BRIEF ON ICSESS CONFERENCE

The International Conference on Science, Engineering and Social Science, ICSESS is a Multidisciplinary International Conference organized annually by the International Students Society-Nigeria (ISS-Nigeria UTM) under the collaboration and supervision of UTM International Office.
Its objectives are to:
i. Share novel knowledge;
ii. Promote networking among researchers;
iii. Encourage research and publication among UTM Students, the university community and non- UTM students alike; and
iv. Boost UTM visibility globally and contribute in raising the University's global ranking.

The Conference is domiciled in Universiti Teknologi Malaysia and have the following thematic areas:
* Computing & Sciences
* Engineering
* Earth & Environmental Sciences
* Education
* Humanities and
* Social Sciences.

The Conference was held in 2015, 2016 and 2017. Since then, the conference was not held until this year 2021 under the current leadership of ISS-Nigeria, the executive decided to revive it for its immense benefits to UTM students, the university community and non-UTM alike.

This year's Conference is the 4th in the series of ICSESS Conference since inception.
It is scheduled to hold online between 29th and 30th November, 2021 with the theme:
"Promoting Multidisciplinary and Innovative Research in the New Normal".
A total of 63-papers were received but only 46 Extended Abstracts from different disciplines were registered, reviewed and accepted for presentation at the Conference after which will be sent to Scopus-indexed journals for their selection and publication process.

The Conference promises to be robust and intellectually rewarding engagement as Pre-Conference Workshop is now added to the Conference.

We believe that the knowledge that would be shared will benefit all the participants and many more people around the globe.

Thank you.
Abdullahi Tanko Mohammed
(President, ISS-Nigeria UTM 2020-2021)

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ICSESS 2021

4 **International Conference on Science, Engineering, and Social Science**

Conference IT Proceedings

Normal

Theme:
Promoting Multidisciplinary and Innovative Research in the New-Normal

29th - 30th/11/2021

ICSESS
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4 International Conference on Science, Engineering, and Social Science

Conference Proceedings

Theme:
Promoting Multidisciplinary and Innovative Research in the New-Normal

29th - 30th/11/2021

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BRIEF ON NiSA/ISS-NIGERIA, UTM

ISS-NIGERIA UTM actually started from NiSA, when Nigerians started going to UTM for postgraduate studies. The few that were there then came together to form what was then called NiSA meaning Nigerian Students Association. That was done simply to get themselves organized, frameworked and formed a platform under which the interest of Nigeria and Nigerians is both promoted and protected.

Having seen what the association could achieve, UTM borrowed a leaf, the SPS then asked for the NiSA constitution, studied it and adopted it. As a result UTM came up with what is called today as ISS - International Students Society and then it began to register country chapters with the central body at the top. It has always been a thing of pride for Nigerians as the ISS was eatablished following the steps of NiSA.

Activities of ISS-NIGERIA include organising training workshops and public lectures, celebrating nigeria national day and other festivities, orientation for new students, conference (ICSESS Conference), etc.

All the activities of ISS Country chapters in UTM including ISS-NIGERIA is approved and supervised by the UTM International Office (formerly called ISC, meaning International Students Center).

ICSESS 2021

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9.	Dr. Ibrahim Kayode Adenuga	2016 - 2017
10.	Dr. Yahya Gambo	2017
11.	Hassan Ibrahim	2017 - 2018
12.	Dr. Ashiru Garba	2018 - 2019
13.	Abba Kyari Buba	2019 - 2020
14.	Abdullahi Tanko Mohammed	2020 – Date.

SCHEDULE OF PROGRAMMES

Day 1, (29th/11/2021)

Program	Time
Special Anthem	8.00am
Opening prayer	8.05am
Opening Speech /Introduction of Special Guests by Conference Chair	8.10am
Welcoming Address by Chief Host,	8.30am
Citation of the Guest Speaker	8.35am
Guest Speaker Prof. Abdullahi Bala	8.45am
Citation of 1st Keynote Speaker	9.10am
1st Kenote Address-Prof. Chew Tin Lee	9.20am
Citation of 2nd Keynote Speaker	9.45am
2nd Keynote Address- Assoc. Prof. Dr. Noor Hazarina Hashim	9.55am
Vote of Thanks byPresident ISS-Nigeria Mr. Abdullahi Tanko Mohammed	10:20am
Announcement and Photo Session	10:25am
Closing Break	10:35am
Technical Session i-iii	12;00am-1:00pm
Break	1.00pm-2:00pm
Parallel Sessions iv-vi,.. continues	2.00pm-3.45pm
Day 1 closes	3:45pm-4:00pm

Day 2, (30th/11/2021)

Program	Time
Opening prayer	8.00am
National Anthem	8.05am
Guest Speaker	8.10am
3rd Keynote speaker : Prof. Datuk Wei Chuang Beng	8.40am
4th Keynote speaker: Prof. Engr. Emenike C. Ejiogu	9.10am
Pre Technical Session Break	9.40-11.54 am
Join Technical Sessions	11.55-12.00noon
Technical Session vii-ix	12.00noon-1.00pm
Technical Session x-xii	2.10pm-3.40pm
Break	3.40-3.50pm

Closing Program (30th/11/2021)

Program	Time
Opening Prayer	3.50pm
National Anthem	3.55pm
Welcoming Speech by Conference Chair	4.00pm
Speech by Special Guests	4.10pm
Montage Presentation	4.30pm
Award ceremony by Conference Chairman	4.35pm
Vote of Thanks by ISS-Nigeria President	4.45pm
Closing Prayer	4.55pm
Photo Session	4.58 pm
Exit event platform	5.00pm

Technical Session Day I: Monday, 29th November 2021

Session I: Management and Business
Chair: Mohammed Umar Dikko

Paper ID No.	Time	Title
045	12:00pm - 12:10pm Q&A 12:10pm – 12:15pm	Impact Of Bank Credit On Capital Structure Of Non-Financial Firms In Africa. **Ahmed Balarabe Musa, Mohammed Zubairu, Adamu Yahaya and Ahmed Mohammed**
046	12:15pm - 12:25pm Q&A 12:25pm – 12:30pm	Analysis Of Poverty Status And Income Diversification Strategies Among Small Scale Sorghum Farmers In Kano State, Nigeria. **Ahmed Balarabe Musa, Mahmud M. Hamisu, Usman Abdullahi and Shuaibu Muhammad**
056	12:30pm - 12:40pm Q&A 12:40pm – 12:45pm	Green Supply Chain Management And Performance Of Listed Oil And Gas Firms In Nigeria: A Moderating Role Of Internet Of Things. **Abba Adam, Halima A. A Yusuf, Abubakar Abubakar, Ibrahim Labaran Ali, and Shehu Usman Hassan**

Session II: Civil Engineering
Chair: Dr Edo Oga Ojoko

Paper ID No.	Time	Title
014	12:00pm - 12:10pm Q&A 12:10pm – 12:15pm	Photocatalytic membrane technology for oilfield produced water treatment - a review **Ojo Samuel**
066	12:15pm - 12:25pm Q&A 12:25pm – 12:30pm	Sustainable Filling Of Underground Mining Voids Using A Mixture Of Paste And Aggregate Waste. **Masih Rashidi**
068	12:30pm - 12:40pm Q&A 12:40pm – 12:45pm	Review of the impact of landfill leachate formation, toxicity evaluation, and treatment methods used in some of Nigeria's most populous cities **A. Ishaq, M. I. M Said, S. B. Azman, S. A. Wada**

Session III: Education
Chair: Dr. Muddassir Ahmad Gado

033	12:00pm – 12:10pm Q&A 12:10pm – 12:15pm	School Dropout Form Among Junior Secondary School In Kebbi State, Nigeria. **Bashiru Musa Said**
055	12:15pm – 12:25pm Q&A 12:25pm – 12:30pm	Perception Of Physics Teachers'continuous Professional Career Development And Curriculum Implementation Practices In Jos North Senatorial Zone Of Plateau State. **Gana, C. S., Suleiman, A**
060	12:30pm – 12:40pm Q&A 12:40pm – 12:45pm	Teacher Qualification And Students Performance In Physics: A Study Of Schools In Suleja Local Government Area Of Niger State. **Gana Celina Shitnan, Fadipe Bayo Michael**
061	12:45pm – 12:55pm Q&A 12:55pm – 01:00pm	Extent Of Basic Innovative Skills Acquisition And Application By Teachers Of Science And Technical Education In Kwara State. **Aede Hatib Musta'amala, Abdulrauf Shefiu, Ademiotan Moriyike Laleye, Jimoh Iyanda Yekeen, and Yusuf, N. B.**

Session IV: Management and Business
Chair: Dr. Aliyu Isah Chikaji

Paper ID No.	Time	Title
057	02:10pm - 02:20pm Q&A 02:20pm – 02:25pm	Trends in Industry 4.0 Research: A Bibliometric Analysis of Publications in the Internet of Things Component. **Abba Adam, Halima A. A Yusuf, Ibrahim Labaran Ali, Ado Abdu Bichi, and Salisu Alh. Uba**
063	02:25pm - 02:35pm Q&A 02:35pm – 02:40pm	The Value Relevance Of Research And Development Using Market Base Approach Of Listed Manufacturing Companies In Nigeria. **Bukar Amos, Mohammed Aliyu, Fatima Abdullahi Mahadi, Zakariya Musa, Luka Mailafiya**
064	02:40pm - 02:50pm Q&A 02:55pm – 03:00pm	Value Relevance Of Brand Name Of Listed Consumers Goods Firms In Nigeria. **Bukar Amos, Mohammed Aliyu, Fatima Abdullahi Mahadi, Zakariya Musa, Luka mailafiya**

Session V: Electrical Engineering and Computing
Chair: Dr. Murtala Aminu-Baba

Paper ID No.	Time	Title
017	02:25pm - 02:35pm Q&A 02:35pm – 02:40pm	Improved Navigation and Tracking Mechanisms for Blind People Using GPS and other Devices for Obstacle Detection. **Kabiru Abubakar Yahya, Oyebamiji Ajibola Rashidat, Bubakari Joda, Dahiru Mohammed Zakari**
023	02:40pm - 02:50pm Q&A 02:50pm – 02:55pm	Mobility-aware Void Avoidance and Mitigation for Energy Efficiency in Underwater Wireless Sensor Networks. **Umar Sani, Mohd Murtadha Mohd, Ahmed Aliyu, Ahmed Rufai**
058	03:25pm - 03:35pm Q&A 03:35pm – 03:40pm	Drift Detection and Handling-based Ensemble Classifier for Online Sentiment Classification. **Idris Rabiu, Naomie Salim, and Aminu Da'u**
007	03:40pm - 03:50pm Q&A 03:50pm – 03:55pm	Performance Validation of Linear Block Code for Mitigating BER Using BPSK and QPSK Modulation Techniques. Abubakar **Abdulkadir, A. M. Gadam, Zahraddin Umar Dahiru and Mubarak Abdurrahman, A.H. Mahdi**
044	03:55pm - 04:05pm Q&A 04:05pm – 04:10pm	Perception Of Noise Pollution In Malaysia: Questionnaire -Based Study. **Yaseen H. Ali, Rozeha A. Rashid and Siti Z. Abdul Hamid**

Session VI: Science
Chair: Dr. Abdulkarim Ali Deba

Paper ID No.	Time	Title
024	02:10pm - 02:20pm Q&A 02:20pm – 02:25pm	A Combined Drought Forecasting Involving Wavelet-Group Methods Of Data Handling. **Mohammed Salisu Alfa, Ani Shabri, Stephen Dauda**
031	02:25pm - 02:35pm Q&A 02:35pm – 02:40pm	Comparative Study Of The Potential Of Aspergillus Species "Koji" And Sweet Potato Amylase For Hydrolysis Of Cassava Peel For Ethanol Production. **Iliyasu Datti Gwarzo, Caroline Anyakorah, and Muhammad Abdullahi Auwal**
035	02:40pm - 02:50pm Q&A 02:50pm – 02:55pm	Application of Microbial Fuel Cell as a combined strategy for Treatment of Landfill Leachate and Power Generation: A Review. **A. Ishaq, M. I. M Said, S. Azman**
037	02:55pm - 03:05pm Q&A 03:05pm – 03:10pm	Influence of Activated Carbon derived from Coconut Shell on the Morphologies, Filtration rate and Water Absorption Capacity of Polypropylene Air Filter. **Ugo, U. K., Yibowei, M. E., Ajekwene, K. K., Ichetaonye, S. I., Muhammed-Raji, A., and Kalu, E.U.**
041	03:10pm - 03:20pm Q&A 03:20pm – 03:25pm	Phytochemical Analysis and Antibacterial Activity of ginger (Zingiberofficinale) Methanolic extract Against Escherichia coli and Staphylococcus aureus. **Nafiatu.A, Zainab.I, Zainab Sabiya.Z**

Technical Session Day 2: Tuesday, 30th November 2021

Session VII: Education
Chair: Dr. ADAMU Gagdi Jibrin

Paper ID No.	Time	Title
067	12:00pm - 12:10pm Q&A 12:10pm – 12:15pm	A Meta-Analytic Review Of Apology And Request Strategies Of Libyan University Students And Their Mentors. **Mohammed Abulqasem Mohammed Elasfar, Dr. Hema Roshney binti Mustafa, Dr. Aliakbar Imani**
08	12:15pm - 12:25pm Q&A 12:25pm – 12:30pm	Level Of Awareness, Attitude And Coping Strategies Towards Covid-19 Among College And Secondary School Students In Niger State, Nigeria. **Hassan Usman, Kure Isah Danjuma and Wun Thiam Yew**
039	12:30pm - 12:40pm Q&A 12:40pm – 12:45pm	An Appraisal of Military invasion of Shangev-Tiev Communities and Human Rights violations in internal Peacekeeping Operations. **Rita Iorbo, Dick T. Andzenge**

