case the whole sample showed cumulative histogram curve phi dominated by a diagram showing the cusp or unimod also that it can be interpreted sediments. Deposition area than those that are in the area of coastal sediment / river that has the characteristics.

Here is one example of the data analysis results sieving sediment samples was performed using GRADISTAT, a program proposed by Blottand Pye(2011) and developed by Kenneth Pye Associates Ltd. Software GRADISTAT run in Microsoft Excel program. Calculation method used, namely, Method of Moments (Mathematical) and Folk & Ward (Graphic)

Further analysis of the data using GRADISTAT produce sorting varied group description. Group sorting of each test sample can be seen in Table 2 below.

Tabel.2: Granulo metric cummulative table

Mesh	Phi unit	Diameter (mm)	Grain Size	Fraction (gr)	Frequency (%Fraction)	Cumulative (%)
18	<0	1	Very Coarse Sand	11,4	11,85	11,85
35	0 - 1	0,5	Coarse Sand	26	27,03	38,88
60	1 - 2	0,25	Medium Sand	29,4	30,56	69,44
120	2 - 3	0,125	Fine Sand	16,9	17,57	87,01
230	3 - 4	0,0625	Very Fine Sand	4,8	4,99	92,00
270	4 - 4,25	0,053	Silt	4,8	4,99	96,99
>270	>4,25	<0,053	Clay	2,9	3,01	100,0
			T	96,2	100	100

Table.3: Description Tabulation Sorting

No	Poorly Sorted	Moderately Sorted	Well Sorted	Very Well Sorted
1	LK 1.1 (Bimodal)	LK 1.3 (Unimodal)	LK 1.4 (Unimodal)	LK 2.1 (Unimodal)
2	LK 1.2 (Bimodal)	LK 3.4 (Bimodal)	LK 4.2 (Unimodal)	
3	LK 3.1 (Bimodal)	LK 3.5 (Unimodal)		
4	LK 3.2 (Unimodal)	LK 5.2 (Unimodal)		
5	LK 3.3 (Unimodal)			
6	LK 4.1 (Unimodal)			
7	LK 5.1 (Bimodal)			
8	LK 5.3 (Bimodal)			

Overviews of the depositional environment of the test sample can be obtained from the statistical parameters using the analysis function of discrimination raised by Sahu(1964).

The use of bivariate scatter plots proposed by Moiola and Weiser (1968) and Friedman (1961) also used to get a general overview of the depositional environment of the test sample.

Values of mean, sorting, skewness, and curtosis for each test sample can be seen in Table 2 and Table 3.

Here is presented a sample graphic of grain characteristics (mean, sorting, skewness, and curtosis) for each sample (figure 4 and 8 for sample). Overview depositional environment of the test sample can be seen on the plot charts by making crossplot between Y1, Y2, Y3 and Y4 as presented figure 9.
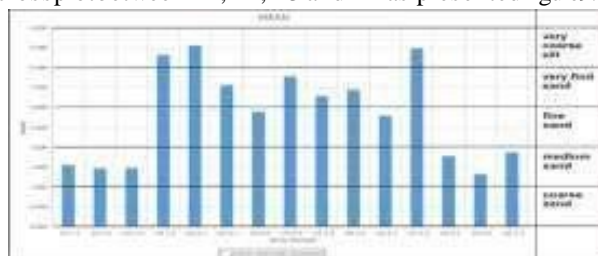

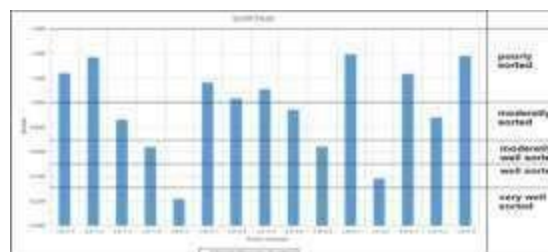*Fig.4: Grain characteristics (mean, sorting, skewness, and curtosis) from sample LK-1*

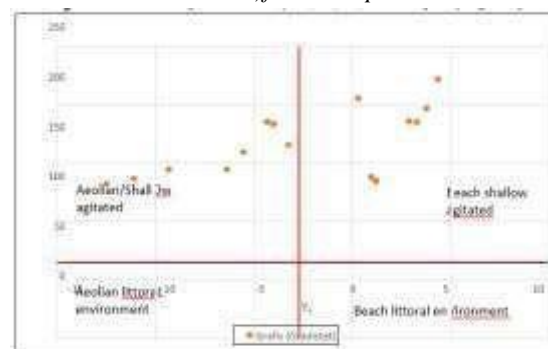*Fig.5: Grain characteristics (mean, sorting, skewness, and curtosis)from sampleLK-2*

Fig.9: Depositional Environment fromLK-1

Table.4: Tabulation Characteristics Sample Test Granulas (Mathematical Methods GRADISTAT)

Sample	Mean	Sorting	Skewnes	Curtosis
LK 1.1	1,552	1,243	0,769	2,816
LK 1.2	1,475	1,372	0,809	2,630
LK 1.3	1,479	0,864	0,092	2,319
LK 1.4	4,325	0,641	-2,987	13,530
LK 2.1	4,563	0,220	-3,830	17,310
LK 3.1	3,564	1,166	-0,810	2,700
LK 3.2	2,900	1,036	-0,587	2,911
LK 3.3	3,783	1,112	-1,509	4,476
LK 3.4	3,295	0,944	-0,448	3,070
LK 3.5	3,447	0,645	-0,030	2,379
LK 4.1	2,796	1,395	-0,522	1,940
LK 4.2	4,488	0,385	-3,451	15,700
LK 5.1	1,786	1,238	0,439	2,414
LK 5.2	1,328	0,882	0,678	3,423
LK 5.3	1,875	1,381	0,375	2,199

Overview depositional environment obtained from bivariate plot as noted by Moiola and Weiser (1968) and Friedman (1961) presented in the graphs below.

Table.5: Characteristics of Grain Sample Tabulation Test (Graphic Methoda GRADISTAT)

| Sample	Mean	Sorting	Skewnes	Curtosis
LK 1.1	1,449	1,297	0,218	0,928
LK 1.2	1,361	1,380	0,337	0,797
LK 1.3	1,456	0,959	-0,036	0,875
LK 1.4	4,447	0,495	-0,305	1,421
LK 2.1	4,589	0,278	-0,070	0,857
LK 3.1	3,644	1,171	-0,408	0,790
LK 3.2	2,964	1,042	-0,170	0,886
LK 3.3	3,842	1,092	-0,528	1,264
LK 3.4	3,298	0,942	-0,055	0,801
LK 3.5	3,421	0,733	-0,097	1,039
LK 4.1	2,785	1,400	-0,392	0,697
LK 4.2	4,555	0,351	-0,181	1,156
LK 5.1	1,658	1,296	0,087	0,938
LK 5.2	1,284	0,929	0,062	0,895
LK 5.3	1,778	1,516	0,112	0,854
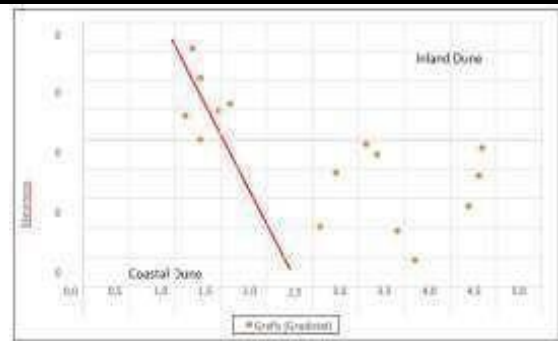
Fig.6: Depositional Environment Crossplot from LK-1

IV.   CONCLUSIONS

1.   The mechanism of transport of sediment in the sample indicates that the transport mechanism is very influential in sediments are suspended load and deposition processes on the river.

2.   In the mechanism that is where the suspended load sediment materials tertransportasikan by river, by floating above the bottom of the river by the flow of water turbulence. So that the transported material will generally produce the grain size of silt to clay as ditunjjukkan the statistical calculation data on how many samples between 1.4 sample LK LKLK2.1 3.1 9 In the deposition process streams according to Thornbury 1964; where the river can no longer transport the material - material he was carrying. It is influenced by factors decrease the flow rate of the river, the addition of material that is transported on the river, its flow is reduced due to climate change, as well as their results by the wind deposition of thick and extensive consisting of grain size of clay, silt, and sand. This can be seen by the data analysis on the curve grain size distribution in the sample, which showed an increase and cumulative particle diameter phi drastic thus producing two peak on cumulative histogram phi diagram. As well as a greater percentage relative presence of granules composed of sand-sized grains like that are shown in the data sample statistical analysis results.

3.   Characteristics of Pellets and results tabulation Discrimination function test samples in Table 3, it produced some of the data are then displayed in the chart overview depositional environment of the test sample that can be seen in the graph plot by making cross plot between nilay Y1, Y2, Y3 and Y4 as presented. Where on cross plot between the Y1 and Y2 indicate that the sedimentary depositional environment than it is on the shallow depositional environment that is influenced by the relative flow speed is quieter, the Y2 and y3 is in an environment where there are marine fluvial influence of flow rate water is fairly quiet. In Y3 and Y4 is still in the marine fluvial depositional environment but in this environment has affected the water flow in the turbidite sediments. Each of

sediment deposition will be influenced by the rate of water flow, conditions of lithology area depositional environments, physical processes during transport, climate conditions, the density of granules of sediment conditions of weathering and the distance of transportation thana grain of sediment from the initial site / host rock to the accumulation of granules - granules so deposited back (tersedimentasi) the farther the distance as well as the water flow rate fluctuations will result in a material with a grain shapes more rounded.