Session VIII: Mechanical Engineering
Chair: Dr. Ibham Veza

Paper ID No.	Time	Title
038	12:15pm - 12:25pm Q&A 12:25pm – 12:30pm	Recurrent Neural Network Model for the Control of Temperature in a Multi-Circuit Air Conditioning System. **Ibrahim Oleolo, Hayati Abdullah, Maziah Mohamad, Mohammad Nazri Mohd**
040	12:30pm - 12:40pm Q&A 12:40pm – 12:45pm	Characterization And Wear Resistance Behaviours Of Aluminium Alloy/ Reinforced With Agricultural Wastes Particulate At Different Loads. **Idawu Yakubu Suleiman, Abdullahi Tanko Mohammed, Moveh Samuel, Ogheneme O. Clifford, Muhammad Mustapha Aliyu and Abdullahi Guruza**
043	12:45pm - 12:55pm Q&A 12:55pm – 01:00pm	Improved Mechanical Properties of Maleic Anhydride Compatibilized Recycled Low-Density Polyethylene/Natural Rubber (r-LDPE/NR) Blends. **Odubunmi, J.O., Muhammed Raji, A., Alebiosu, S.O., Amosu, J.O., Alabi, F.O., and Okoye, S.O.**

Session IX: Built Environment
Chair: Dr Yusuf Opalua

01	12:00pm - 12:10pm Q&A 12:10pm – 12:15pm	Development Of A Web-Based Forest Information System For Forest Management: Case Study Of Akure, Owo And Akure-Ala Reserves. **Olorunleke G. Damilola and Babalola Sunday Oyetayo**
019	12:15pm - 12:25pm Q&A 12:25pm – 12:30pm	Harnessing Socio-Cultural Meanings And Values For Sustainable Indigenous Housing Transformation In Nigeria. **Thomas T. Aule, Roshida B. A. Majid, Mahmud B. M. Jusan**
027	12:30pm - 12:40pm Q&A 12:40pm – 12:45pm	Relational Database In Conceptualization Of Land Registration For The Adoption Of LaND In Nigeria. **Babalola, Sunday Oyetayo and Aniekan, Effiong Eyoh**
036	12:45pm - 12:55pm Q&A 12:55pm – 01:00pm	Effect Of Locational Attributes On Residential Property Values Of Birnin Kebbi Local Government Of Kebbi State Nigeria. **Isyaku Ibrahim, Dhurllkanian Daud, Usman Bello Sa'ad, Hamza Umar Yaro and Adebayo Oluwale A.**

Session X: Mechanical Engineering
Chair: Prof. Abdulkarim Nasir

Paper ID No.	Time	Title
059	02:10pm - 02:20pm Q&A 02:20pm – 02:25pm	Evaluation Of Mechanical, Microstructures And Wear Behaviours Of Aluminium Alloy Reinforced With Aquacultural Waste Powder. **Idawu Yakubu Suleiman, Abdullahi Tanko Mohammed, Moveh Samuel, Ogheneme O. Clifford, Muhammad Mustapha Aliyu and Abdullahi Guruza**
065	02:25pm - 02:35pm Q&A 02:35pm – 02:40pm	Modification Of A Conventional Motorcycle To A Solar Hybrid Motorcycle. **Abdulkadir Baba Hassan**
047	02:40pm - 02:50pm Q&A 02:50pm – 02:55pm	Damage Identification In Plate Structure Using Change In Frequency Method. **Marwan Youssef, Emmanuel Achara and Muyideen Abdulkareem**
016	02:55pm - 03:05pm Q&A 03:05pm – 03:10pm	Covid-19 Impact On Automotive Industry's Green Energy Target In South-East Asia: A Malaysian Perspective. **Ahmed Sule Zulkarnain A. Latiff and Mohammed A. Abbas**

Session XI: Built Environment
Chair: Dr Dodo Aminu

Paper ID No.	Time	Title
042	02:10pm - 02:20pm Q&A 02:20pm – 02:25pm	Improved automated Detecting of Tin (Cassiterite) Mineral Distribution over the Jos Plateau using Geospatial Remote Sensing. **Danboyi Joseph Amusuk Mazlan Hashim and Amin Beiranvand Pour**
049	02:25pm - 02:35pm Q&A 02:35pm – 02:40pm	Desertification and climate change study using multi-temporal remote sensing technique- the Yobe state perspective. **Alhaji Mustapha Isa, Abubakar Ayuba Fusami, Danboyi Joseph Amusuk, Mazlan Hashim and Ibrahim Bukar Geidam**
050	02:40pm - 02:50pm Q&A 02:50pm – 02:55pm	Prospective Mapping of pyrophyllite mineral deposit groups using Remote Sensing imagery at hydrothermal alteration regions of Plateau State, North Central Nigeria. **Danboyi Joseph Amusuk, Mazlan Hashim, Amin Beiranvand Pour, Isa Mohammed Zumo, and Chindo Musa Muhammad**
069	02:55pm - 03:05pm Q&A 03:05pm – 03:10pm	An Overview Of Building Maintenance Problems In Malaysia. **Ifeoluwa A. Adeyemi, Mohd S. A. Rahman, and Adegbenga Adeyemi**
062	03:10pm - 03:20pm Q&A 03:20pm – 03:25pm	Impact Of Population Changes In Post Pandemic Period: Issues And Challenges In Nigeria. **A. M. Eya, S. Abdullahi. . A. R. Suleiman**

Session XII: Science
Chair: Dr Azza Hashim Abbas

Paper ID No.	Time	Title
051	02:10pm - 02:20pm Q&A 02:20pm – 02:25pm	Optimization and statistical modeling of esterification synthesis of ethyl pentanoate using a hybrid composite conjugated Candida rugosa lipase. **Adikwu G. Jacob and Roswanira A. Wahab**
052	02:25pm - 02:35pm Q&A 02:35pm – 02:40pm	Fractional Order and Numerical Solution of Examination Misconduct Using Laplace Adomian Decomposition Method. **M.B Abdullahi & A.Sule**
053	02:40pm - 02:50pm Q&A 02:50pm – 02:55pm	Numerical Solution of Fractional Order of Coronary Heart Disease Using Laplace Adomian Decomposition Method. **Abdullahi, Mohammed Baba & Mohammed Alhaji Liman**
012	02:55pm - 03:05pm Q&A 03:05pm – 03:10pm	Synthesis Of Copper-Based Catalysts And Their Application In The Reduction Of 4-Nitrophenol. **Muhammad Sabiu Abdullahi and Mohamad Shazwan Shah Jamil**
018	03:10pm - 03:20pm Q&A 03:20pm – 03:25pm	Adoption Of 'Omics' Techniques For Understanding The Impacts Of Multi-Metal Toxicity In Aquatic Environment. **Ibrahim Aliyu Kangiwa, Musa I. Mohammed and Abdullahi Bilyaminu**

PREFACE

Welcome to ICSESS 2021

On behalf of the central working committee, it is my great pleasure to welcome all participants to the 4th International Conference on Science, Engineering and Social Science (ICSESS) 2021 held at Universiti Teknologi Malaysia, Johor Bahru, Malaysia via Online virtual meeting platform from November 29th-30th 2021. The conference, organized by the International Students Society Nigeria (ISS-Nigeria), Universiti Teknologi Malaysia with the main theme: **"Promoting Multi-disciplinary and Innovative Research in the New-normal",** was convened as an academic-practitioner/industry experts' platform for championing the pursuit of excellence in various research areas; by providing credible outlet for dissemination of research output and facilitation of collaboration between academia and industry through keynote addresses, plenary sessions, presentations and discussions.

ICSESS 2021 specifically presents a platform for knowledge sharing, building and integration of researchers with the overarching goal of consolidating on the research successes recorded in the various fields of inquiry. ICSESS 2021 is also a forum for promoting recent research trends, promoting networking among researchers and industry practitioners, and identifying upcoming research areas for academia/industry collaboration in the field of Science, Engineering and Social Science.

A total of 63-papers were received but only 46 were registered, reviewed and accepted for presentation. These accepted papers after presentation will be sent to Scopus-indexed journals for their selection and publication process.

In the course of the conference, one plenary and four keynote speeches will be delivered by distinguished scholars in the field of research and development. The conference presentations have been grouped according to the following sub-themes:

  i. Engineering and Sciences;
  ii. Earth and environmental Sciences;
  iii. Education, Humanities, and social sciences.

Once again, on behalf of the conference organizing committee, a very warm welcome to all ICSESS 2021 participants, and I hope this conference will have a lasting impact in your careers as researchers, academicians, and industry practitioners.

Best wishes.

Assoc. Prof. Dr. Kasim Bin Abdul Jalil
Conference Chair, ICSESS 2021.

GOODWILL MESSAGE

From
HON. MINISTER OF EDUCATION (NIGERIA)
(Email: info@education.gov.ng)

Mallam Adamu Adamu
Hon. Minister of Education
Federal Republic of Nigeria

The Federal Ministry of Education (Nigeria) felicitates with the International Students Society Nigeria UTM and the Universiti Teknologi Malaysia on the occasion of the 4th ICSESS 2021 Conference holding vitually online between 29th and 30th November 2021.

We are proud of the unique effort of the Nigerian International Students in UTM for the courage, innovation and determination to organize such international Conference of this standard that will serve as a platform for showcasing research output, networking among international researchers across the globe and for knowledge sharing.

Countries across the globe developed through implementing purposeful research outputs and the Federal Ministry of Education (Nigeria) is keenly interested in the outcome of this conference hence will be glad to receive the Conference Communique' for a more bilateral collaborative partnership with Malaysia through the university, UTM.

We wish you a successful ICSESS 2021 Conference.

Thank you.

Mallam Adamu Adamu
Hon. Minister, Federal Ministry of Education,
Abuja, Nigeria.
16/11/2021.

Prof. Datuk Ts. Dr. Ahmad Fauzi Bin Ismail
Vice-Chancellor, UTM

Prof. Datuk Ts. Dr. Ahmad Fauzi Ismail is Professor at Faculty of Chemical and Energy Engineering, UTM. His research interest are in development of polymeric, inorganic and novel mixed matrix membranes for water desalination, waste water treatment, gas separation processes, membrane for palm oil refining, photocatalytic membrane for removal of emerging contaminants, development of haemodialysis membrane and polymer electrolyte membrane for fuel cell applications.

Born in March 1966, Prof. Ahmad Fauzi Ismail obtained his PhD in Chemical & Process Engineering in 1997 from **University of Strathclyde** and MSc. and BSc. from **Universiti Teknologi Malaysia in** 1992 and 1989 respectively. His research has been published in many high impact factor journals. He also actively authored many academic books in this field which published by reputable international publishers. He is the author and co-author of over 550 refereed journals. He has authored 6 books, 50 book chapters and 4 edited books, 6 Patents granted, 14 Patents pending. His h-index is 59 with cumulative citation of over 15434.

He have won more than 130 awards national and internationally. Among the most prestigious award won is the **Merdeka Award** for the **Outstanding Scholastic Achievement Category** at 4th September 2014, **Malaysia's Rising Star Award 2016** for **Frontier Researcher** category at 1st November 2016, **Malaysia's Research Star Award 2017** on 5 October 2017. He also the recipient of **Innovative Action Plan for Human Capital Development Tertiary Level** award at 2013 by The Ministry of Education. He has awarded **Malaysia Young Scientist Award** in 2000; **ASEAN Young Scientist Award** in 2001; the **National Intellectual Property Award** for two times in (Patent Category), 2009 and (Product Category), 2013; Two times **National Innovation Award for (Waste to Wealth Category)**, 2009 and (Product Category), 2011. He also won **National Academic Award (Innovation and Product Commercialization Category)** on August 2013 and

Malaysian Toray Science and Technology Foundation Award, on 28 November 2013, **Winner of IChemE (Malaysia) Innovator of the Year Award** on Oct, 2014, **Top Research Scientist**, Awarded by The Academy of Sciences Malaysia on Nov., 2014 and **Best Fundamental Research Project** awarded by Ministry of Higher Education Malaysia on 2012. Recently he was recognized as **one of the most cited researchers in Chemical Engineering by Shanghai Academic Ranking of World Universities 2016.**

He is a Fellow of The Academy of Sciences Malaysia, Chartered Engineer in the UK (CEng) and a Fellow of the Institution of Chemical Engineers (FIChemE). Ahmad Fauzi also served as the Editorial Board Members of Journal of Membrane Water Treatment, Jurnal Teknologi, Journal of Membrane Science and Research, Journal of Membrane and Separation Technology and the Advisory editorial board member of Journal of Chemical Technology and Biotechnology.

He involved extensively in R&D&C for national and multinational companies related to membrane-based processes for industrial application and currently have two spin off companies. He is the founder of Advanced Membrane Technology Research Center (AMTEC) and now recognized as Higher Education Centre of Excellence (HICoE).
Prof. Ahmad Fauzi is the current and 7th **Vice Chancellor** of Universiti Teknologi Malaysia (UTM), a position he assumed since 1st January, 2021.

GUEST SPEAKER

Prof. Abdullahi Bala, FSSSN
Vice Chancellor, Federal University of Technology, Minna, Nigeria.

Prof. Abdullahi Bala was born on March 27, 1967, in Suleja, a local government area of Niger State, Nigeria. He began his academic pursuit at Dawaki Primary School Suleja. He proceeded to the Federal Government College, Minna, Niger State where he obtained the West African Senior School Certificate with flying colors.

Prof. Abdullahi Bala obtained a Bachelor of Science (B.Sc degree) in Agriculture with a First Class Honours in 1989. He won a Common Wealth Academic Staff Scholarship for a Master's Degree in Soil Chemistry at the University of Reading in the United Kingdom and another Common Wealth Scholarship took him to Wye College, University of London, where he bagged a doctorate degree (PhD) in Soil Microbiology in 1999.

Bala has worked at a number of institutions including with Africare Nigeria (2004-2007) as Associate Policy Analyst at the Independent Policy Group, Abuja, A policy think tank for the then President of Nigeria, Olusegun Obasanjo. In that capacity, he conducted perspective and introspective studies for policy analysis into agriculture, water resources and environment, rural development, and science and technology. He authored and co-authored over 120 articles published in reputable journals. He won a research grant from Bill and Melinda Gates Foundation of USD $19,500,000 and another grant of NGR N19,600,000 from Agricultural Research Council of Nigeria.

Prof. Bala worked in the International Institute of Tropical Agriculture (IITA) Ibadan as the International scientist based at the institutes sub-station in Kano. While there, he served as the Inoculant Delivery Specialist, West Africa Coordinator of N2Africa Project and Rhizobiology Thematic Leader for N2Africa Project in Democratic Republic of Congo, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda and Zimbabwe.

He has served as external assessor of professorial candidates in Ahmadu Bello University, Zaria; Usmanu Danfodiyo University, Sokoto; Bayero University, Kano; University of Benin and Abubakar Tafawa Balewa University, Bauchi.

Prof. Abdullahi Bala is the current and 7th substantive **Vice Chancellor** of Federal University of Technology, Minna, Nigeria, a position he assumed since 3rd December, 2017.

KEYNOTE SPEAKER 1

Prof. Chew Tin Lee
Professor, School of Chemical and Energy Engineering,
Faculty of Engineering, UTM.
Keynote Speaker 1

Prof. Lee Chew Tin. Professor Lee received her PhD in Engineering from the University of Cambridge, U.K in 2004. She currently serves as a Professor in the School of Chemical & Energy Engineering, Universiti Teknologi Malaysia (UTM), Malaysia. She also serves as the guest editor for Journal of Cleaner Production and Clean Technologies and Environmental Policy since 2015. She served as the Director for Global Education in UTM (2008-2016).

Professor Lee has taught various core-courses for the Bachelor Degree of Chemical Engineering including Transport Processes, Process Instrumentation, Chemical Reaction Engineering, Statics and Numerical Methods for Chemical Engineering. She is a graduate member of IChemE U.K. and the Institution of Engineers Malaysia. She is also the advisor and founder for UTM Green DNA student society.

KEYNOTE SPEAKER 2

Assoc. Prof. Dr. Nor Hazarina Binti Hashim
Chair, School of Graduate Studies, UTM.
Keynote Speaker 2

Noor Hazarina is an Associate Professor at **Azman Hashim International Business School, Universiti Teknologi Malaysia**, where she teaches a range of courses at both the graduate and undergraduate level focused on electronic marketing, marketing research and tourism marketing. She researches on how technology influences destination image formation and how technology changes traveler's behavior.

Hazarina's research has been published in international and local media outlets and in leading tourism and hosp[itality journals.
For details:
https://business.utm.my/wp-content/uploads/2019/01/CV_Noor_Hazarina_Hashim_2.1.2019.pdf

KEYNOTE SPEAKER 3

Dato' Wei Chuan Beng
Adjunct Professor, Faculty of Engineering, UTM.
Keynote Speaker 3

Dato' Wei Chuan Beng is a serial digital/ICT entrepreneur and recognized in telecommunication and the digital/ICT industry with an illustrious career developing the nations digital/ICT industry and actively contributing to various national initiatives. Dato' Wei has also contributed immensely to the nations higher education system. He has been conducting Entrepreneur Development Program, public lectures and talks on entrepreneurship since 2015 in universities and conferences. He had a Bachellor of Engineering Degree (1989) in Electrical Engineering from Universiti Teknologi Mmalaysia.

As a founder of digital infrastructure and services solutions provider, he continues to capitalize on his keen understanding of digital future and embark on the journey of personal social responsibility through angel investment, promotion and support of entrepreneurship. He was a Gold Medalist Award winner in 1995, at Malaysia Institute of Management.

Dato' Wei Chuan Beng is a **Council Member,** National Digital Economy and IR 4.0; **Senior Executive Director,** KSI Strategic Institute for Asia Pacific; **Director**, redONE Network Sdn Bhd; **Champion,** Digital Productivity Nexus, MPC; **Board of Director,** UTMSpace; **Commission Member,** Malaysian Communications and Multimedia Commission (MCMC); **Youth Service Director,** Kuala Lumpur DiRaja Rotary Club; **Chairman,** Association of the Computer and Multimedia Industry of Malaysia (PIKOM); **Founder & Group Managing Director,** REDtone International Bhd; **Member,** Young President's Organization (YPO); and many other experienced entrepreneurial/managerial positions too numerous to mention here.

KEYNOTE SPEAKER 4

Engr. Prof. Emenike C. Ijiogu
ACE-SPED, University of Nigeria Nsukka
Keynote Speaker 4

Ejiogu Emenike is a Professor of Electrical and Electronics Engineering at the University of Nigeria, Nsukka and the founder of the Laboratory of Industrial Electronics, Power Devices and New Energy System (LIEPNES). President, NIDOAsia, President, NIDO Japan, Board Member, Nigeria Chamber of Commerce & Industry, Japan (NCCIJ), Director, International Capacity Building Foundation, Abuja, Nigeria.

Born in Lagos, Nigeria on 6th April 1966, Engr. Prof. Emenike had his Bachelor of Engineering (Electrical Engineering) from University of Nigeria Nsukka in 1987, Master of Engineering from University of Nigeria Nsukka in 1990 and Doctor of Philosophy (Industrial Electronics, Power Devices & New Energy Systems) from National Shinshu University, Nagano-city**, Japan.**

Engr. Prof. Emenike Ijiogu is renowned and becomes prominent by his project "Solid waste to energy conversion to electric power: A 500KVA solid waste gasifier Power Plant he built at University of Nigeria Nsukka".

Engr. Prof. Emenike is the Director/Centre Leader, World Bank Africa Centre of Excellence on Sustainable Power and Energy Development (ACE-SPED), UNN;
Director of Industrial Technology and Innovation, Nigerian Chamber of Commerce and Industry Japan (NCCIJ), Tokyo, Japan; **Head of Department,** Department of Electrical Engineering, University of Nigeria, Nsukka; and many other scholarly and managerial positions too numerous to mention here.
For details: https://acespedunn.edu.ng/Mycontents/Prof.%20Ejiogu-Brief%20CV-ACE-SPED.pdf

PLENARY ABSTRACTS

GUEST SPEAKER

**INNOVATIVE AND MULTIDISCIPLINARY RESEARCH:
THE POST COVID-19 APPROACH**

Prof. Abdullahi Bala, FSSSN
Vice-Chancellor, Federal University of Technology, Minna, Nigeria
(www.futminna.edu.ng)

ABSTRACT

The search for lasting solution to Covid-19 pandemic has proven to be a daunting challenge for governments, individuals, and health related organizations across the world. The impact of COVID-19 pandemic was so rapid and ravaging. The outbreak of the virus resulted to the shutdown of socio-economic activities throughout the world in 2020. Also, the COVID-19 pandemic affected most academic and research activities at the onset before concerted efforts were made at redirecting available resources towards finding solution to the menace of the virus through the use of a multifaceted approach across the world. The ravaging effects of the pandemic have shown that research, development and innovation are key to an effective response to and recovery from the COVID‑19 pandemic, particularly in low and middle-income countries. Furthermore, the outbreak of the COVID-19 pandemic has re-emphasized the need for multidisciplinary collaborative researches towards solving societal problems. The multidisciplinary research approach adopted allowed researchers and experts from different backgrounds to work together towards achieving a common goal. In addition, it has led to the search for solution to this problem beyond conventional boundaries as experienced during the fight against COVID-19 pandemic. Our experience at the Federal University of Technology, Minna, Nigeria, propelled the need for collaboration between Engineering, Physical and Life Sciences, towards a holistic non-pharmaceutical responses in form of products and effective service delivery on our campuses.

KEYNOTE SPEAKER 1

ENABLING ORGANIC WASTE CONVERSION TO SOIL ENHANCER FOR SUSTAINABLE AGRICULTURE AND FOOD PRODUCTION

Chew Tin Lee, PhD

School of Chemical and Energy Engineering, Faculty of Engineering, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor. Malaysia.

(E-mail: ctlee@utm.my)

ABSTRACT

Increased volume of solid waste is a key issue facing many fast-developing countries. The conventional landfill treatment is not sustainable due to high cost, environmental risk (illegal dumpsites) and scarcity of land. Innovative solutions are needed to transform waste management towards zero-waste. Ideally, a circular economy could support such transformation via industrial symbiosis concepts; and waste-to-wealth by grooming more green entrepreneurs. However, various gaps exist to realise the zero-waste societies. Recyclable materials such as papers and plastics are more readily to be recycled in modern society. The organic portion of the municipal solid waste (OPMSW), such as the putrescible food waste, is more tedious to be treated. Proper waste segregation at the source, efficient transfer, and further treatments are essential to avoid odor and public health risks. These steps incur significant costs and are often not viable for implementation. This session highlights the need of creating a viable ecosystem to convert organic waste to high-value organic fertiliser to support sustainable soil management and high-quality crop production. Leadership and intervention are needed to coordinate the collaboration among the experts and the multi-stakeholders for managing behaviour change, enabling policies and feasible waste treatment technology.

This session shares the key enablers needed to realise the bio-circular economy roadmap for organic waste management to sustain soil fertility and food production.

KEYNOTE SPEAKER 2

THE FUTURE OF RESEARCH:
SCENARIOS FOR THE NEXT DECADES
Noor Hazarina Bt. Hashim
Azman Hashim International Business School (AHIBS)
Universiti Teknologi Malaysia.
(Email: m-hazarina@utm.my)

ABSTRACT

The research ecosystem is undergoing rapid and profound change. This transformation is being fueled by a wide range of factors, from advances in technology and funding pressures to political uncertainty and population shifts.

This keynote will address three scenarios:

brave open world, tech titan, and eastern ascendance that will transform the research scenario in the next decades.

KEYNOTE SPEAKER 3

AWAKENING OF DIGITAL LEADERSHIP.
Dato' Wei Chuang Beng.

ABSTRACT

Digitalization brings about: exponential productivity from 10x to 100x improvement leading to breakthroughs, integrity and promote excellent green and sustainable production and services. Due to lack of digital infrastructures, transformation to digital economy across the globe is at a very slow pace. However, the Covid-19 Pandemic has really taken us to the digital era very abruptly. Caught unawares as many organisations, institutions and countries were unprepared to embrace digitalization.

Digital economy basically means economy that is enabled by digital technologies and digital capabilities, making it different from a traditional/conventional economy. Digital leaders lead the "go BIG with Digital" and must be brave, smart and digital complaints.

Elements of digital transformation are: digital business, software engineering and digital systems. While elements of digital leadership are: digital talents, organisational digital capabilities and technology infrastructures.

The major challenges of actualizing digital leadership to propel the digital economy drive depends mostly on availability of digital infrastructures and digital complaints human resources. With the possible rolling out of 5G network in Malaysia in few month's time, we will be ushered into the 5G era with fibre optics backbone and the digital community use of cashless payments and digital ID will serve as the pillars to spearhead the proliferations and inclusion of this digital community.

Keywords: Digital leadership, digital economy, digital infrastructures, digital era, technology, productivity.

KEYNOTE SPEAKER 4

TECHNOLOGY AND CREATIVITY IN THE WORLD OF MULTI-DISCIPLINARY RESEARCH FOR NATION BUILDING

Emenike C. Ejiogu[1,2]

[1]World Bank Africa Centre of Excellence for Sustainable Power and Energy Development (ACE-SPED), University of Nigeria, Nsukka, Enugu State, Nigeria.

[2]Nigerian Chamber of Commerce and Industry, Japan (NCCIJ), Tokyo, Japan.

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ABSTRACT

This lecture will explore the conventional concept of technology, creativity and multi-disciplinary research. In a fast changing-world, creativity is a vital ingredient in the quest to solve societal problems. It is needed for the effective deployment of technology for nation building. Besides, almost all societal problems are multi-dimensional in nature and hence naturally must be tackled from the multi-disciplinary research point of view. We give a practical example of how multi-disciplinary research is used to create the gasifier technology for providing an alternative energy source. This practical example and the analysis we make of the creative multi-disciplinary process leads to the university, which in the modern day, is one of the few societal institutions that inherently has a multi-disciplinary environment. Therefore, the university is expected to play a natural role of fostering multi-dimensioned research to continually produce the knowledge base for nation building for the well-being of the citizens.

DEVELOPMENT OF A WEB-BASED FOREST INFORMATION SYSTEM FOR FOREST MANAGEMENT: CASE STUDY OF AKURE, OWO AND AKURE-ALA RESERVES.

OLORUNLEKE G. Damilola*[1] and BABALOLA Sunday Oyetayo[2]

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ABSTRACT

Contrary to the trend in technological advancement, the Forestry Department of Ondo State Ministry of Natural Resources has relied on paper-based record keeping to discharge its mandate to citizens, which undermines the efficiency and effectiveness of Sustainable Forest Management (SFM). The loopholes in the current workflow of forest administration in Ondo state were identified. Data obtained from Ondo State Forest Department was processed using ArcGIS and QGIS software. After processing, the digital maps were then exported to web using the QGIS2Web plugin. In order to ensure easy access anywhere, anytime and on any device, a website was created and the web application was hosted. The web application was then tested by the potential users to validate its' functionality, afterwards a questionnaire survey was conducted. Having processed the questionnaire data using SPSS software, the analysis showed that all 14 of the respondents agreed that the developed system provides a well-structured process of collecting, storing, updating and disseminating forest information. The result of this study is a web based forest information management system which is instrumental in addressing the issue of unsustainable management of forest reserves and will also assist policy and decision makers in developing policies and strategies for sustainable forest management.