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Evaluation of the three diets of different biochemical compositions on the zootechnical performances of the rainbow trout (*Onchorynchys Mykiss walbaum*, 1792) and their impact on the water of the Oum Er-Rbia River (Morocco)

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Abstract— *In order to compare the effects of three types of extruded foods (A, B and C) on the growth of rainbow trout, an experimental test was conducted on June 15, 2015 at the Oum Er Rbia Fish, Morocco.*
The comparison of three foods of different composition and energy is performed in isoenergetic condition. In this study, three extruded foods were tested: food A with 39% protein, 27% fat and 19.2 MJ / kg, food B with41% protein , 24% fat and 20 MJ / Kg and food C with40% protein, 26 fat and 19 MJ / Kg .The initial trout weight was ±40 g bred in six freshwater basins with twice-per-hour renewal.
Fish were raised under the same conditions of breeding at a density of 1.58 kg / m³ and a load of 1.04 m³ / h. Each group was fed twice a day after 222 days of experimentation. The final weight of three foods A, B and C was 803.14g, 1043.9g and 942.1g.
Results showed that the best performances of growth are obtained by food B with a final weight of 1043.9g.
The biochemical composition, the origin of the raw material used in the feed and the formulation of the three extruded feeds had an influence on the growth performance of the rainbow trout. Outlet water from magnification basins does not show any pollution of the aquatic environment.
***Keywords**— Foods, Biochimical composition, Performances, Rainbow trout, Environment, Morocco.*

I. INTRODUCTION

Recently, fish food toke an important place in the world market. It's one of the most desired foods in human alimentation. In this case and to ensure a sustainable control of the production phase of salmonids, it becomes necessary to optimize the nutrition of this specie and to maintain a high quality of the final product in order to meet the customers' requirements.

In fish farms, it's possible to control the breeding parameters for the enhancement of aquaculture production. Such as environmental conditions (temperature, water flow, quality of the environment, etc.), biochemical composition of food (protein, lipids, carbohydrates, etc.) and water quality (ammoniacal nitrogen, phosphorus, suspended matter).

Feeding represents 40 to 60% of the production costs of farmed fish. Its composition must contain high levels of fish meal as the main source of protein, an essential component of artificial fish feeding (NRC, 1993).Foods must be rich in protein (47 to 50% protein). As main ingredient, Fish meal contains 70% of protein. This composition is ideal to cover the fish needs.

Lipids present an important nutrient for rainbow trout (Médale et al. 1991). It requires high levels of lipids in foods without affecting their digestibility (Refstie and Austreng 1981; Choubert et al. 1991; Berge and Storebakken 1991).

In contrast, the introduction of carbohydrates into trout diet induces prolonged hyperglycemia and decreased growth (ANR, 2008).

The objective of this study is to compare the effect of three extruded foods on the growth performance of rainbow trout. This will allow determining the food that

has a positive effect on the growth performances of rainbow trout. Additionally, it will permit to evaluate the digestibility of this specie in order to limit and optimize fish releases and to adopt a sustainable aquaculture that respects the environment.

For economic and ecological reasons, this comparative test of three foods made it possible to remember that the food B had a better zootechnical and low performance with fewer fish releases (Ouaissa et al. 2007).

II. MATERIAL AND METHODS

a. Experimental study

The experiment was carried out on June 15, 2015 at the Oum Er Rbia Fish Farm (Morocco).Growth basins are fed by spring water at 14°C renewed every half hour (48 times /days) with high level of oxygen (more than 90 % saturation).

4574 Trout, of average weight of 40 g, were sampled from the same batch of eggs and divided randomly into six tanks. The test was carried out in monoculture and the fish were fed manually with a determined daily ration.

Every 15 days, 90 fish (according to Student's law) are captured from each basin, being fasted for 24 hours and then anesthetized to measure the size and the weight of each fish, weight gain (WG), feed conversion ratio (FCR), specific growth ratio (SGR) and factor condition (K). The distributed foods were weighted to estimate the consumption by the fish between two successive sampling.

b. Experimental foods

To investigate about the evolution of the individual weight of the fish, we used three types of foods corresponding to their development cycle and magnification (with 3, 4.5 and 7 mm in diameter).

c. Composition of three foods extruded

Table.1 bellow shows the biochemical composition of the three studied foods (A, B and C) in (%).

Table 1. The biochemical composition of the three studied foods (the different food diameters).

Type of foods	A			B			C		
Food diameter	3mm	4.5mm	7mm	3mm	4.5mm	7mm	3mm	4.5mm	7mm
Protein (%)	40	39	39	45	43	41	46	45	40
Lipid (%	23	27	27	20	22	24	20	24	26
NFE (%)	21	18.2	18.2	20	20.7	20.5	15	14	13
Cellulose (%)	2.25	1.86	1.8	1.9	1.9	2.3	1	1	1
Ash (%)	7.20	6.77	6	8.1	7.4	7.2	10	10	10
Phosphorus (%)	1.05	0.98	0.9	1	1	1	1.5	1.5	1.40
Digestible energy(Mj/kg)	19.2	20.2	20.2	20	20.3	20.6	19	19.90	20.50
Digestible protein/Digestible energy (g/MJ)	19	17.5	17.5	-	-	-	22.30	22.30	17.60
Vitamin A (UI.kg)	10000	10000	10000	10000	10000	10000	10000	10000	10000
Vitamin D3 (UI.kg)	1750	1750	1750	1000	1000	1000	1850	1850	1850
Vitamin E (UI.kg)	200	200	200	200	200	200	200	200	200
Vitamin C (UI.kg)	150	150	150	-	-	-	180	180	180

Table .2 show the zootechnical performances studied for the growth of the rainbow trout

Table.2: Parameters of zoo-technical performances studies

Parameters	Formulas	Unit
Weight gain. (Cren ,1947)	$WG = \text{final body weight(g)} - \text{initial body weight(g)}$	(g)
Specific Growth Rate. (Brett et al., 1969)	$SGR = \dfrac{\{\ln(\text{Final weight}) - \ln(\text{Initial Weight})\} * 100}{\text{Duration of experience}}$	(%)
Feed Conversion Rate (Bellet ,1977)	$FCR = \dfrac{\text{Amount of food ingested}}{\text{Weight gain}}$	Without unit
Condition Factor (k) (Tesch ,1971)	$K = \dfrac{10^5 * \text{Weight}}{\text{Size}^3}$	Without unit

d. Analysis of fish releases

• **Physical and chemical parameters of water**

To estimate the outflows of nitrogen (NH_4^+), phosphorus (PO_4^{3-}) and suspended matter at the inlet and the outlet of basins, water samples are taken twice per month consecutively. Samples are transported, in a cooler at 4°C and analyzed in the laboratory of the Oum Er-Rbia hydraulic basin agency in Beni-Mellal.

According to AFNOR (1983), Ammonia nitrogen was measured by the acidimetric method after distillation (NFT90-015) ; orthophosphates by spectrophotometry after mineralization followed by acid hydrolysis (NFT 90-013) and suspended matter by filtration method on fiberglass filter disc (NFT 90-105).

III. RESULTS

The following table presents the zootechnical performances of the three foods (A, B and C) in the three stages of rearing fed by the different food diameters (3mm, 4.5mm and 7mm) obtained during this test.

Table.3: Zootechnical performances of rainbow trout fed with extruded food during the three growth stages.

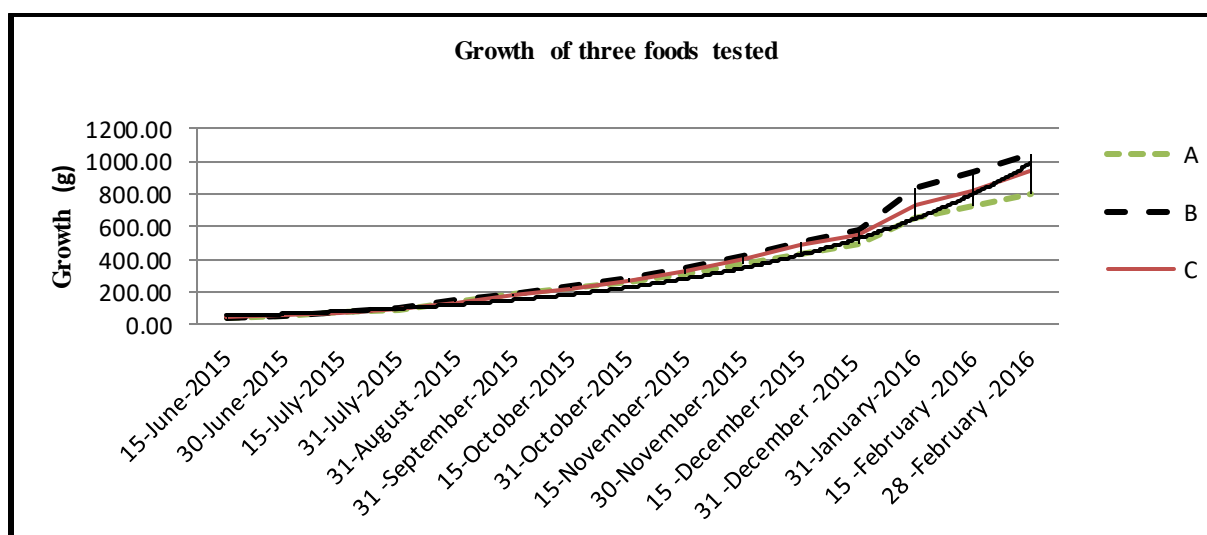| Settings	A			B			C		
	3mm	4,5mm	7mm	3mm	4,5mm	7mm	3mm	4,5mm	7mm
Initial weight(g)	41.05	192.31	428.4	41.15	192.15	501.1	44.65	180.55	48.95
Final weight(g)	143.28	366.66	803.14	147.22	421,1	1043.9	132.68	402.5	942.1
Specific growth rate (%)	1.7	1.1	1.1	1.7	1,2	1.2	1.6	1.3	1.4
Conversion index	0.8	1.0	1.1	0.8	0.9	0.9	0.9	0.8	0.8
Condition factor	1.2	1.22	1.27	1.27	1.45	1.61	1.08	1.28	1.03

Fig.1: Growth of rainbow trout with thethree foods (A, B and C)

During the experiment, the test was carried out under the same conditions of breeding for the three tested foods A, B and C (temperature, oxygen and water flow).