Key words: Sustainable, WebGIS, Forest Information System

INTRODUCTION

Forests are extremely important to humans and the environment in more ways than we can imagine. We depend on forests for our survival, from the air we breathe to the wood we use. In spite of our dependence on forests, we are not conserving them as much as we should which is the reason they are gradually disappearing. Deforestation does not only have effects

on the climate but also on humans and animals. Adekunle et al., (2008) defined forest management as the process of organizing forest stands/ecosystems so that they produce a continuous stream of whatever resources are desired from them. However, the most distinguished principle of forest management all over the world is the principle of sustained yield. It is not enough to just manage the forests, most importantly is the sustainable management of these forests to ensure that they not only meet our immediate needs but also that of future generations.

Sustainable Forest Management as defined by Forest Europe and adopted by the United Nations Food and Agriculture Organization (FAO) is the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems. Unfortunately, forest reserves in Nigeria are not being managed well enough to meet our current needs let alone the needs of future generations. Eugene (2004), Onyekwelu (2017) and a couple of other researchers mentioned that lack of up-to-date information on forest, inefficient use of resources, weaknesses in implementation of the forest management plan and enforcement of the forestry law are some of the factors that hinder sustainable forest management. Therefore Information and Communication Technology (ICT) has come to play an essential role in proper record keeping and data management of forest reserves. An example of this is the use of Geographic Information System (GIS) in sustainable forest management. More efficient is the integration of a web-based information system application to house the GIS plan. Similarly, Babalola and Uyi (2019) in their research on web-based land information system, addressed the problem of inadequate or uncoordinated land administrative system. This study therefore developed a web-based forest information system to facilitate user access, update and retrieve forest information and overall monitoring of forest activities, all for the primary purpose of sustainable forest management.

The methodology of this research employs techniques that involves data acquisition, data processing, system development and integration. The forest reserves chosen for this research are; Akure, Owo and Akure-Ala forest reserves, with emphasis on assessing the factors that contribute to unsustainable harvesting of trees and inefficient data management in the forest department of Ondo state. Reconnaissance was first carried out which aided in deciding the type of data that would be required. Data was acquired from Ondo State Forest Department, Ministry of Natural Resources. Spatial data and non-spatial data were used which includes layout maps, other forest administrative records and questionnaire data. Information extracted from the raw datasets were then processed using ArcGIS and QGIS software, after which the system was developed and exported to web using the QGIS2Web plugin. For easy access anywhere, anytime and on any device, a website was created and the web application was hosted. The web application URL and system files were made available to the prospective users to test the system and validate its' functionality to determine whether it solves the research problems or meets the intended objectives. After the testing process, questionnaire survey was deployed to obtain feedback from the users. The information extracted from the questionnaire survey was then analysed using SPSS software and the result of the analysis was used to clearly define the research problem and also to validate the research results. The developed Forest Information System is a web-based GIS

application that is run in a web browser. The importance of this application are: easy installation and maintenance, multiuse, increased efficiency, easy data sharing, data availability, etc.

MAIN RESULTS

Figure 1. Home page of web application.

Figure 1 above shows the home page of the web application. The web-based Forest Management Information System provides ease of data storage, access and data management. It also performs distance measurement, search, zoom and pan functions for ease of navigation on the map. With the click of a button, information about each compartment is automatically displayed to show the unique ID, area, tree type, age of trees, status of allocation and harvest date.

Generally, all the respondents were of the opinion that the system provides a platform that appears to be precisely what they needed. They expressed their satisfaction and made recommendations where necessary. Table 1 below shows a summary of the participants' response after system testing.

Table 1. Summary of the system testing response

Test	Average
Navigation/links functioned correctly	1
Web application contains all relevant forest data	1
Web application supports sustainable forest management	1
Data update and retrieval was done with ease	1

Point values of 1 to 5 were assigned to each response. The numbers 1 to 5 represents strongly agree, agree, neutral, disagree and strongly disagree respectively.

CONCLUSION

The motivation of this study arises from the need to provide an efficient platform that supports sustainable forest management as opposed to the current paper-based method of

record keeping and forest administration in Ondo state forest department. The system offers an efficient flow of forest information within the Ministry, ensuring there is ease of data storage, access and data management. The benefit of this web application system are numerous, ranging from up-to-date information on forest activities to ease of data access, retrieval and exchange. The result of the system testing showed that the web application will be very instrumental in the sustainable management of the forest reserves, which will consequently help reduce illegal activities, enhance transparency in the use of forest resources, aid harvest planning, enable quick decision-making to facilitate and enhance analysis for forest use planning and also serve as a tool for improving public service.

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Performance Validation of Linear Block Code for Mitigating BER Using BPSK and QPSK Modulation Techniques

Abubakar Abdulkadir *, A. M. Gadam[1], Zahraddin Umar Dahiru[2] and Mubarak Abdurrahman[3], A.H. Mahdi[4], Umar Aminu[5]
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ABSTRACT

The high impairments of the communication systems channel, which led to an error in sending vital information using digital techniques which is the main challenge in the signal that interrupts the system's reliability in communication. This paper aims to validate the reduction of bit error rate (BER) via linear block coding. The simple method used was by transmitting a single-bit and two-bit at a time with different modulation techniques. As a result, the BER of the system with BPSK and QPSK was maintained equal but the Additive White Gaussian Noise (AWGN) and the Rayleigh channel were improved to .001 and .05 respectively, by the implementation of the zero-forcing equalizer.

Keywords: BER, Modulation, QPSK, BPSK, Linear Block Code.

INTRODUCTION

A (6,3) linear block code is used in this research to improve the reliability of the input message bit. In addition, the linear block can improve the performance of the communications by increasing the robustness against channel impairments [1].n this work, the input message bit-stream is chopped into a block of 3 bits and each block is encoded to a larger block of 6 bits. The steps to construct the linear block code are shown below.

Creating a (3x3) parity matrix;

$$P = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$$

(1)

Producing a generator matrix by applying the following equation [2].

$$G = [P \vdots I_k]$$

(2)

Where

$$I_k = k \times k$$

$$k = 3$$

The generator matrix, G is shown below.

$$G = \begin{bmatrix} 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

(3)

The codeword, U for all the possible input message bit.;

$$U = mG$$

(4)

To determine the parity check matrix, H is given by [3]:

$$H = [I_{n-k} \vdots P^T]$$

(5)

The possible syndrome, S, and the error pattern, e is given by [4]:

$$S = eH^T = rH^T$$

(6)

The linear block code has a minimum distance, d_{min} of 3 bits. It was able to detect 2 bits errors and correct 1-bit errors.

MODULATION TECHNIQUES EMPLOYED

Binary Pulse Shift Keying (BPSK) is a modulation technique with 1-bit data per symbol [5]. However, a cosine waveform was used as the carrier wave of the BPSK modulation. Therefore, when the input bit is 1, the modulated signal is a cosine wave [6].
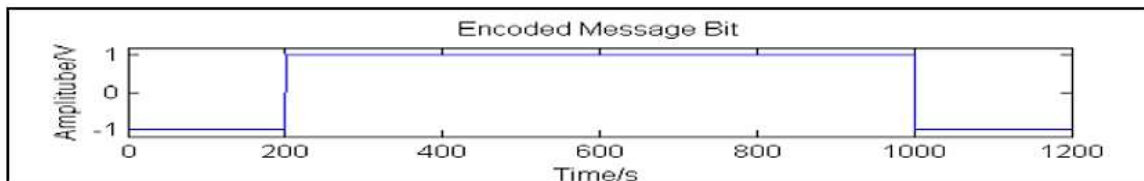
a. the polar NRZ-L of the encoded input message bit of 1 1 0.
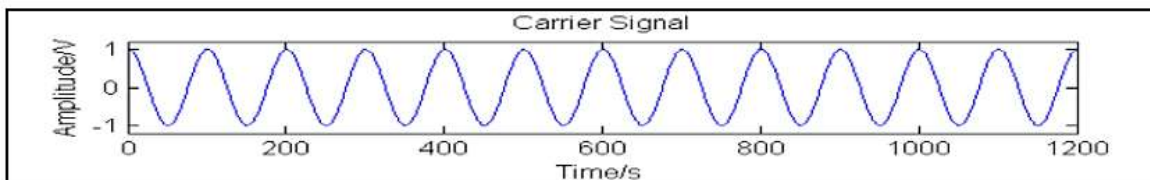
b. Cosine carrier signal at the modulator.
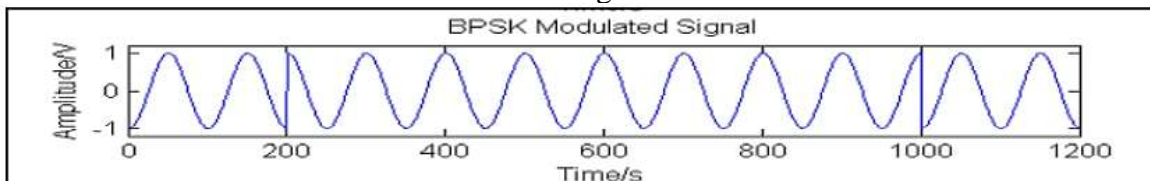
c. BPSK modulated signal.

Figure 1. The transmitter of the system

When the input bit is 0, the modulated signal is a negative of the cosine wave. Figure 1 shows (a) the polar NRZ-L of the encoded input message bit of 1 1 0, (b), and (c) are the carrier wave and modulated input signal for the BPSK modulation [7].

RESULTS

The uncoded BPSK requires higher energy compared to coded BPSK for the same PB with the same E_b/N_0, and the uncoded BPSK has a greater bit error rate than coded BPSK as depicted in Figure 2(a) and (b).
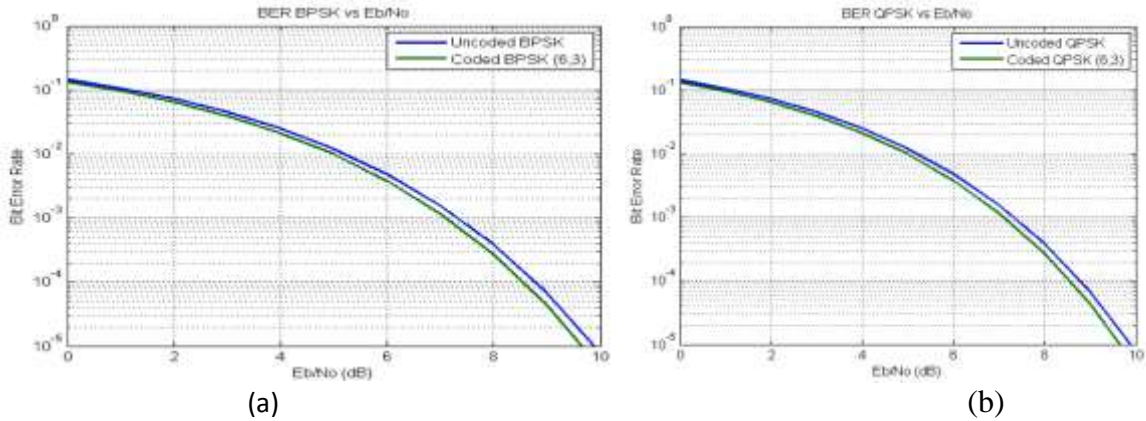

(a)   (b)

Figure 2. Comparison of BER using BPSK and QPSK Modulation Techniques

Therefore, the BER for both BPSK and QPSK are identical, the QPSK has twice the bandwidth efficiency of BPSK meanwhile 2-bits are transmitted in a single modulation.
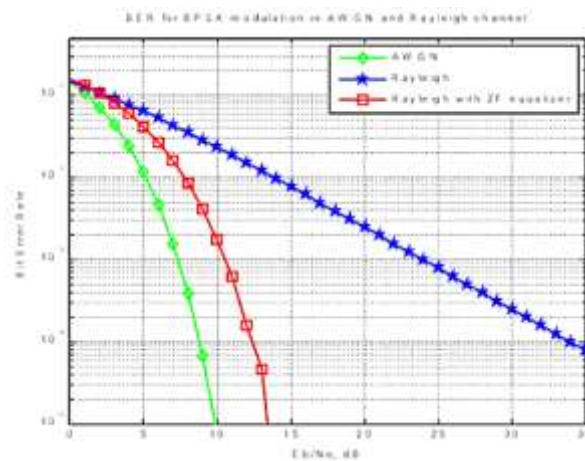
Figure 3. BER vs E_b/N_0 for AWGN and Rayleigh Channels.

Figure 3 shows the performance of the system with AWGN and Rayleigh channels. From this figure, the green line indicates the system's performance with the AWGN channel, the blue line indicates the performance of the system with the Rayleigh channel, and the red line indicates the system's performance in ISI with ISI a zero-forcing equalizer. The implementation of a zero-forcing equalizer can improve the bit error rate of the system with the Rayleigh channel. This is because the zero-forcing equalizer inverses the frequency response of the Rayleigh channel, therefore it can bring down the ISI to zero in a free noise case. The BER for the proposed system with BPSK and QPSK were kept equal then the

AWGN and the Rayleigh channels were improved to 0.001 and 0.05, respectively, by the deployment of the zero-forcing equalizer.

CONCLUSION

The advanced way of transmitting data over long distances is by using a digital technique. The received data is usually encountered with distortions, errors, noises, and losses called impairments. The proposed technique was deployed to reduce the signal impairments received at the destination. We recommend further study to work on QAM modulation for more reduction of noise.

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LEVEL OF AWARENESS, ATTITUDE AND COPING STRATEGIES TOWARDS COVID-19 AMONG COLLEGE AND SECONDARY SCHOOL STUDENTS IN NIGER STATE, NIGERIA

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ABSTRACT

The study was carried out to determine the level of awareness, attitude and coping strategies towards COVID-19 among college students in Niger State, Nigeria. Three objectives with corresponding research questions guided the study. A cross-sectional survey research design was adopted for the study. A total of 168 college and senior high school students form the sample for the study. The instrument used for the study was Researchers-designed questionnaire that was divided into three sections; the awareness, attitude and coping strategy. The questionnaire was validated by experts and Cronbach Alpha's value was computed to ascertain the internal consistency. The reliability coefficient of the questionnaire was obtained to be 0.86. The collected data were analysed using Mean and Standard deviation with a criterion mean of 2.5 as the basis for judgment. Findings revealed that students have positive attitude and awareness towards COVID-19 pandemic. Hence, it was recommended among others that college and secondary school management should continue to enlighten students to sustain their attitude and awareness towards COVID-19 pandemic.

Keywords:
Attitude, awareness, college and senior high school students, coping strategy, COVID-19,

INTRODUCTION

COVID-19, a deadly illness caused by a corona virus was first reported in Wuhan, China at the end of 2019 (Ozdemir, 2020). To be precise, the World Health Organisation on the 30th of January 2019 (WHO) declared CoVID-19 as a "public health emergency of international concern". Since then, it has spread to over 223 countries (Hou et al. 2020). To date, there are more than two hundred and twenty three million positive COVID-19 cases recorded with at least over four million deaths globally (Tria, 2020; Yamin, 2020; Hansen et al 2021). That is to say that the disease has so far characterised by high mobility and mortality rate alongside other ailment.

In Africa, Nigeria in specific, were reluctant in adhering to control measures put in place. Quite a number of Nigerians interpreted the disease as a white man's illness that could never spread to their homes Thompson et al., 2021). Without the intervention, of experts, Nigerians and indeed government underrated the emergence of COVID-19 in various cities and villages thus undermining the implementation of initial precautionary measures which would have saved expenses while protecting the Nigerians from undue exposure to the virus.

In the context of Nigeria education, COVID-19 crisis has also made an impact. And to contain the crisis, Educational institutions were temporary close down schools for months, indeed Classes were suspended due to lockdown. It is on the basis of all the above conditions that this study is aimed at assessing College and secondary school students awareness, attitudes and personal coping strategies toward COVID-19 pandemic in Niger State Nigeria.

Aim and objectives
The aim of this study is to assess level of awareness, attitude and personal coping strategies of college students during the COVID-19 pandemic in Niger State Nigeria. Specifically three research objectives with corresponding research questions guided the study.

Research Methodology
Descriptive cross-sectional survey research design was adopted for the study, the design is considered suitable where identified findings of a studied population is to describe (Patten & Newhart, 2017). The population of the study comprised of the entire secondary/College/University students in Niger state, Nigeria. A total of one hundred and sixty eight168 students selected across college and senior high school form the sample for the study, using a convenience sample technique to select respondents for this study. The instrument used for the study was Researchers-designed questionnaire that was divided into three sections: the awareness, attitude and coping strategy. The questionnaire was validated by experts and Cronbach Alpha's value was computed to ascertain the internal consistency. The reliability coefficient of the questionnaire was obtained to be 0.86. Mean, and Standard deviation were used for data analysis. A criterion mean of 2.5 was the basis for judgment. Thus, in establishing level of awareness, attitude and coping strategies towards COVID-19 among college students a calculated mean score of 2.5 and above was interpreted as a perceived positive attitude, awareness and coping strategies toward Covid-19 while mean score below 2.5 was regarded as there is no positive attitude, awareness and coping strategies toward Covid-19.

Conclusion
This research work provides a complete assessment of the student level of awareness, attitude and coping strategy towards COVID-19 in Niger state, Nigeria. The findings suggest that students who participated in this research have a significant level of awareness on COVID-19 with a positive attitude and appreciable coping strategy in line with the necessary infection, preventive and control measures drawn out by the government, which are necessary for reducing the spread of COVID-19.

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SYNTHESIS OF COPPER-BASED CATALYSTS AND THEIR APPLICATION IN THE REDUCTION OF 4-NITROPHENOL

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ABSTRACT

Copper(II) oxides (**1a** and **2a**) have been successfully synthesized from two corresponding copper(II) complexes of symmetrical Schiff base ligands. First complex (**1**) contains NN'bis(4-methoxysalicylidene)1,2-phenylenediamine (**L1**) ligand whilst the second complex (**2**) comprises of NN'-bis(4methoxysalicylidene)1,2-phenylenediamine (**L2**) ligand. The complexes and oxides were characterized by spectroscopic techniques such as NMR, UV-Vis, FTIR, XRD, FESEM and HRTEM. The complexes were converted to copper(II) oxides by means of solvothermal precipitation ethylene glycol. Both the complexes and oxides were tested and compared as catalysts in the reduction of 4-nitrophenol to 4-aminophenol using $NaBH_4$ reductant. The results have shown that both of copper(II) oxides derived have higher catalytic performance (90.10 and 85.30 %) relative to their corresponding copper(II) complexes (81.30 and 77.45 % respectively). Moreover, the catalyst dose optimization revealed in that 1 and 1.5 mmol of the catalyst was the optimum with respect to the oxides and complexes respectively. Finally, the recyclability test and reaction kinetics results have justified the promising efficiency of the oxides over the analogous complexes and both could be recycled three times without significant decrease in their catalytic performance.

Key words: Schiff base ligand, copper (II) complex, copper (II) oxide, catalytic reduction of 4-nitrophenol.

INTRODUCTION
Nitroaromatic compounds are organic contaminants that are commonly found in industrial production and agricultural discharge. They are extremely unstable and toxic to ecosystem even at trace levels.(Kong et al., 2017) (Hashimi et al., 2019)(Ibrahim et al., 2019). Selective hydrogenation is considered to be an efficient choice for the conversion of nitro compounds

into corresponding amino compounds, being rapid and easy method. (Hashimi et al., 2019; Shamsuddin & Raja Nordin, 2019). Among the transition metals compounds, copper-based compounds were proved to be cheap, less toxic with excellent catalytic activity. Moreover, Copper oxides and Schiff base copper complexes Nano particles have been shown to possess effective catalytic ability with excellent selectivity and stability. (Hashimi et al., 2019 and Esmaielzadeh & Zarenezhad, 2018)

The objective of this research aimed at synthesis of Schiff base ligands **L1** and **L2**, their corresponding complexes **1** and **2** and oxides 1a and 2a using an inexpensive transition meta(copper) to effectively catalyse the reduction of 4-nitro phenol to 4-aminophenol. The study entailed the synthesis and characterization of symmetrical N_2O_2 Schiff base ligands, analogous copper (II) complexes, their corresponding copper (II) oxides. These were synthesized using solvothermal methods respectively and characterized by analytical methods NMR, FTIR, UV / Visible, XRD, FESEM and HRTEM. They were further tested as catalysts in the reduction of 4-nitro phenol to 4-aminophenol at mild condition. Their catalytic performance and reusability were evaluated based on their percentage conversions for a number of identical reactions. The kinetics study and catalyst optimization were finally carried out to further assessed the best.

MATERIALS AND METHODS

The Schiff bases ligands were synthesized by refluxing ethanoic solutions of 1:2 mmol of 1,2-phenylenediamine and salicylaldehyde or 4-methoxysalicylaldehyde for **L1** or **L2** respectively at 78 ^{O}C for 3 hours under continuous stirring. The analogous complexes **1** and **2** were synthesized by refluxing 1:1 mmol hot ethanolic solution of Cu(AOC)$_2$.H$_2$O and Schiff base ligand **L1** and **L2** at 78 ^{O}C for about 3 hours under continuous stirring. The coloured precipitates formed in all the cases, were cooled, collected by filtration, washed with ethanol/methanol and dried.

The corresponding oxides **1a** and **2a** were synthesized by dispersing 0.001 mole of the prepared complexes 1 and 2 in 50 mL of ethylene glycol and refluxed under perpetual stirring at 198 ^{O}C for 3 hours, forming precipitates that was then centrifuged at 4000 rpm for 15 minutes, washed 3-4 times with hexane/methanol, water, filtered using a vacuum pump and. The catalytic testing was carried out by adding 1 or 1.5 mmol of the catalyst to the mixture of 300 µL (100 mM) NaBH$_4$ and 3 mL (0.05 mM) of 4-NP in a quartz cuvette. The reaction was monitored using UV-Visible spectroscopy, where the p-nitrophenolate absorbance was recorded within intervals through the scanning range of 200 and 500 nm.
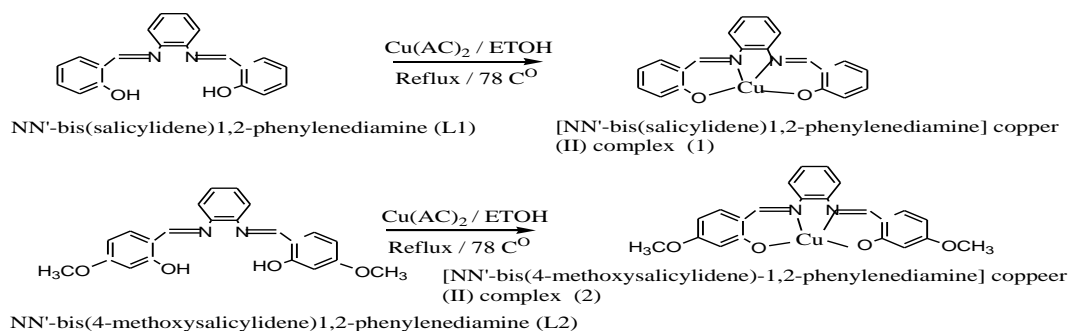

Figure 1. Reaction scheme for the synthesis of the complexes **1** and **2**
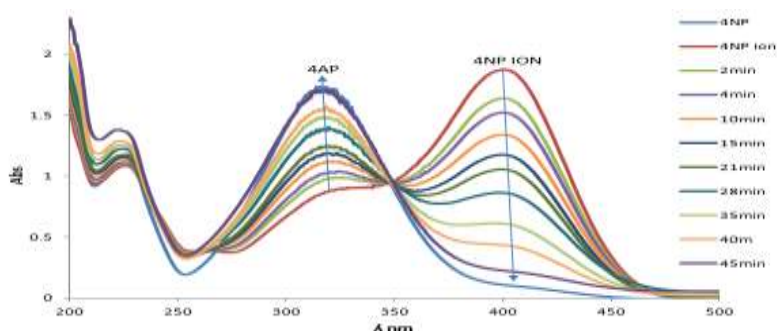
MAIN RESULTS

Table 1. Assessment of catalytic performance and optimization of **1, 2, 1a** and **2a**

Copper (II) catalysts	Amount (mg)	Percentage conversion (%)
Complex (**1**)	0.5	69.34
	1.0	67.53
	1.5	77.45
Complex (**2**)	0.5	62.67
	1.0	70.25
	1.5	81.30
Oxide (**1a**)	0.5	68.24
	1.0	85.30
	1.5	72.56
Oxide (**2a**)	0.5	70.12
	1.0	90.10
	1.5	76.45

Figure 2. Reduction Proceedingss of 4-nitrophenol in presence of $NaBH_4$ at different time intervals using **1** mg catalyst **2a**

CONCLUSION

Two symmetrical N_2O_2 Schiff base ligands **L1**, **L2**, their corresponding copper (II) complexes **1**, **2** and oxides **1a**, **2a** were successfully synthesized, characterized, tested, and compared as catalysts in the reduction of 4-NP to 4-AP using $NaBH_4$. The results show that the synthesized copper (II) oxides **1a** and **2a** have uniform morphology (rodlike) with average crystallite sizes of 112 and 97 nm, respectively, and displayed better catalytic performance than the analogous copper (II) complexes **1** and **2**. The reaction kinetics also revealed that the reduction occurs via pseudo-first order kinetics, with **2a** exhibiting a higher rate than **1a**, **1** and **2**. Finally, the catalyst optimization revealed that 1 and 1.5 mmol are the best concentrations for oxides and complexes, respectively, and that all catalysts could be recycled three times without significantly lowering their efficiency.

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PHOTOCATALYTIC MEMBRANE TECHNOLOGY FOR OILFIELD PRODUCED WATER TREATMENT - A REVIEW

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ABSTRACT

Oilfield Produced water (OPW) is the wastewater produced during oil and gas exploration which is generated because of the reservoir or ground water from the oil reservoir moving up to the surface. OPW is generated in huge quantity and contains various complex compounds which can be both organic and inorganic in nature and most of these compounds are toxic in nature. OPW is at present being treated using the conventional method of treatment which includes cyclone separation, adsorption, coagulation, decantation floatation and biological treatment. However due the complex nature of OPW treatment these conventional treatment methods have not been able to treat this water to acceptable standard before it is discharged into the environment or before it been re-injected into the reservoir for reuse within the reservoir well. Membrane technology has shown to be a better treatment method in comparison the available conventional technology, however this method also has the set back of fouling which most times greatly affects its efficiency to treat OPW. Also, its inability to remove and treat oil emulsion having very small droplet size is also another limitation. To address this draw back, photocatalytic membrane a promising technology which couple photocatalysis and membrane filtration in a single unit has been studies lately where the smaller oil droplets and organic pollutants are degraded and mineralize via photocatalysis and the OPW is filtered simultaneous by the membrane process. This technology has emerged to be better means of treating OPW to meet the minimum acceptable standard before discharge into the environment or for other uses. This review paper attempts to discuss the complex nature of OPW, and the use of photocatalytic membrane as a promising technology for treatment of OPW treatment.