Table 3 shows the growth performance of rainbow trout during the experimental period. food B is still the most efficient (weight gain, specific growth rate and daily individual growth). It gives greater growth and better performance compared to the other two tested foods (A and C).

Weight growth has a major impact on production. It reflects the effectiveness of the food in mass production.

For this reason, a regular trout weight measurement was carried out throughout the experimental test.

The graphical representation of the evolution of the average weight of rainbow trout fed by three types of iso-energetic food of different biochemical compositions is shown in table 1.

In term of growth, the results reveal that food Bis the most efficient food. Its growth has recorded 1043.9 g compared to foods A (803.14g) and C (942.1g) even if its lipid content is lower than the other two foods A and C.
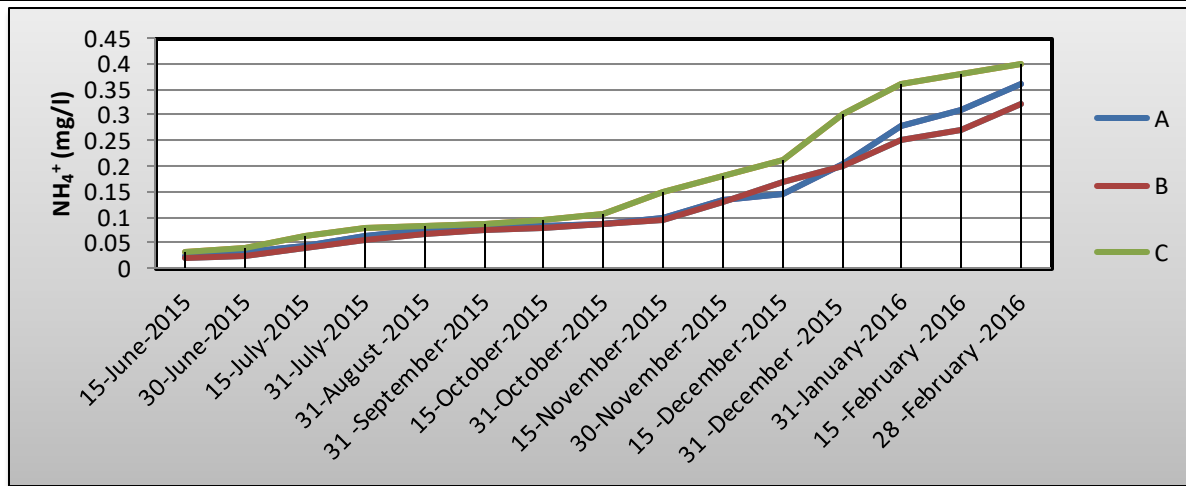
Fig.2: The evolution of rates of nitrogen discharges.

Figure 2 show that the amount of nitrogen discharges increases with exponential production. This is due to the fact that the release of nitrogen is proportional to the quantities of food distributed. However, releases from fish for the three foods tested remain below the 0.5 mg/L standards.
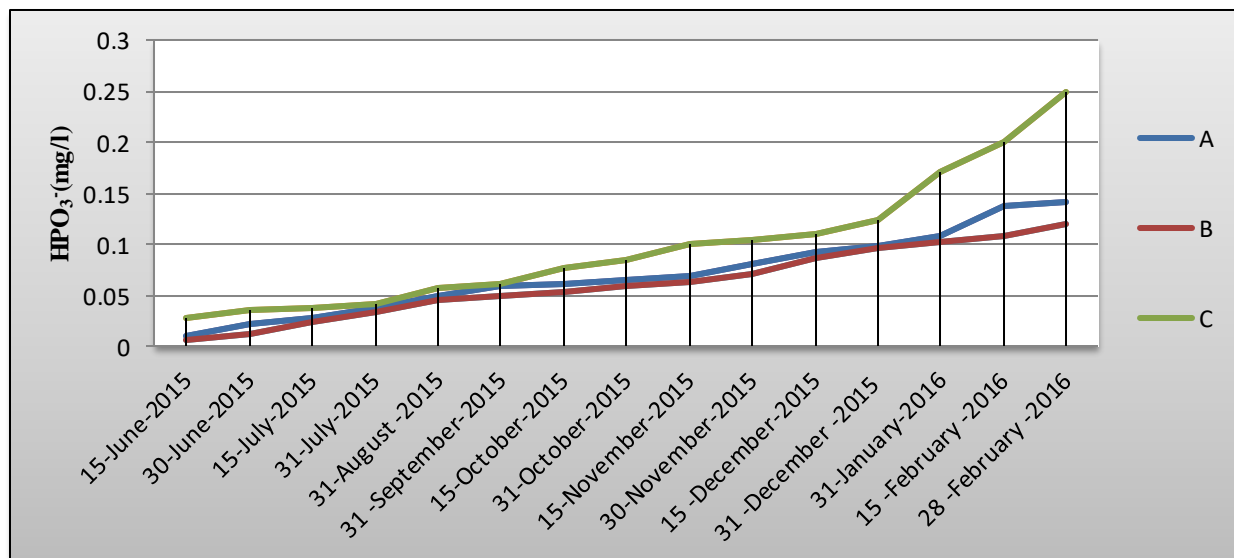

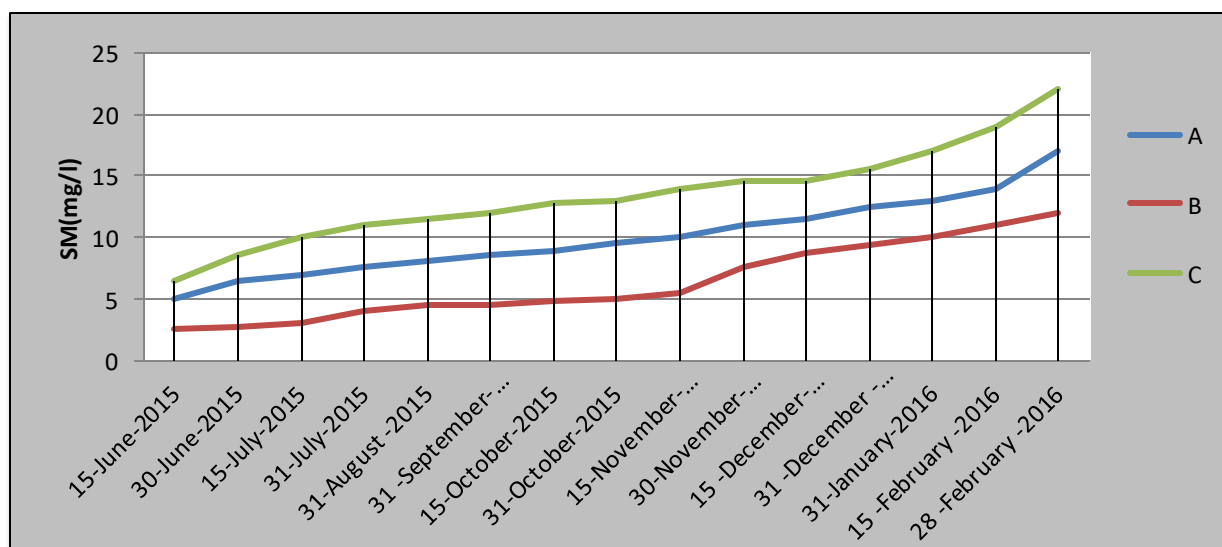*Fig.3: The evolution of rate of phosphorus discharges.*

Fig.4: Evolution of suspended matter solids rate.

Figures 2, 3 and 4 presents the results of water analysis at the outlet of basins with the three extruded foods tested. Fish fed with food C discharged more nitrogen and phosphate than food A and B.

IV. DISCUSSION

The rainbow trout fish were kept under optimal conditions throughout the trial period, the values obtained for temperature, dissolved oxygen and pH meeting the standards for breeding these fish (Wedemeyer, 1996). According to this comparative study, the results show that feed B ensures a significant growth of trout fish compared to food A and C. the final weight for food B was 1043.9g, compared to 883.1g for food A and 942.1g for food C.

The extruded food B provided better growth performance compared to food A and C. The highest final average weight values of daily growth rates and feed conversion efficiencies were obtained using diet B.

It was found that growth was also increased by increasing lipid levels in diet C. The final weight of the fish fed by the food B is higher than food C even if they have almost the same protein content (B = 39 % and C = 40%) but with a different lipid content in both diets. Our results are similar to those obtained by (Luquet, 1971) and defined by the preliminary saving.

The results confirm the existence of a feed efficiency; the better growth was recorded for food B (1043.9 g). At the magnification stage, food B contains low fats (24%) compared to food A and C that contain 27% and 26% of lipids, respectively. These results are contradictory to those found by (Chaiyapechara, 2003).

The conversion indexes recorded in this study was {CI_b=0.86} and they are comparable to those obtained by (Erika et al. 2007) and those reported by (Brauge et al. 1994) and (Azevedo et al. 2004), whose experiments concern the study of the effect of two extruded foods on the rainbow trout' performances and that reveals a good growth and an efficient food conversion (0.88).