Key words: oilfield produced water; photocatalytic membrane; membrane technology; oil and gas; exploration; treatment technology.

1.0   Introduction:

There is no doubt that for day-to-day operations, modern society is heavily reliant on readily available and reliable energy. Among the various energy sources accessible, fossil fuels account for the largest share and have been regarded the most acceptable and convenient energy source for decades. (Munirasu et al., 2016). Except for coal, all available fossil fuel sources, including gas, oil, coal bed methane, and modern shale oil and gas, are obtained through exploration, which involves penetrating the earth's crust. Water has traditionally

been the most significant by-product of the exploratory process. This water known as Oilfield Produced Water (OPW) has a complex nature including salt, both organic and inorganic compounds as its constituents. The quantity water generated from any reservoir during exploration varies from one reservoir to the other and it also depend on the age of the reservoir and in some instances could be up to 98% of total volume of fluid discharged from the reservoir during exploration (Alzahrani et al., 2013; Igunnu & Chen, 2014).

However, it is generally accepted that the water oil ratio for most oil well is 1:3(Cordes et al., 2016; Khatib & Verbeek, 2002). OPW mixture can be hazardous to the environment if not properly treated. At present marine life in the ecosystem are faced with great challenges of damage and pollution to the environment as a result of various oil spills and discharges from petroleum production activities which are normally discharged into the water body and this tend to threaten the existence of these marine life(Soto et al., 2014; Zhang et al., 2015). However, as a result of the various setbacks and limitations of oil exploration technology within the offshore platform of the oil and gas production process, a huge quantity of OPW is discharged into the water body thereby polluting the it (Tornero & Hanke, 2016; Turkayeva et al., 2017).

Basically, there are a number of both physical, chemical and biological separation methods use for OPW treatment these includes filtration (Scholz, 2016), flocculation/ coagulation (Khalid and Hind, 2016; Su et al., 2015) adsorption (Al-Maamari et al., 2012; Fathy et al., 2018), hydrocyclone (Igunnu & Chen, 2014; Souza et al., 2012), floatation (Yu et al., 2017), electrodialysis (Martin, 2014), precipitation (Li et al., 2000), chemical oxidation (Igunnu & Chen, 2014), electrochemical technique (Igunnu & Chen, 2014), activated sludge (Fakhru'l-Razi et al., 2009) biological aerated filters (Su et al., 2007) and microalgae based treatment process (Comninellis et al., 2008). These conventional methods have been used to treat OPW as standalone or in combination to separate oil-water emulsion. However, these methods have face different limitations especially their inability to degrade and separate oil droplets of less 10μm in size.

Membrane filtration has however attracted much attention recently as a promising technology for treatment of OPW. Membrane technology has several advantages over the conventional methods such as energy efficiency, stable which comprise stable quality of effluent and small footprint (Azizo et al., 2017; Cai et al., 2020; Ibrahim et al., 2018). Depending on what to separate, the pore size of the membrane can be tailored to have size of a little as micro size so as to ensure total filtration of oil emulsion(Obaid et al., 2015; Salahi et al., 2013). However, this technology also has the limitation of membrane fouling which is the major problem of membrane filtration process, and this could greatly affect the efficiency of the treatment process causing decline in flux.

To address this concern, Photocatalytic membrane which couple photocatalysis with membrane filtration in a single unit has shown to be promising technology to degrade, mineralize and treat organic pollutants present in OPW. It has been shown that this technology is efficient, effective, and reliable in separating oil emulsion of very small droplet size.

This review therefore aims at giving insight into the complex nature of OPW, principle of membrane technology, photocatalysis and the use of Photocatalytic membrane for OPW treatment as obtained from literatures.

2.0   Oilfield Produced Water (OPW) Composition

The complex nature and composition of OPW varies from one oil well to another. Its constituents in terms of chemical and physical characteristics are dependent on various

factors such as the geographical location of the well, age of the well, type of chemical injected into the well during extraction, type of hydrocarbon present in the well and its geological formation. OPW in most case may have the chemical characteristic of the type of hydrocarbon found in well since the reservoir water has been in contact with the hydrocarbon compound for several years. The volume and properties of the OPW may continue to vary for the reservoir's life time (Veil, et al., 2004). OPW discharged from oil reservoirs are less toxic compared to that discharge from condensate/gas exploration which is found to be more toxic and even 10 times more toxic than that from oil wells. However, the volume of water discharged from oil wells are far larger than that from gas platforms (Duraisamy, et al., 2013).

The main constituents of OPW that are of much concern are :, Oil and Grease (O&G), benzene, toluene, eethylbenzene and Xxylenes (BTEX), Salts (total dissolved solids (TDS), or electrical conductivity, referred to as salinity), polyaromatic hydrocarbons (PAHs), Phenol, Organic acids, some natural organic and inorganic compounds (e.g., chemicals that cause scaling and hardness like magnesium, barium, sulfates, and calcium), Chemical additives added during drilling, fracturing, and well operation that could be toxic such as biocides and corrosion inhibitors (Arthur et al., 2011). Table 1 gives the main constitutes of OPW.

Table 1- Commonly existing constituent of pollutants from Produced water (Adapted from Munirasu et al., 2016)

Constituents	Oilfield produced water (OPW)	Gas field Produced water
TOC	1 – 1,500	67 – 38,000
COD	1,200	2,600 – 120,000
TSS	1 – 1,000	8 – 5,484
pH	4 – 10	3.1 – 7
Total oil	2 - 565	NA
Volatiles (BTEX)	0.4 – 35	NA
Chloride	80 – 200,000	1,400 – 190,000
Bicarbonate	77 – 3,990	1,400 – 190,000
Sulfate	2- 1,650	<0.4 – 47
Ammonia	10 – 300	NA
Nitrogen Sulfide	□ 10	NA
Phenols	Up to 23	NA
Volatile Fatty acids	2 – 4,900	NA

Calcium	13 – 25,800	Up to 51,300
Sodium	132 – 97,000	520 – 120,000
Potassium	24 – 4,300	149 – 3,870
Magnesium	8 – 6,000	0.9 – 4,300
Iron	< 0.1 – 100	Up to 56
Aluminum	310 – 410	< 0.5 – 83
Boron	5 – 95	Up to 56
Barium	1.3 – 650	< 1 – 1,740
Cadmium	< 0.005 – 0.2	< 0.02 – 1.21
Chromium	0.02 – 1.1	Up to 0.03
Copper	< 0.002 – 105	Up to 5
Lithium	3 – 50	18.6 – 235
Manganese	< 0.004 - 175	Up to 63
Lead	0.002 – 8.8	< 0.2 – 10.2
Strontium	0.02 – 1,000	Up to 6,200
Zinc	0.01 – 35	< 0.02 – 5
Arsenic	< 0.3	Up to 151
Mercury	< 0.002	NA

3.0   Principle of Membrane technology for OPW treatment

Membranes are microporous media with particular pore sizes which separate a fluid from its components selectively. There are basically four known membrane filtration or separation processes and these includes reverse osmosis (RO), microfiltration (MF), nanofiltration (NF) and ultrafiltration (UF)(Xu, & Drewes, 2006).UF best separates macromolecules, RO used to separate ionic and dissolved components, NF for separation of multivalent ions while MF used to separate suspended particles (Judd & Jefferson, 2003; Madaeni, 1999) . NF and RO are normally used in water desalination while UF and MF can be used as standalone separation process. Two basic types of filtration process are normally operated with membrane technology which are dead-end and cross-flow filtration process and can either vacuum or pressure driven systems(Drewes et al., 2009).

3.1   Polymeric and ceramic membranes

Both ceramic and polymeric membranes are employed for MF and UF water treatment. Polymeric UF and MF membranes are prepared from polyvinylidene and polyacrylonitrile while clays of carbides, metals, nitrides and oxides are used to prepare ceramic membranes (Khemakhem et al., 2010). MF and UF ceramic membranes have been employed for OPW

treatment at full scale facility(Drewes et al., 2009). It was reported that OPW treated using these types of membrane were free from suspended solids and almost all non- dissolved organic carbon were removed(Faibish & Cohen, 2001; Lobo et al., 2006). MF and UF ceramic membranes can be used in both dead-end and cross-flow filtration system and can be used fro more than a decade. Chemical may only use properly during cleaning of these type of the ceramic membrane otherwise chemical are not normally used for the filtration process with ceramic membranes.

3.1.2 Microfiltration and ultrafiltration

MF membranes are made of larger pore size of between 0.1- 3µm and mostly used for reducing turbidity and for the filtration of suspended solid particles it can be operated as either dead-end or crossflow filtration system. In the case of the ultrafiltration, the pore size ranges between 0.001- 0.1µm. This type of membrane filtration system is used in the removal of viruses, colour, organic matter (colloidal) and odour from water(Drewes et al., 2009)(Han et al., 2010). UF is considered the most efficient separation process for the removal of oil emulsion from OPW in comparison with other separation techniques(He & Jiang, 2008). The UF is also known to more effective for hydrocarbons, dissolved components and suspended solids removal in OPW than MF (Bilstad & Espedal, 1996). This two method are normally operated at low membrane pressure of between 1-30 psi and can be used as pretreatment method for desalination but cannot be used to filter salt(Drewes et al., 2009).

3.1.2 Reverse Osmosis (RO) and Nanofiltration (NF)

NF and RO are membrane processes driven by pressure. Osmotic pressure of the fed fluid is subdued by application of hydraulic pressure in which the filtered solution is passed through the non-porous dense membrane (Khemakhem et al., 2009).pollutants as little as 0.0001µm in sea water can be removed by RO however its greatest setback is fouling and scaling of the membrane system(Drewes et al., 2009; Mark W, 2007). Early use of RO for OPW treated has reported were not successful and this was a result of poor treatment of the water and inadequate integration of the filtration process(Doran et al., 1998; Nicolaisen & Lien, 2003). However, Nicolaisen & Lien, (2003) in their work reported a successful use of RO for OPW treatment in California USA. They developed a pilot system operated for 6 months in above 1700 h which eventually produced clean water of about 20 gpm. Studies done at bench scale have also shown RO membranes to be promising to successfully treat oil contaminated brackish water. Further studies have also demonstrated that RO membrane system would be effective in treating OPW with a pretreatment process (Mondal & Wickramasinghe, 2008; Xu & Drewes, 2006). Depending on the size of pollutant removal rate or rejection, the material used for fabrication and location determine the economic cost of RO system. The level of total dissolved solid (TDS) to be removed and energy requirement are the main determining factor of the operating cost of the RO system. It is found that the RO membrane system have an average life span of between 3-7 years (Drewes et al., 2009). Other the other hand NF is a filtration system used to soften and remove metals and pollutant as small as 0.001µm from water(Drewes et al., 2009). It is used for removal of TDS of size between 500-25000 ppm. The NF membrane system is similar to the RO system and is use for OPW treatment at both pilot and bench scale (Nicolaisen & Lien , 2003; Xu & Drewes, 2006). In a study by Mondal & Wickramasinghe (2008) to investigate

the effectiveness of NF membranes to treat OPW water, they found out that there was an improvement in the filtration efficiency in comparison with the RO system in treating oil polluted brackish water using the same feed.

3.2 Fundamentals of photocatalysis

Heterogeneous photocatalysis have been widely studied using with various types of semiconductors, but TiO_2 nanoparticles has consistently shown considerable stability and exceptional photocatalytic activity. Photocatalysis is a form of AOP, defined as the process of oxidation of organic pollutants by hydroxyl radical in aqueous solution(Quiroz et al., 2015).

The migration of electrons by elevating them from valence to conduction band upon light irradiation (ultraviolet (UV) or Visible light (Vis)) leaves behind a positive electron hole that oxidizes molecules in contact with them, such as water or adsorbed molecules to oxidize or produce hydroxyl radicals that in turn non-selectively degrade organic contaminants or pollutants. Water is an important medium in photocatalysis, as it is used as the sacrificial molecule to generate hydroxyl radicals. Hydrogen peroxide (H_2O_2) can also be used as a sacrificial molecule, as it is able to dissociate to produce hydroxyl radicals upon UV irradiation or concurrently used with Fenton catalyst such as ferrous iron (Bensalah et al., 2018). Photocatalysis can degrade a wide variety of organic pollutants, including EDCs such as bisphenol A (BPA), chlorophenol, phenol and synthetic dyes such as reactive red and methylene blue (MB) and other pollutants like oil molecules and tannic acid. Basically, heterogeneous photocatalysis occurs in aqueous solutions due to the importance of water in the production of hydroxyl radical and the subsequent degradation and mineralization of pollutants end in the formation of water and Carbondioxide (CO_2) Equation 1 below shows the overall photocatalytic reaction.

Organic pollutants + TiO_2/Ultraviolet (UV) light →Intermediates + TiO_2/UV→CO_2 + H_2O Eqn. 1.
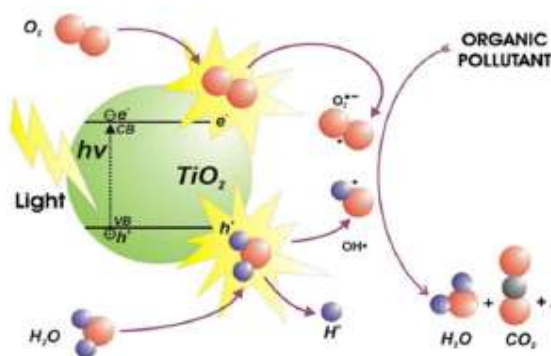

Figure 2. photocatalytic process for degradation of organic pollutants (Tu et al., 2014)

3.3 Use of Photocatalytic membranes (PMRs) for OPW Treatment

To combine the functions of both membrane separation of filtration with that of photocatalysis into a single unit, researchers have investigated the possibility of coupling or incorporating photocatalytic materials (photocatalyst) into membranes to address the limitations experienced by both technologies when used separately. This resulted in the development of photocatalytic membrane which operates in such a manner that both photocatalytic degradation of pollutants and filtration process takes place simultaneously in a single unit. The photocatalyst is either immobilized or suspended in the photocatalytic membrane unit Figure 3. Among the earliest works in incorporating photocatalysts into

membranes as a substrate was developed by Yamashita et al. (Yamashita et al., 2003). In that work, TiO_2 was coated on a superhydrophobic porous Teflon membrane by the ion-assisted deposition method. The combined effect of antifouling and photocatalysis also contributed to the membrane's antifouling and self-cleaning ability. However, with time, researchers realized that the incorporation of photocatalyst into membrane structures could not only impart self-cleaning ability but can directly involve in the remediation of treated effluent by degrading the pollutants present. Initial work on photocatalytic membrane for degradation of pollutant was done by incorporating the photocatalyst into the membrane matrix by blending it with the polymer solution. However, in recent times, more focus had been placed on the immobilization of such photocatalyst on the membrane surface to improve efficacy. Table 2 presents various work on the use of photocatalytic membranes for the removal of organic contaminants and pollutants and treatment OPW.
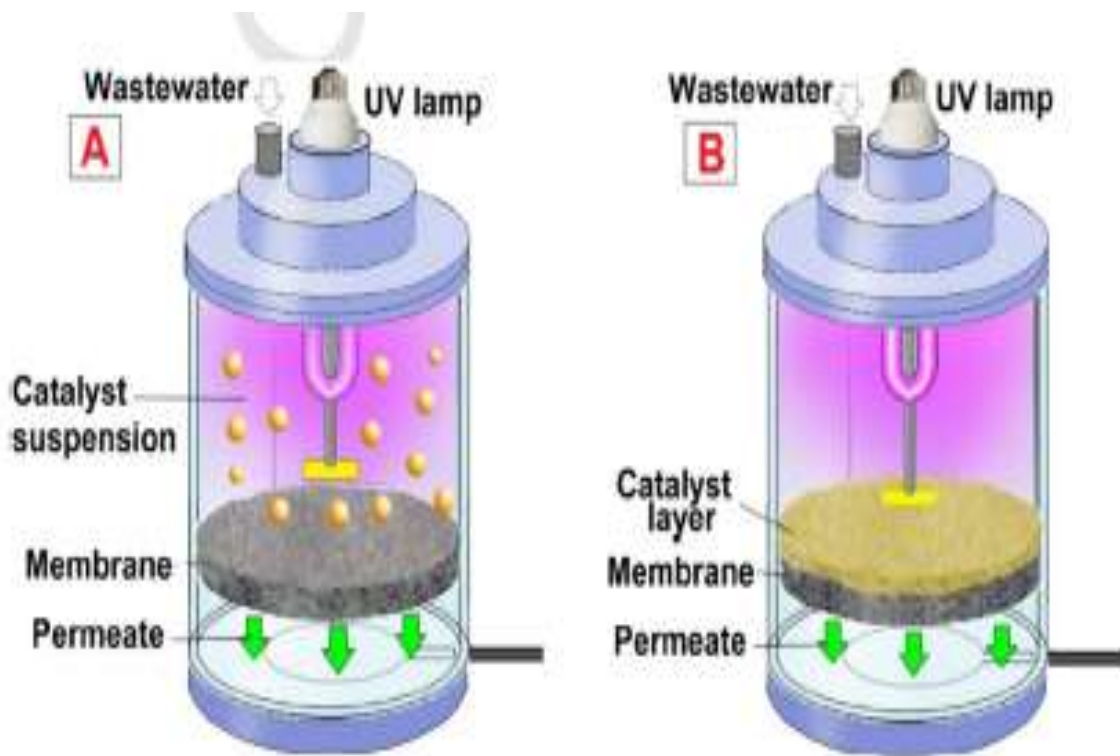

Fig. 3. Two different configurations of PMRs (A) photocatalyst in suspension media, (B) photocatalyst immobilized in/on the membrane (Nasrollahi et al., 2021)

Table 2 Use of Photocatalytic Hollow Fiber membrane for OPW treatment from literatures

Photocatalytic membrane	Light source	Parameter/pollutant targeted	Flux (Lm^{-2} h^{-1}).	Remark	Reference
Graphitic carbon nitride (GCN) coated on Alumina (Al$_2$O$_3$)	UV	Oil rejection of 97% (180 min)	577	Focuses on oil removal	(Alias et al., 2020)
PVDF/TiO$_2$	UV	Surfactant rejection of 66.73%	47.95	Focuses on surfactant removal	(Rawindran et al., 2019)
α-Fe$_2$O$_3$ supported Al$_2$O$_3$/YSZ	Vis	98% oil rejection	High flux	Focuses on oily wastewater	(Paiman et al., 2020)
GCN/PAN nanofibers	UV	90.2% removal of partially hydrolyzed polyacrylamide (HPAM)	-	Focuses on removal of HPAM form polymer flooding produce water.	(Alias et al., 2020)
PVDF/rGO/TiO$_2$ nanofiber webs	UV	Oil removal of 98.46% from water		Focuses on oil removal from water	(Lou et al., 2020)
GO/g-C$_3$N$_4$@TiO$_2$	UV	95% oil rejection after 10 cycles of filtration.	Reached 4536	Focused on oil removal.	(Liu et al., 2018)
PVDF-HFP	UV	98% oil rejection	799	Focused on oil removal	(Wang, et al., 2020)
RGO-Ag-TiO$_2$/CA	Visible Light	99 % oil rejection	-	Focused on oil removal	(Chen et al., 2018)
Cellulose-cotton fiber/ Ag@AgCl@MOF	Visible Light	99.64 % oil rejection	-	Focused on oil removal	(Li et al., 2019)

Abbreviations: CA: cellulose acetate; HFP: Hexafluoro Propylene; PVDF: polyvinylidene fluoride; RGO: reduced graphene oxide, GCN; Graphitic carbon nitride, YSZ: Yttria-stabilized zirconia; HPAM: Hydrolyzed polyacrylamide; PAN: Polyacrylonitrile; MOF: Metal organic framework.

4.0 Conclusion and recommendation

It can be concluded from the forgoing that photocatalytic membrane technology is a promising technology for OPW treatment since it takes care of the setback experience by the conventional methods employed in OPW treatment. This treatment process is found to be cost effective, easy to operate, does not require large space for installation, does not require the addition of chemicals, efficient and effective in degradation and mineralizing organic pollutants in OPW and as well treating the OPW to acceptable standard for discharge.

It is therefore recommended for use in OPW treatment considering the enormous damage OPW does to the environment if not properly treated and as well as the growing scarcity of fresh water for drinking and other purposes such as irrigation, livestock watering there is the need to adopt critical measures to address this need. Considering the rate at which the demand for energy is increasing and the major available source of energy globally is the fossil fuel at the moment, exploration activities will still continue for a larger part of human life and this will continue to generate OPW of which it needs to be treated to save the environment for both human and aquatic life.

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COVID-19 IMPACT ON AUTOMOTIVE INDUSTRY'S GREEN ENERGY TARGET IN SOUTH-EAST ASIA: A MALAYSIAN PERSPECTIVE

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ABSTRACT

Recently, higher rate of flooding occurrences has been reported in Germany, USA, China and other region around the world leading to displacement of settlements and deaths in some cases, researchers over past years have attributed this and other environmental crisis to climate change which is influenced by fossil fuel combustion. Automotive industries contribute second highest source of greenhouse gases emissions from fossil fuel combustion, although many countries in South-east Asia had developed blueprint to adopt green and renewable energy sources especially biodiesel to replace fossil fuel however, emergence of the COVID-19 pandemic especially the delta variant has affected the green energy plans; therefore this paper present the impact of COVID-19 on Malaysian automotive industry and how it diminishes the chance of timely achieving the target of total green economy , furthermore; this paper suggest possible ways to mitigate the challenges posed by the pandemic in the Malaysian automotive sector.

Keywords: COVID-19, Fossil fuel, Biodiesel, Pandemic, Green energy

INTRODUCTION

The progress of fossil fuel and its usage has continuously increased with corresponding world population growth in order to meet the market demand of the product, however, issues related and affecting the continuous demand of the product is the non-renewability and limited availability in addition to emission of harmful gases to the environment after combustion [1-3], in terms of emission, the transportation industry is known to be the second largest contributor to Greenhouse gas release to the environment as reported by [4,

5] and this fact has led to the search for sustainable and greener energy by automotive industries including biodiesel [6] and biofuels [7] with both been anticipated to be the best fuel candidates to replace the conventional fuels of gasoline and diesel for three main reasons: cleaner burning compared to fossil fuels, renewability and non-requirement for engine modification before usage [8].

Although the advantages of biodiesel are noted, many factors tend to slow its acceptance among which is fear of a rapid competition between food and fuel [9]. In south-east Asian countries, Indonesia and Malaysia has been playing leading roles in the development of biodiesel industries. Apart from developing this key sector of their economy, the government of both countries gradually began the process of blending conventional diesel with biodiesel, starting from laboratory testing to road testing and then commercialisation was implemented. In comparison, Indonesia as at January 2020, approved the biodiesel blending of 30% (B30) from 20% (B20) with conventional diesel while projecting increase in local consumption deem necessary to increase and contribute to the country economy, on the other hand, Malaysian government announced a similar increase from the 10% biodiesel commercial quantity blend to 20% blend usage for the automotive sector in same January 2020. This road map for a greener energy in Malaysia was projected by the automotive industry in Malaysia in collaboration with the Malaysian palm oil industry [8]. A research strategy was developed over the years to experiment with the biodiesel from palm oil known. The systemic stages of the development in Malaysia is as presented in Table 1.

Table 1: Development of Palm Biodiesel in Malaysia [7]

Palm Biodiesel Development	Year	Projections/targets
Reasearch, plant launching and testings	1982-1990	Trail vehicles, emission level and perfomance validation
Commercialisation, Testing, Technology transfer	1991-2000	Price control, feedback
Power application, B5	2001-2011	Increase grid, B5 use feedback

COVID-19 IMPACT ON MALAYSIAN AUTOMOTIVE INDUSTRY

The corona virus infection also termed COVID -19 was first identified in the local wet market of Wuhan in China in 2019 and presumed to have spread by crossing from an animal host assumed to be bat to human causing respiratory difficulties and other symptoms sometimes leading to death. Due to the communicable nature of the virus, spread of infections was rapid and within a short period the whole world was in a dire situation. As expected, the pandemic affected the automotive industry especially as it had stagnated the implementation of the green energy for transportation sector blueprint.

The Malaysian automotive industry's green energy target of increasing the percentage of biodiesel blend to diesel fuel was aimed at reducing greenhouse gas emission which was influencing climate change, however, by the end of January 2020, the novel corona virus

pandemic had already started to spread in many South-Asian countries including Malaysia and this led to a pause in the roll out of diesel fuel blended with 20% biodiesel for commercial vehicles in Malaysia. The Malaysia automotive industry over the years increased production of indigenous vehicles which has significantly led to increase in the number of on road vehicles (ORV) and thereby making Malaysia the second country in Asian with high rate of vehicle ownership per individual after Brunei. Considering that transportation industry constitutes second largest gas emission, the responsibility of reducing amount of emitted gas in Malaysia from the transport sector becomes quite necessary.

The spread of the virus in Malaysia made the government to impose a movement control order (MCO) with many restrictions including shutdown of most companies except sectors providing essential services. The green plan and initial blend of 10% for the Malaysian automotive industry and ambition to raise the ratio to 20% was impacted and hence paused for reasons, secondly, many countries shut their borders and the general transportation corridor of the world was maximally reduced especially the aviation sector. The price of crude oil in the international marketdecline and CPO sustainability become priority, foreign labor which Malaysia relied on for the palm plantation were unable to return [10] and the automotive industry fuel blending and green plan became stagnated.

SUGGESTIONS FOR POST COVID-19 RECOVERY AND GREEN ENERGY IN AUTOMOTIVE INDUSTRY

The development and approval of selected vaccine and vaccination program in most South-east Asian countries, the Malaysian government should mitigate the impact of COVID-19 and automotive green energy plan by: increasing fuel blend directly to B30 since indonesia already present data of no side effects; government vehicles should be mandated to utilized the B30 while commercial vehicles should encouraged to do same at reduced price; more economic collaboration should be encouraged between Malaysian and African government to boost export ratio of Malaysia car brands since Palm biodiesel industries can easily be established on the continent; Vaccinated foreign workers should be allowed into the country to reboost the palm production sector in Malysia.

CONCLUSION
Considering that the COVID-19 pandemic has influence social order and affected key sectors of the economy of most countries of the world including the automotive sector, it is important for the Malaysian government to fast-tract economic recovery plans from the suggestions stated and get rapid commitment towards the establishment of more biodiesel industries, reboost the green energy plan, encourage stakeholder ton brainstorm to reach new automotive commercial target, involve and expand the Malaysian automotive sector through international memorandom of understanding with other countries as well as investing in more research for the sector.