Our results show also that the factor condition (K) is very high in diet B by {K_b=1.61}, which shows the excellent health status of the fish. This factor explains why the fish undergoing this diet have better growth performances in term of weight and length ratio. On the other hand, for the diet C, the fish had a size performance higher than the weight performances. This can be explained by the richness of the food C by the phosphorus which leads to an important development of skeleton fish fed by food B (Kaushik, 2005).

In the context of sustainable development and the preservation of water resources, aquaculture by their turn acts directly on the environment and preserves water resources. Several studies have been interested on determining the effect of aquaculture on the environment (Einen and al. 1997) on the bar "*Dicentrarchuslabrax*" and salmonids (Young and al. 1998 ; Dosdat et al. 2003).

In open fish farms, nitrogen releases were estimated using the linear relationship between nitrogen in food and nitrogen excreted.

Since the excretion of dissolved substances is linked to the fish metabolism, excretion within the same species remains the same irrespective of the considered breeding (cages, ponds or rearing in recycled water (Pagand, 1999). According to the work of (Kaushik, 1998), it has been observed that as long as the diet is rich in protein, the excretion of ammonia is important. This is not in accord with our results because the food B, which is rich in protein, presents a low concentration of nitrogen in the fish releases.

All the phosphorus required for fish comes from their diet. The phosphorus produced will, therefore, depends on the amount present in the food. Phosphorus can be of animal origin (fish meal), vegetable or mineral. The digestibility of phosphorus varies depending on the species and the origin of the phosphorus.

Based on the results obtained and shown in the figures {1,2 and 3}, it can be said that the extruded food B allows a reduction of fish releases compared to foods A and C, knowing that the food B contains 41% of protein content in the composition (39%) and normally have more releases than the load B at a rate of 0.31 mg / L compared to the nitrogen concentration released by the food B (0.32 mg / L).

Additionally, food C has a high content of suspended solids compared to food A and B, due to the high level of phosphate and nitrogen excreted by fish in test basins.

V. CONCLUSION

This study shows that extruded food is characterized by its energy content, its high digestibility, its best energy digestible / digestible protein ratio and its non-protein energy determining level. This food offers the best growth performance of rainbow trout.

The price of food production is the main factor of production in intensive fish farming. Using extruded diets despite their high price can be justified by their important advantages like:

- Savings resulting from their food efficiency,
- The best feed conversion,
- The reduction of discards,
- The contribution to sustainable aquaculture.

All this requires technical and professional efficiency in the control of food formulation.

Conflict of Interest: The authors declare that they have no conflict of interest.

Ethical approval "This article does not contain any studies with animals performed by any of the authors."

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Innovation Adoption Determinants and Competitive Advantage of Selected SMEs in Ado-Ota, Ogun State, Nigeria.

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Abstract— Rivalry within the Nigerian business environment has made the competitive atmosphere fierce, even amongst small and medium enterprise (SMEs). This has created a dilemma for firms desiring to remain relevant and has informed the urgent need to achieve sustained competitive advantage through innovation adoption. This paper investigated the effect of innovation adoption determinants on competitive advantage of SMEs in Ado-Ota local government area, Ogun State, Nigeria. Empirical and theoretical reviews were used to establish the effect of innovation adoption on competitive advantage. Primary data collected with a pre-tested questionnaire administered to four hundred and forty-six managerial cadre of selected SMEs was used. The regressed data results revealed that innovation adoption determinants exhibited positive significant effects on the competitive advantage of the surveyed selected SMEs. The paper recommends that owners-managers of SMEs should seek to selectively adopt innovation in order to gain competitive advantage and achieve sustainable superior performance over their rivals on the long-run.

Keywords— Innovation adoption, Competitive advantage, SMEs, Technological capability, Financial capability.

I. INTRODUCTION

The dependence on Small and medium enterprises (SMEs) to improve and sustain the economies of developed and developing nations has resonates their fundamental importance in today's business world. Robu (2013), Zafar and Mustafa (2017) sustained that SMEs have the power to fuel household income growth and uplift people from chronic poverty. As catalyst, SMEs drive economic growth and development, and are universally recognized as tools for unemployment deflation (Hassan, 2016; Peña-Vinces, Casanova, Guillen &Urbano, 2017; Zieman, 2014). In addition, Ensaria and Karabay (2014) postulated that a nation's economic vibrancy is a derivative of dynamic and robust small and medium enterprises. Likewise, due to the increased competitive nature of the business environment, scholars (Robu, 2013; Zafar& Mustafa, 2017; Zieman, 2014) in the field of entrepreneurship and stakeholders in the manufacturing industry have been interested in studying and understanding sources of SME performance especially in the aspect of competitive advantage (Agbawodikeizu,2018).

As the global competitiveness continues to follow significant trends, the urgency to embrace innovation adoption as a strategy to gain competitive advantage and stimulate performance of small and medium businesses even in Nigeria has begun to grow (Olughor, 2015). Despite this assertion, very few SMEs in Nigeria have embraced innovation in order to reap its benefits (Taiwo, Falohun, &Agwu, 2016). Furthermore, empirical studies have been conducted to examine the relationship between innovation adoption and firm performance, however not all haveconnected innovation adoption with competitive advantage (Abdu &Jibir, 2017; Eniola&Ektebang, 2014; Ojo, Petrescu, Petrescu, &Bîlcan, 2017; Olughor, 2015; Uchegbulam, Akinyele, &Ibidunni, 2015).

In addition, majority of the aforementioned investigations did not focus on the interactions between innovation adoption and competitive advantage in SMEs in Ota, Ogun State, Nigeria. Moreover, a number of studies carried out in Nigeria (Abereijo&Fayomi, 2005; Akpan-Obong, 2007; Padachi, 2012; Sokoto& Abdullah, 2013) only attributed SMEs' high failure to their inability to achieve competitive advantage without innovation adoption. In light of the foregoing, this study examined the effect of innovation adoption determinants on competitive advantage of selected SMEs in Ota, Ogun State, Nigeria. The work is structured into four main parts such as introduction; literature and theoretical review, methodology, data analysis/presentation, and conclusions/recommendations.

II.   LITERATURE REVIEW

Scholarly discourse within this work focuses on conceptual, empirical and theoretical undertones have been deliberated upon to enable readers have an interesting robust view of authors' positions on the constructs and the interactions between SMEs innovation adoption and competitive advantage.

2.1   Innovation Adoption

Rogers (1995; 2003) portrayed innovation adoption as deliberate decision to initiate and utilize innovation to change the competitive landscape within an industry. This course of action enables entrepreneurs to maximize return on investment. Innovation adoption implies the introduction of a bundle of new practices/actions that contribute decisively to the successful development and progression of the enterprise(Zieman, 2014). The core motive for innovation adoption is to achieve superior organizational performance and increased competitive advantage. According to Agbawodikeizu(2018) innovation adoption is a vivacious process capable of reawakening a dying company as well as providing a formidable base for increased performance in a seemingly vigorous firm. Innovation adoption enables SMEs to survive tensed competition, global economic catastrophe and strive against larger organizations.

Literature have justified that a combination of intrapreneurial culture, technological capability, innovative culture and financial capability will bring about the decision to adopt innovation (Agbawodikeizu,2018). Intrapreneurial culture of SMEs dictates employees' resources use, time and financial budgets to work on unique ideas because they know that creating space for their employees to be inventive yields the most valuable contributions thereby increasing the tendencies to adopt innovations speedily (Gunjan & Bandyopadhyay, 2016). Technological capability constitutes firms'internal ability and future potential to apply firm-specific technological power to solve technical problems and/or enhance the technical functioning of its production process and/or its finished products and to generate new knowledge and skills in response to the competitive business environment (Ince, Imamoglu, &Turkcan, 2016).

Innovative culture consists of constant innovative processes that have dominated an organization's way of life. Employees in a culture of innovation are unafraid to improvise or experiment while managers are risk-tolerant and tend to aggressively search for, create and exploit opportunities (Padilha&Gomes, 2016). Consequently, the financial capability of SMEs is very crucial when it comes to innovation activities and it is an important factor that determines the performance of a firm (Ngah& Ibrahim, 2009). As a result of SMEs' size, SMEs are flexible and are more able to adapt to changes within the market environment than large firms (Aryeetey&Ahene, 2005; Udechukwu, 2003). One of the key means for SMEs to remain competitive in harsh conditions is innovation adoption.

2.2   Competitive Advantage

According to Besanko (2010), a firm achieves competitive advantage if it gains a higher economic efficiency or profit vis-a-vis the average rate of profit in the same market or industry. However, Peteraf (2010) viewed competitive advantage from financial indices with particular allusion to retention of earnings higher than normal which bear resemblance to Besanko (2010). Although financial parameters are not the only measurement of competitive advantage, the work of Porter, 1990) addressed it from strategic perspective by demonstrating that superior performance relative to other competitors in the same industry or the industry average connotes competitive advantage. Similar view-point was observed that competitive advantage is a derivative of firms' buddle of unique agility, warehousing and deploying core competencies to mitigate imitations or duplication of its competitive resources (Gaya, Struwig, & Smith, 2013). Coyne (2010) argues in the direction of creating sustainable competitive advantage with reference to market-centric philosophy; customers need to recognize the differences between a firm's products and those of the competitors. The differences in product, processes and systems must have been created due to the firm's differentials in terms of resources possession and utilization that are not accessible through market structure by its competitors.

Švárová andVrchota (2014) posits that the fundamental thrust of innovation adoption is to create competitive advantage dominance which constitutes the bedrock of business success. Thus, firm's potentials are harnessed, aligned and utilized to achieve predetermined goal by through tactical operational and results-oriented decisions based on adopted innovations. McAdam and Keogh(2004) created a congruence by demonstrating that statistical relationship exists between firms' performance and depth or familiarity with innovation and research. This assertion emanated from an integrated innovation-performance analysis carried which Al-Ansari (2014) sustained among manufacturing firms in Turkey. The gap in McAdam and Keogh (2004) was revisited by Al-Ansari (2014) who explored different aspects of firm performance-innovation (competitive advantage), production, market and financial and presented evidence of symmetrical alignment. Olughor

(2015) contributed to the discussion on how innovation affects business performance in small and medium-sized enterprises (SMEs) in an up-and-coming market, like Nigeria and a profound statistical significant relationship was discovered.

2.3 Innovation Adoption and Competitive Advantage

There is an academic consensus among scholars (Apulu, 2012; Olughor, 2015; Rogger, 2003) regarding the positive effect of innovation adoption on SMEs' performance with respect to competitive advantage. Notable researchers (Apulu, 2012; Love & Roper, 2015; Rajapathirana& Hui, 2017; Skiltere&Jesilevska, 2013) have systematically examined innovation adoption and its effect on the competitive advantage of SMEs with result pointing to positive relationship. The aforementioned studies assert that certain firm-specifics enhance the ability of SMEs to adopt innovation, thus improving their competitive advantage. Correspondingly, Aziz and Samad (2016) examined firm-age moderating effect on the interaction between innovation adoption with results indicating strong positive impact on competitive advantage.

Likewise, Otejere, Amadi, Echendu and Okorhi (2015)study revealed that innovation has a strong positive impact on competitive advantage which Aziz and Samad (2016) seemed to sustain.Corroborating the results of Otejere, *et al* (2015) and Aziz and Samad (2016) is Akinwale, Adepoju and Olomu (2017) that innovation adoption significantly drives competitive advantage especially product innovation. In a similar perspective, Salehi and Abdollahbeigi (2017) revealed that that constant investment in productand technology innovation had a significant relationship with firms' competitive advantage. Synthesis of the different views appeared to show that new or improved product or process of production continues to create firm's competitive advantage over others in themarket.

This study by Akinwale, Adepoju andOlomu (2017) on the impact of technological innovation on SME'sprofitability in Nigeriaexamined the impact of research and development (R&D) expenditure, product and process innovations on SMEs performance in the manufacturing industry in Nigeria. The results with least squares method showed that R&D spending by the firms as well as product and process innovation has significant impacts on the firm's performance. Also, training of workforce constitutes the major innovationactivities in the Nigerian manufacturing SMEs as against in-house andoutsourced R&D activities. This study suggests improvement in R&D spendingand other technological activities which are expected to increase

SMEs'profitability and thus generate more employment in the country.

2.4 Diffusion of Innovation Theory

Diffusion of Innovation Theory (DOI) was first introduced by Everett Rogers (1995) to elucidate the diffusion of innovation process. The theory seeks to explain how, why, and at what rate new ideas and technologies spread. The spreading out of innovation is a process by which, through certain channels, innovation is communicated among the members of a social system over time (Rogers, 1995). Consequently, it is a process that spreads innovation out from its discovery or creation-source to the user or its adapter, a process that occurs in the society as a group process (Rogers, 2003). Diffusion of innovation theory model expresses that people cannot potentially expect to accept innovation as long as adopters lacks information or not aware of the innovation or its benefits. Awareness and positive mind-set and attitude toward innovation come from information about innovation (Rogers, 1995 & 2003).The adoption of innovation is considered as part of the innovation diffusion process and a measure of its success (Murad &Thomson, 2011).One of the reasons for the adoption of innovation is the desire of organizations to achieve superior organizational performance and proliferation of competitive advantage. In Nigeria, SMEs recurrently prove Roger's innovation theory appropriate but the practice is hindered by lack of information and at times unconsciously diffused.

2.5 Dynamic Capability Theory

The Dynamic Capabilities Approach emerged in the 1990s and added the missing dynamic perspective to the Resource-Based View. Teece, Pisano, and Shuen(1997) disseminated the concept of dynamic capabilities, which encompasses the capacity to perceive and seize new opportunities, to reconfigure and protect knowledge resources and assets, as well as competencies and complementary resources, in order to achieve sustainable competitive advantage. Dynamic capability theory entails the ability of a firm to speedily coordinate, integrate, build and reconfigure internal and external competences in order to achieve competitive advantage in a rapidly changing environment (Lim, Stratopoulous,&Wirjanto, 2012; Teece, Pisano,& Shuen,1997).

The dynamic capabilities view focuses on the issue of competitive survival in response to rapidly changing contemporary business conditions. It explicates the rationale behind some enterprises that are able to steadily achieve competitive advantage in dynamic markets (Ferdinand, Graca, &Easterby-Smith, 2004). The criticisms of dynamic capability theory are that the theory is incomplete in terms

of specifics (Arend&Bromiley, 2011). They argue that the theory is not able to explain when there is need for a change and when not to change.Since dynamic capability theory includes those capabilities required to address consumer changes and technological opportunities (Teece, 2007), it can also support the understanding of innovation adoption of firms, which is the focus of this study.

III. METHODOLOGY

This study was premised on the framework that showed the relationship that exists between innovation adoption and competitive advantage. The a priori expectation is that innovation adoption exhibits positive significant effect on competitive advantage. In order to achieve the aforementioned, the study adopted survey research design and stratified sampling technique in order to collate primary data over a section of time. The total population comprises of two thousand, four hundred and twenty-five management staff of selected SME's domiciled in Ado-Ota local government area. The SME's were selected based on their registration with Small and Medium Enterprises Development Agency of Nigeria (SMEDAN) with constant operational period of above five(5) years. The sample size was determined through Yamane (1967) which gave a scientific size of three hundred and forty-three (343). 30% non-response rate was added to cushion for attrition. The sample size arrived at was four hundred and forty-six(446).

The study used a 6-point Likert-type scale questionnaire with specific items ranging from strongly agree to strongly disagree and the instrument contains three sections:section A coveredrespondents' bio-data, B consisted of innovation adoption variables (i) intrapreneurial culture (ii) technological capability (iii) innovative culture (iv) financial capability, and C covered competitive advantage.The research instrument's validity was established through exploratory factor analysis with Kaiser-Meyer Olkin (KMO) test value of 70 percent and Bartlett's Test of Sphericity with p-value < 0.05. KMO and Bartlett's

Test of Sphericity measure sampling adequacy and Average Variance Extracted (AVE) > 0.05 was conducted as additional evidence of convergent validity. The internal consistency reliability was established with Cronbach Alpha Coefficient ranging from 70% to 90%

Model Specification
The model was specified econometrically;

Y	=	f(X)
X	=	(x_1, x_2, x_3, x_4)
IA_t	=	Innovation Adoption Predictors (IAP)
y_1	=	Competitive Advantage (CA)
x_1	=	Intrapreneurial Culture (IntC)
x_2	=	Technological Capability (TC)
x_3	=	Innovative Culture (InnC)
x_4	=	Financial Capability (FC)
β_0	=	Constant Term
β_1-β_4	=	Regression Coefficients to be estimated
CA	=	$\beta_0 + \beta_1 IntC + \beta_2 TC + \beta_3 InnC + \beta_4 FC + \mu_i$ ….…………...Eqn (1)

In order to ensure anonymity of the respondents, the researchers ensured that names and other respondents' traceable personal details were not sought for or documented anywhere in the study. Also, in the course of carrying out the research, the researchers gave ensured that considerable attention to ensure confidentiality and voluntary participation in data collection.

Results and Discussions

The major focus of this study is to investigate the effect of innovation adoption on competitive advantage of selected SMEs in Ado/Ota Local government area. The analysis was ascertained via the aid of the statistical package for science solution (SPSS 21.0). Tables 1(a) and Tables 1(b) depicts the multiple regression output of the variables under study with results of the fitness of the model, analysis of covariance, coefficient of determination. The findings, interpretation and implications follow thereafter.

Table.1(a): Regression Model Summary

Model		Sum of Squares	Df	Mean Square	F	Sig.	Std. Error of the Estimate
1	Regression	741.009	4	185.252	24.929	0.000[b]	2.726
	Residual	2801.577	377	7.431			
	Total	3542.586	381				
R = 0.457[a]; R Square = 0.209; Adjusted R Square = 0.201							
a. Dependent Variable: Competitive Advantage							
b. Predictors: (Constant), Financial Capability, Intrapreneurial Culture, Innovative Culture, Technological Capability							

Source: Field Survey Result, 2018

Table 1(a) elucidates the multiple linear regression analysis which reveals the overall model fit of innovation adoption on competitive advantage of selected SMEs in Ado Ota local government area, Ogun State. The regression equation in Table 1(a) depicts that innovation adoption proxied by financial capability, intrapreneurial culture, innovative culture and technological capability can be explained by 20.1% of the variability in competitive advantage (Adj.

R^2=0.201, p<0.05). The correlation coefficient, R at 20.9% denotesa low/weak positive relationship between the prognosticators, innovation adoption on competitive advantage of selected SMEs. This implies that discrepancies in the financial capability, intrapreneurial culture, innovative culture and technological capability have positive outcomes on competitive advantage of selected SMEs.

Table 1(b) Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.779	1.616		6.053	0.000
	Intrapreneurial Culture	0.031	0.069	0.025	0.451	0.652
	Technological Capability	0.092	0.058	0.093	1.574	0.116
	Innovative Culture	0.180	0.063	0.165	2.863	0.004
	Financial Capability	0.267	0.054	0.277	4.980	0.000

Source: Field Survey Result, 2018

The established regression equation is expressed as follows:

CA = 9.779 + 0.031IntC + 0.092TC + 0.180InnC + 0.267FC

Where: CA   =   Competitive Advantage

IntC   =   Intrapreneurial Culture

TC   =   Technological Capability

InnC   =   Innovative Culture

FC   =   Financial Capability

The regression equation above indicates that holding all the independent variables (intrapreneurial culture, technological capability, innovative culture and financial capability) to a constant zero, competitive advantage of selected SMEs would be 9.779. The findings also show that taking all other independent variables at zero, a unit increase in intrapreneurial culture would cause an increase in competitive advantage of selected SMEs by a factor of 0.031. The findings also show that taking all other independent variables at zero, a unit increase in technological capability would cause an increase in competitive advantage of selected SMEs by a factor of 0.092. A unit increase in innovative culture would cause an increase in competitive advantage of selected SMEs by a factor of 0.180. Also, an increase in financial capability would cause an increase in competitive advantage of selected SMEs by a factor of 0.267. This clearly shows that intrapreneurial culture, technological capability, innovative culture and financial capability has positive effect on competitive advantage of selected SMEs. The results further reported that innovative culture (β = 0.180. t = 2.863, p<0.05) and financial capability (β = 0.267,t = 4.980,

p<0.05) are statistically significant in predicting competitive advantage of selected SMEs while intrapreneurial culture (β = 0.031, t = 0.451, p>0.05) and technological capability (β = 0.092. t = 1.574, p>0.05) were not significant. In the results, financial capability had the greatest and significant effect on the competitive advantage of selected SMEs(β = 0.267,t = 4.980, p<0.05) followed by innovative culture (β = 0.180. t = 2.863, p<0.05). In coming up with the final model, only the significant variables, financial capability and innovative culture were retained. The regression equation established becomes:

CA = 9.779 + 0.180InnC + 0.267FC …..…………………………..…… Eq. (ii)

For testing the hypothesis, the regression coefficients should be significantly different from zero [βi ≠ 0 (i = 1, 2]. Since some of the regression coefficients were not significant and not also statistically different from zero as indicated in Table 1b, the hypothesis cannot be rejected.

IV.   DISCUSSION OF FINDINGS

The findings have strong implications for economies striving to gain competitive edge for the potential SME

population in that have outgrown the earlier challenges of the "liability of newness" as the focus were firms in operation for over five (5)years. It implies that ensuring that the capabilities in the organization operate in an innovative atmosphere, will have implied effect in bring out the intrapreneurial capabilities in the unique human resources and will help differentiate them in the industry in which the firms play. Consequently, these intrapreneurs are able to utilize technological capabilities and financial capabilities in providing increase the competitive advantage of the firm.

The results of multiple regression analysis for effect of innovation adoption predictors (intrapreneurial culture, technological capability, innovative culture and financial capability) on competitive advantage of selected SMEs showed a significant effect. Although, the results showed positive relationship between the variables, only financial capability had the greatest and significant effect on the competitive advantage of selected SMEs(β = 0.267,t = 4.980, p<0.05) followed by innovative culture (β = 0.180. t = 2.863, p<0.05).

This finding is in congruence with previous studies carried out by Aziz and Samad (2016), Soltani and Hosseini (2012), Ekawati*et al.* (2016) and Akinwale*et al.* (2017) who found that innovation in product technology had a significant relationship with competitive advantage. The findings of this study are supported by Otejere,*et al* (2015) who found that innovation has a strong positive impact on competitive advantage. The findings of this study are also concurrent with the results established by Rahaman and Chowdhury (2016) in their research which showed that ICT adoption can directly contribute to improving the performance of service SMEs in a different way and supporting to face challenges in a competitive business world to gain significant competitive advantage. The result is also supported by studies carried out Padilha and Gomes (2016), Motilewa*et al.* (2015) and Ulusoy*et al.* (2015) where they found that innovation culture and financial capability have greater influence on the process innovation. They also concluded that financial capability was important in determining the response of bank lending to the SMEs and highlighted how a stable and efficient financial sector promotes SMEs' growth.

V.   CONCLUSION/ RECOMMENDATION

This study examined the effect of innovation adoption determinants on competitive advantage in selected SMEs in Ado-Ota local government area of Ogun State. The result revealed that innovation adoption is a major driver for achieving firm's competitive advantage. The theoretical framework supported the findings of the study which is the

dynamic capabilities theory. The theory focuses on the issue of competitive survival in response to rapidly changing contemporary business conditions. It explains the reason why some enterprises are able to steadily achieve competitive advantage in dynamic markets through technological capability, intrapreneurial culture, innovative culture and financial capability.

The study recommends that SMEs owners should incorporate an innovative culture and mindset to compete in the highly volatile business environment. Consequently, resources and investments should be inclined to research and development in order to meet up with current trends to enhance top-notch product or services. Government should encourage SMEs owners by providing flexible loan scheme with little or no interest attached to it.

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Design and Simulation of Photonic Crystal Fiber with Low Dispersion Coefficient in Band Terahertz

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Abstract— *In this paper, a hexagonal solid state photonic crystal fiber at frequency 10 THz is presented. First, by finding the main conductive model and its dispersion rate to evaluate dispersion changes based on the fixed changes of fiber network in the main mode with the goal of achieving the lowest dispersion rate. In the next section, dispersion variations are measured and evaluated based on changes in the size of the radius of the cavities of the photonic crystal fiber area. Then the fiber-forming cavities of the fiber region have become elliptical geometry, and the size of the disintegration has been discussed for this change. Finally, by changing the refractive index of the fiber substrate region, the size of the disintegration has been investigated. For the geometries of all the steps that have the least disintegration, an optimized structure is obtained. In this way, the proposed structure has a dispersion rate of -75×10^{-3} ps/(nm km), which is a good fit for similar designs.*

Keywords— *photonic crystal fiber, dispersion, refractive index, substrate.*

I. INTRODUCTION

Today, the terahertz band is highly regarded by its electrical researchers because of its widespread use, such as medical, astronomy, imaging security detection, and so on. The frequency range of the terahertz band is between 0.1 to 10 THz .To date, many advances have been made in the field of methods for producing and detecting terrestrial waves, but most of the terahertz systems today have large dimensions and due to the lack of effective waveguide transmission in the field of terahertz, relies on the release of free space are . It's very difficult to control and direct these waves from this. In addition, terahertz radiation is strongly absorbed by the airborne vapor . To overcome these problems, the use of photonic crystal fibers to transmit these waves from terahertz waveguides is. One of the basic ways to send THz waves The use of photonic crystal fibers. Photonic crystal fibers have the same characteristics as common optical fibers, such as acting on a single-mode broadband, dispersing surface control [1,2], and so on. And usually, the PCF has a cross-section consisting of numerous cavities compared with optical fibers,

such as acting on a single-mode, broadband, having a cross-section consisting of numerous cavities (which are usually intermittent) (inside the silicon cavity) Which is both surrounded by solid silica. Nucleated fiber core and solid core . The guidance mechanism is provided using a change in the principle of the overall internal reflection or the effect of the photonic band gap. These fibers are used for various applications with attention to . The simplest type of PCF is solid core fiber consisting of a regular hexagonal network with small air cavities with center defects that is guided by the correction of the general internal reflection principle. So far, many scholars have worked on the hexagonal structure [3,4,5,6,7], and have been trying to improve fiber optics. In fact, the structure of crystal photonic crystal is such that ,the combination of air cavities (vents) in the shell section results in a reduction of the effective mean effective failure coefficient, which allows more variation in the coefficient of bridges and strange dispersal properties . The solid core fibers in which the shell has a higher fill rate of more than of the air leads to an effective delta parameter that is called high-fiber or spider fiber, which is dependent on cross-sectional dimensions. The enclosed field in the solid core, based on the effect of the photonic band gap, requires periodic arrangement of air cavities in the wavelength scale with an air filling coefficient sufficiently high in the shell to obtain a level surface in the gap of the bond For , the emission level is within the specific wavelength range.

The conduction of light in a solid core (photonic band gap fibers) is shown using a hexagonal pattern of air cavities in silicon as a shell; this arrangement makes it possible to direct light in gases. The conductive conductor in the solid core is not fully centralized and part of the power can still be transmitted through the air.

In this paper, we first tried to evaluate a hexagonal crystalline fiber and its disintegration. Continue with changing the radius of the cavities, turning the cavity to the elliptical cavity, and finally, with the fluid, the refractive index of the substrate, the amount of dispersion to the minimum amount possible. The fiber deflection design is small compared to other designs

with a high dispersion. A detailed description of the design is presented in the next section.

II. HEXAGONAL PHOTONIC CRYSTAL FIBER DESIGN

In the design of photonic crystal fiber, the microstructure of solid core is used. The photonic crystal fiber is composed of a silica substrate with a deflection coefficient of 1.4 and a coating area of 5 hexagonal circles with spherical cavities with a radius of 10 µm, with the removal of two rows of holes in the middle of the structure. In this structure, the ratio of radius changes to the fixed crystal photonic fiber network r / a = 0.40. The shape is used to create a hexagonal network in the fiber core of the photonic crystal core of the coding. Use of structured code to examine all parameters of the holes and geometric components of the structure as a unit parameter is essential. In the simulation of the structure of the numerical method (the method of the limited time difference variable in the time domain), this method is used to simulate waveguide devices, so in this method, all waveguide tools based on their constituents in two or three Next, a two-dimensional cross-sectional form of effective spraying material forms on the. By applying the varFDTD and PML boundary simulation in this structure, MODE Solutions software at 10 frequency terahertz, which is considered the optimal wavelength in the optical communication domain, has many conductive modes and unstable modes in the structure. Therefore, for the analysis of photonic crystal fiber and disintegration control, there should be a principal direction or a mode of investigation. The main conduction mode in this crystal is photonic crystal in the core at the frequency of 10 THz. The graphical representation of the main mode of conduction in a solid-state photonic crystal fiber is shown in Fig. 2
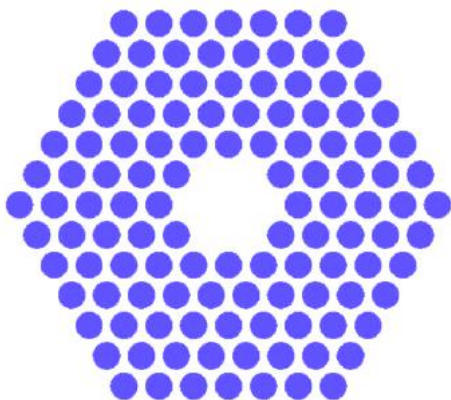

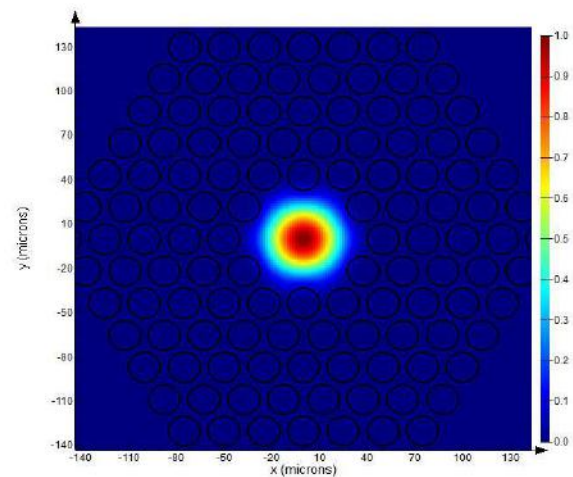*Fig.1: The design of a solid-state photonic crystal fiber structure*

Fig.2: The main mode of conduction in the design of fiber at a frequency of 10 THz with a core core and fixed network is 10 and 25 µm respectively

In the next sections, the simulation will be done by changing the radius of the core, the fixed network size, the coverage area, the change in the geometry of the fiber core, and the change of the refractive index of the core to improve and control the disintegration of the principal mode of design. In all simulations, all simulation parameters of the same structure are assumed. It's worth noting that this dispersion rate with this numerical method in this design, in turn, is unique to solid-state photonic crystal fibers like.However, we try to achieve the lowest degree of disintegration in the conduction modes by performing various evaluations of the photonic crystal geometry of the solid core and the refractive index of the substrate material. In all simulations, the main mode is guided and the results are plotted.The structure of the fiber provided by varFDTD numerical simulation and analysis.

III. CALCULATE THE DISPERSION IN A PHOTONIC FIBER CRYSTAL

3.1 Hexagonal constant variation

At this stage of the simulation, we will evaluate the splitting of the solid-state photonic crystal fiber by changing the fixed size of the solid fiber photonic crystal . To carry out this assessment to significantly reduce disintegration, we change the fixed size of the crystal crystal network of the solid state photon from 24 to 46 µm at 21 simulation points.In this simulation, the radius of the mesh cavities is considered to be the structure of the 10 µm structure. With this swap, it is observed that the least disintegration is in the range of -0.05 $ps/(nm\ km)$, 32 µm constant at the frequency of 10 THZ . Fig(3)
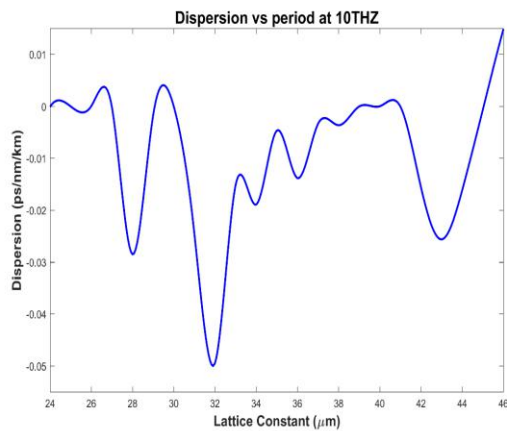
Fig.3: fiber dispersion assessed by measuring the change in frequency of 10 THz solid core photonic crystal fiber lattice constant

To find out about the accuracy of the evaluation, we simulate the simulation by resizing the photonic crystal network to 32 μM and the radius of the cavities in the coverage region of 10 μM. It is seen that the main conduction mode has a dispersion of -0.05 $ps/(nm\ km)$. It turns out that the accuracy of our disintegration assessment is verified by a fixed size coupling of a hexagonal photonic crystal network. Figure 4 illustrates the main modes of guidance obtained by this evaluation.
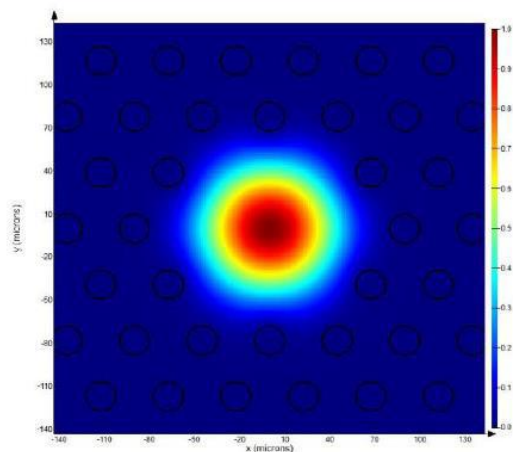
Fig.4: The main mode of conduction obtained from the evaluation of fiber dispersion by resizing the crystal lattice network Hexagonal photon from 24 to 46 μm

3.2 Change the cavity gap coverage

In the last step of our simulation to obtain the best conductive mode with the least degree of dispersion, with the same change approach, the radius of all the cavities of the fiber core of the crystalline solid core is discussed. To perform this evaluation to reduce disintegration, we first consider the fixed size of the photonic crystal fiber obtained from step a We consider 32 micrometers. We first consider the fixed size of

the photonic crystal fiber network, which then calculates the radius of the radius of all the cavities of the photonic crystal fiber area from 5 to 15 μM, so that we can evaluate the disintegration changes in the structure by numerical simulation. With this swap, it is observed that the minimum sputter is suspended at -0.06 $ps/(nm\ km)$, to the cavities of the region with a radius of 15 μM (Fig. 5).
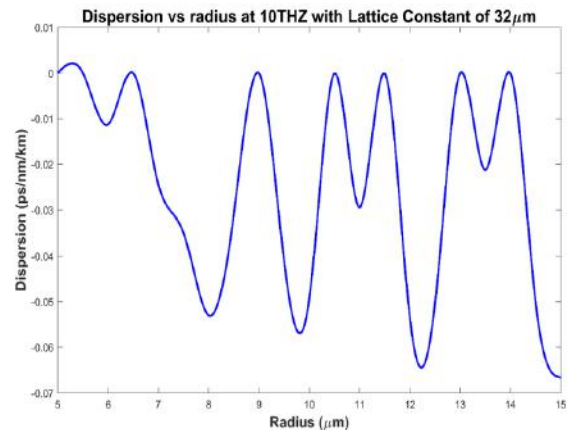

Fig.5: Estimation of fiber splitting by the radius of the cavity area of the coating. This assessment was performed by fixing the core radius , which is derived from the evaluation of step a.

Compared with the degree of disintegration in the state a, the disintegration is measured by changing the fixed size of the fiber network, and this state is observed, which is reduced to 16×10^{-3} $ps/(nm\ km)$. To find out the accuracy of the evaluation, the simulation is observed by varying the radius of all the cavities of the photonic crystal fiber area to 15 μM and by keeping the values obtained from step a, which is the principal mode of conduction having a dispersion 7×10^{-3} $ps/(nm\ km)$. It is obtained on that verifies the accuracy of our disintegration evaluation by the size of the cavity of the hexagonal mesh hole in the solid state photonic crystal. Figure 6 shows the main mode of guidance obtained by this assessment.
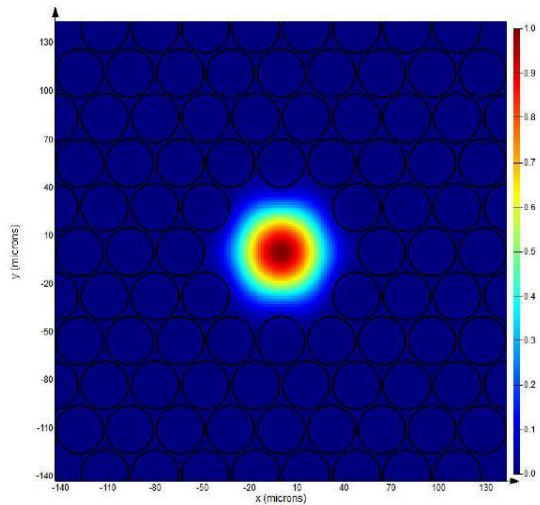
Fig.6: The main mode of conduction obtained from the evaluation of fiber splitting by resizing the cavities of the hexagonal mesh area of the crystal The solid core photon from 5 to 15 µM at 10 THZ frequencies is an optimum size of 11 µM

3.3 Slippage of the cavities of the area

As we already know, the change in structure geometry causes a change in the photonic band gap and is very effective in limiting strong light. According to the latest research, the transformation of defect cavities in photonic crystal waveguides, especially fiber, has resulted in a large increase in the frequency of the photonic band gap, which results in intensification of light-sealing operations.

In this phase of our simulation, we obtain a fuller and larger photon band gap and a main conduction mode with the least degree of disintegration with the approach of changing the geometry of the core cavity in solid-state photonic crystal fiber. To carry out this assessment for a significant reduction of disintegration, we first plotted the fixed size of the photonic crystal fiber from step a. (32 µM) and the radii obtained in step b for fiber area cavities (12 µM), then we change the size of the second radius of the coating area from 15 to 25 µM.

Obviously, the resulting shapes will have elliptical geometry. Sipes evaluate numerical simulation of disintegration in a photonic crystal fiber core with elliptic geometry.

With this swap, it is observed that the minimum disintegration of $-7\times 10^{-2}ps/(nm\ km)$ is 15 µm radius, ie, a circular state. Figure 7 shows the effects of changes in the second circle radius to achieve a minimum spatial resolution in the structure for the elliptic geometry of the core region.

To find out the accuracy of the evaluation, the simulation is observed by varying the horizontal and vertical radii of the cavity of the photonic crystal fiber coating region to 15 and 15 µM, respectively, and by keeping the values obtained from

step a The primary mode is a dispersion conductor of -$0.07ps/(nm\ km)$ which confirms the accuracy of our disintegration evaluation by the Swing transforming the spherical geometry of the nucleus through a hexagonal network of photon crystals of the nucleus.As already mentioned, the casualties are also reduced at this stage. The figure shows 8 main modes of guidance given by this evaluation.
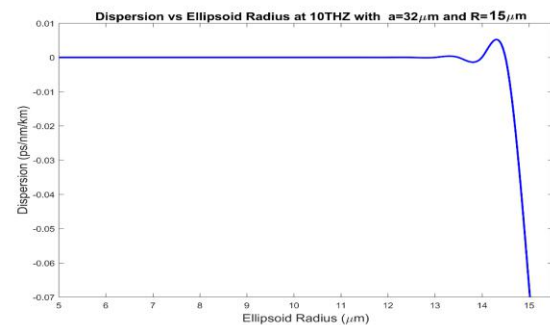

Fig.7: Evaluation of fiber splitting by the second radius of the area of the cavity at the frequency of 10 terahertz
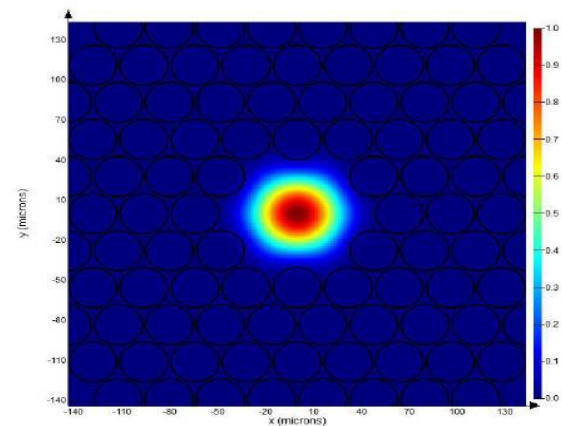

Fig.8: The main modes of conduction obtained from the evaluation of fiber splashing by the spin geometry swap area of the region. Coating to the hexagonal network of photonic crystals of solid core from 5 to 15 µm at a frequency of 10 THZ

3.4 Change in refractive index of substrate material

In addition to the change in the structure geometry that changes the photonic band gap, the changes in the refractive index of the material of the substrate material of the photons inside the cavity also cause changes in the photonic band gap and the intensity of light capture. In this section of the simulation, the degree of disintegration of the substance of the fiber substrate is evaluated. In the last step of our simulation to obtain the best conductive method with the least degree of disintegration, we consider the refractive index of the material of the substrate material of a solid-state photonic crystal. In order to obtain the lowest degree of disintegration,

we first obtain the fixed size of a photonic crystal fiber (32 μM), the radii obtained for the fiber area cavities (15 μM).Then, change the refractive index of the material of the solid-state photonic crystal cell base from the refractive index of the glass 1.4 to 3.4 times the GaAs refractive index.

Then, by performing numerical simulations, we will evaluate the diffusion changes in the photonic crystal fiber core with a change in the fractional deflection . With this switch, it is observed that the minimum disintegration is -75× $10^{-3}ps/(nm\ km)$ to the coefficient Failure 1.6 belongs. Figure 9 shows the variation of the refractive index in order to achieve disintegration in the drain, in exchange for the refractive index of the solid-state photonic crystal fiber substrate.

To find out the accuracy of the evaluation, the simulation is observed by varying the refractive index of the material of the photonic crystal fiber substrate to 7.2, and by keeping the values obtained from steps c, b, and a, the main mode of conduction has a disintegration rate -75× $10^{-3}\ ps/(nm\ km)$, which confirms the accuracy of our disintegration assessment by the spin-angular geometry swap to the elliptical cross-sectional network of the six-core cross-section of the photonic crystal. As already mentioned, the casualty rate has dropped to this level. Figure 10 main modes of guidance obtained by this assessment shows.
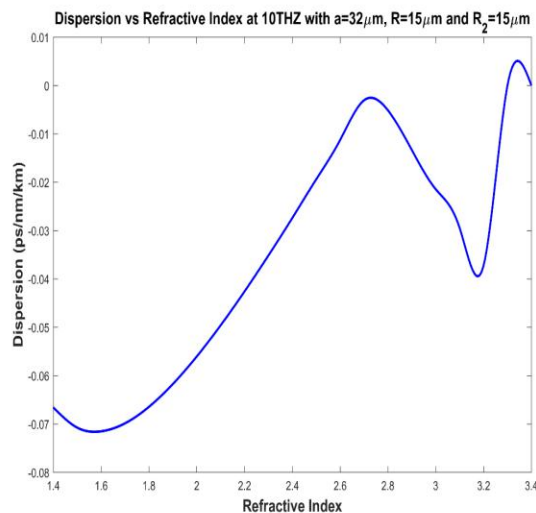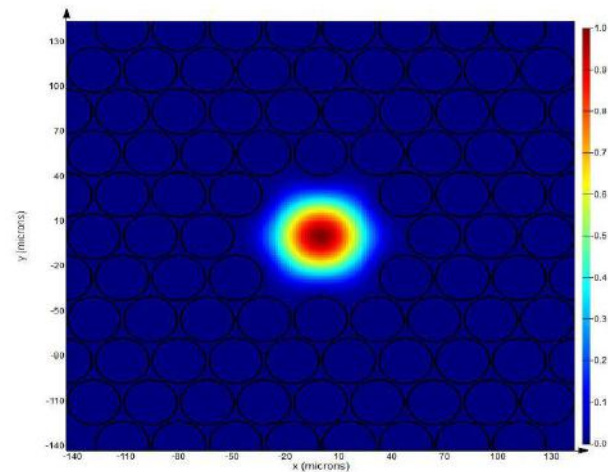

Fig.10: The main mode of conduction obtained from the evaluation of fiber splashing by the refractive index of the substrate material of the hexagonal network of photonic crystal solid core from 1.4 to 3.4

According to the steps a through b, it was found that the disintegration rate could be reduced by the geometric changes in the fiber structure and the change in the coefficient of defect in the substrate material. In this structure, the degree of spraying has been reduced step by step, and its structure and guiding mode are depicted in Figures 11 and 12. The structure has a disintegration of -75× $10^{-3}\ ps/(nm\ km)$, simulated and analyzed by varFDTD method. The geometric properties of the structure have been obtained during the above steps, and for confirmation and repeatability of the simulation, several steps have been carried out to verify its accuracy.
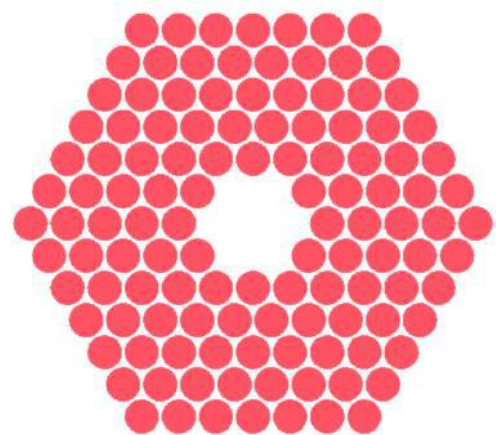

Fig.9: Fiber disintegration evaluation by refractive index variations of the material of photonic crystal fiber at a frequency of 10 THZ

Fig.11: Optimized structure of photonic crystal solid hexagonal core during steps a to e
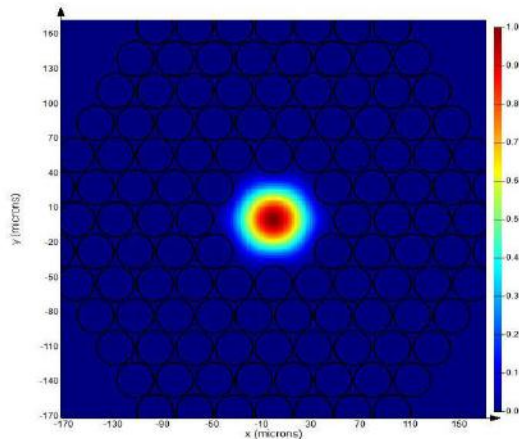
Fig.12: The main mode of conduction obtained for the optimized structure of the hexagonal helix fiber photonic crystal core during the steps a to d at 10THZ frequencies

IV. CONCLUSION

In this paper, a hexagonal solid-state hexagonal crystal fiber in the terahertz band was presented. Geometric changes in the fiber structure and the variation in the refractive index of the substrate material led to a reduction in dispersion.

So that by making changes to optimize the fiber dispersion coefficient, we could reach the dispersion rate to -$75 \times 10^{-3}\, ps/(nm\ km)$, which is an optimal amount for photonic crystal fibers. As the photonic crystal fiber can be converted into an important candidate in the field of photonic photoconductivity, it can be applied in the industrial field

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