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Improved Navigation and Tracking Mechanisms for Blind People Using GPS and other Devices for Obstacle Detection

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ABSTRACT: God gifted sense of vision to the human being is an important aspect of our life. But some unfortunate people cannot see things. The visually impaired have to face many challenges in their daily life. The problem gets worse when they travel to an unfamiliar location. Only a few of the navigation systems available for visually impaired people can provide dynamic navigation through speech output. None of these systems works perfectly for both indoor and outdoor applications. In this paper, we designed a navigation device for the visually impaired which is focused on providing voice output for obstacle prevention and navigation using ultrasonic sensors, Radio Frequency Identification (RFID) technology, and android devices. The device can be used for guiding individuals who are partially sighted or blind. It can also help blind people to travel with the same ease and confidence as sighted people. The device has proximity ultrasonic sensors. RFID tags are installed in a public building and are also integrated into a blind person's walking stick. The whole device was designed to be small and is used in conjunction with the white cane. An android application was designed which gives voice navigation based on RFID tags read and also updates a person's location information on the server. One more application GPS was also incorporated for family members to access the blind person's location through the server whenever needed.

Keywords — *Android, blind, Intelligent Navigation Device, Ultrasonic sensors, partially sighted, PCB unit, RFID Tag, GPS locator.*

INTRODUCTION

This paper presents a system concept to provide a smart electronic aid for blind people. We designed an intelligent device that alerts the person on the occurrence of obstacles based on the distance between the person and the obstacle. The intelligent device not only alerts but also traces the location of the person and informs the current position of the person to his relatives through the use of a GPS server. There are many blind people in society, who are

suffering while exercising the basic daily human life needs that could put lives at risk while travelling. There is a necessity these days to provide security and safety to blind people. There have been few devices designed so far to help the blind.

Blindness or visual impairment is a condition that affects many people around the world. The usage of the blind navigation system is very less and is not efficient. The blind traveller is dependent on other guides like white cane, the information given by the people, trained dogs [1] etc. Many virtually impaired people use walking sticks or guide dogs to move from place to place. A guide dog is trained for guiding its users to avoid accidents from objects and barriers over a fixed path or in a fixed area. When a visually impaired person uses a walking stick, he waves his stick and finds the obstacle by striking the obstacles in his way. The device has proximity ultrasonic sensors which provide the vibration alert to avoid obstacles. The RFID tags can be installed into a public building and it is also integrated into a blind person's walking stick through RFID sensor. The whole device is designed to be small and is used in conjunction with the white cane. This device is connected to any android phone through Bluetooth. An android application was designed which gives voice navigation based on RFID tags read and also updates a person's location information on the GPS server. Also, vibration alerts are provided through the smartphone on obstacle detection. One more application was designed for family members to access the blind person's location through the server, whenever needed.

The system is based on RFID tags and GPS which may be expensive but can be used for both indoor and outdoor navigation respectively and location tracking. It also uses ultrasonic sensors for blind person's navigation which combines voice alert and vibration properties. These were developed for sending the command to the relative of person in the form of emergency SMS by system registered cell phone number. The system responds to it by transmitting its current coordinates in the form of Latitude and Longitude using a reply SMS to the Cell phone. The device uses the sensors to detect obstacles within the designed range and gives vibration alerts through a sound to the blind person to avoid the obstacle as shown in fig.1.
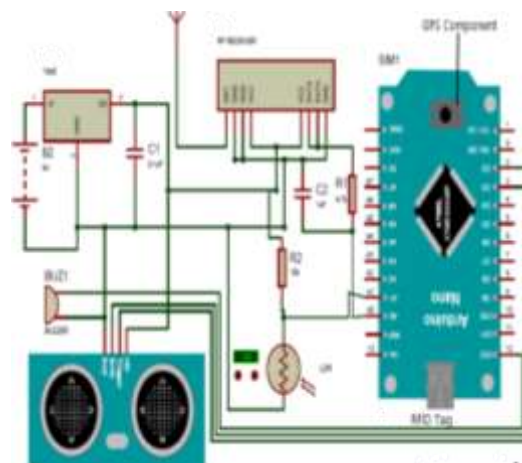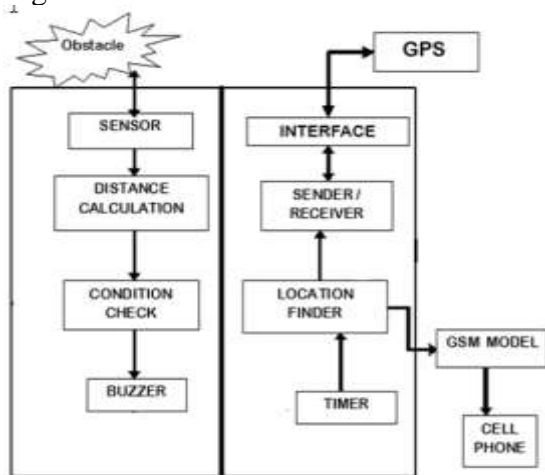

Fig 1. Block Diagram of GSM and GPS based System   Fig 2. Circuit Diagram of the system

This system has the disadvantage that the location of the blind person could be tracked only by using the specified cell phone number i.e. if the saved number in the system is lost or deactivated the location tracking would fail. Only outdoor navigation could be provided using GPS as GPS doesn't work for indoor navigation in India. Thus, using these ideas we have come up with a device designed to alert the blind person with voice output as well as

vibration alerts and update his recent location using GPS on a server which can be accessed by his relatives as and when the need arises. The additional benefit being an SMS alert is sent in emergencies

CONCLUSION

The proposed system tries to eliminate the flaws in the previous system. It aims to solve the problems faced by blind people in their daily life. The system also takes measures to ensure their safety. It can be further enhanced by using VLSI technology to design the PCB unit. This makes the system furthermore compact. Also, the use of active RFID tags will transmit the location information automatically to the PCB unit, when the intelligent stick is in its range. The Blind stick is a practically feasible product and convenient to carry around like any other walking stick. This reduces the dependency on other family members, friends while walking around. It can serve as the benchmark in aid for the blind Due to its features it is the best equipment for blind and visually impaired people for walking on roads.

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ADOPTION OF 'OMICS' TECHNIQUES FOR UNDERSTANDING THE IMPACTS OF MULTI-METAL TOXICITY IN AQUATIC ENVIRONMENT

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ABSTRACT

Over the years, the study on the ecotoxicological impacts of heavy metals in the aquatic environment has majorly been focused on the concentrations of individual single metals; and by using conventional unidimensional analytical methodologies. It is however evidently reported that the synergy between the mixture of the occuring metals is more damaging to vital metabolic interactions in the aquatic species and subsequently in human systems. Through the aquatic environment, fish has proven to be the reliable sentinel organism for transfer and biomagnification of toxic heavy metals into human body via the food chain. Fish also has similar biochemical features to human body hence its adoption for the deep understanding of the metabolic interactions and changes/damages that occur within the metabolites by identifying potential biomarkers and elucidating the resultant consequences. The cutting edge binomial 'Omics' techniques of metallomics and metabolomics (metallometabollomics) have proven to provide a clear insight into the metabolic effects of multi-metal toxicity. This mini review provides an insight into the adoption of the 'Omics' techniques for novel and enhanced understanding of the actual toxicological changes that occur.
Key words: Toxicity, Metallomics, Metabolomics, Biomarkers and Metabolites.

INTRODUCTION

In the recent past, great attention has been given to the increased and persistent problem of heavy metals contamination and accumulation in the environment from various anthropogenic and natural sources mainly due to their non-degradable, highly accumulative and xenobiotic nature, which, once taken into the body system, persist in cells, tissues and organs, posing great deal of neurological and reproductive disorders, heart problems, respiratory complications as-well-as interference with normal homeostasis and DNA

activities. Arsenic (As), cadmium (Cd), chromium (Cr), mercury (Hg) and lead (Pb) are the most vital toxic metals on global perspective. They are found especially in the aquatic environment due to increased industrialisation and other anthropogenic activities, thereby bio-accumulating in the organisms found in the aquatic environment, most especially fish; and therefore subsequently biomagnifying in humans through the food chain due to increased consumption of fish species as cheap and simple source of protein. Fish is said to have many similar biochemical mechanisms in comparison to humans [1,2,3].

As, Cd, Cr, Hg and Pb are also found as mixtures in the ecosystem which makes them to be more toxic due to synergistic interactions. Recently in Mexico, the death of dozens of marine mammals was linked to the presence of mixture of the aforementioned metals in the aquatic environment [3]. There currently is paucity of data on studies related to the toxicological effects of metal mixtures via fish species, hence the concepts remain unclear [4]. Since toxic metals are mostly encountered as mixture of two or more elements, the evaluation individually of their toxic effects does not offer a realistic estimate of their impact on biological processes [3,4]. For instance, the toxicological effects of binary metals of As/Cd exposure was reported to be more damaging than separate exposures; inducing lipid peroxidation and upward regulation of glutathione and metallothionein. The conventional unidimensional approaches do not give the full picture of the real metabolic effects such as damage to lipids, proteins, enzymes and DNA via the production of free radicals [2,3,5].

CONCEPTS OF METALLOMICS AND METABOLOMICS
The binomial 'Omics' technologies of metallomics and metabolomics have recently been greatly focused-on for the study of toxic metals in relation to metabolites for environmental toxicological assessments to overcome the limitations of the unidimensional conventional methodologies through the evaluation of biomolecules and biomarkers [3,4,5,6]. Metallomics technique is aimed at verifying the distribution of metals and/or metalloids, as well as elucidation of physiological and functional aspects of proteins, genes, and metabolites containing metals of biological interest. In metallomics, metallomes are defined as metalloproteins, metalloenzymes, and metal-containing biomolecules; representing main target of metallomics studies [5,6]. Metallomics information is classified as qualitative and comparative and gives a deep insight into the concept of metal trafficking, interactions and homeostasis, for instance, selenium (Se) and zinc (Zn) have been cited by the protective action against toxic metals such as mercury (Hg) or cadmium (Cd), while manganese (Mn) is the cellular defence against reactive oxygen species and cancer protection [5,6,7]. The common adopted methodologies of ICP-MS and NAA enable the simultaneous quantitative analysis of multiple elements, while SR-µXRF and LA-ICP-MS are also used to study the distribution of the metallomes [5,6,7,8].

Metabolomics refers to, and is basically concerned with the identification and quantification of metabolites within a cell, tissue, or organ of an organism [5]. Unlike the targeted approach of earlier studies, the metabolomics technique is, today, a discovery-driven science applying a shotgun approach for a holistic evaluation of hundreds of metabolites without a prior selection (non-targeted), responding to differential environmental stimuli [5,6]. The pattern of metabolic response to exposure of living organisms to different toxic metals include alteration of energy metabolism, alterations of cell membrane, glutathione expression, and amino acids [5]. Measuring only the metal content in particular organ does not give information about its effect at the subcellular level, hence the need for the evaluation of biochemical biomarkers such as metalloproteins and enzymes, for the prediction of the

effects of metal toxicity [3,5,6,7]. Metabolomics data are more precise in reflecting the physiological status of a biological system. NMR, LC/MS, and GC/MS are the most common technologies in metabolomics research. The generated data usually consist of measurements performed on subjects under various conditions; which may be digitized spectra, or a list of metabolite levels [5,6,9]. Several pattern recognition methods and statistical programmes are currently available for analysis of both NMR and MS data, such as principal components analysis (PCA) and partial least squares (PLS). Comprehensive software XCMS, freely available since 2006 to analyse global MS-based metabolomics datasets has been developed at The Scripps Research Institute. Other popular metabolomics programmes for mass spectral analysis include MZmine and MetAlign [5,6,10].

METALLOPROTEINS AND METALLOTHIONEINS AS BIOMARKERS OF MULTI-METAL TOXICITY IN FISH

Attention has recently been shifted from bioindicators of metal pollution, to biomarkers of multi-metal toxicity, which is a novel and paradigm shift into the world of toxicological studies [5,6]. Therefore, metalloproteins in fish have been used as biomarkers for environmental contamination showing ecological importance due to their high affinity to metal-protein interaction. In addition, another group of small proteins that show ecological importance, known as metallothioneins, are important in the detoxification of essential (Zn and Cu) and toxic (As, Cd and Hg) metals [11]. Cysteine residues present in metalloproteins and metallothioneins have a high affinity to bind with heavy metals, such as Pb^{2+}, Hg^{2+}, Zn^{2+}, Cd^{2+}, $Fe^{2+/3+}$, As^{3+}, Cu^+ and Ag^+ [7,11].

CONCLUSION

The adoption of the concept of 'Omics' techniques for ecotoxicological study of the impacts of multi-metals in aquatic environment is a novel approach that will give a clear picture of the metabolic changes within living system, thereby filling the wide gap created by the unidimensional methodologies. This will influence decisions on environmental impact assessments and create a broader perspective for understanding the metabolic changes due to multi-metal toxicty.

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HARNESSING SOCIO-CULTURAL MEANINGS AND VALUES FOR SUSTAINABLE INDIGENOUS HOUSING TRANSFORMATION IN NIGERIA

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ABSTRACT

The challenge of acute housing shortage and a dwindling economic downturn in Nigeria made stakeholders explore ways to harness indigenous building materials for housing provision. Most previous studies on Nigerian indigenous architecture focus more on ethnographic accounts of vernacular housing typologies, construction materials and techniques. There is a need to explore matters of inherent socio-cultural values, symbolic form, interpretation of meanings, spatial configurations, and improvements strategies. This study examines the meanings and values of the Tiv people of central Nigeria regarding their housing choice and preferences. The study employs the Means-end chain model of qualitative research, with 24 laddering interviews, to elicit responses from participants. The results indicated that most Tiv indigenous houses are circular, constructed in a dispersed setting to facilitate free movements and ensure some level of control over prevailing climatic factors simply. The people claim the local houses also represent their cultural heritage in a natural setting to achieve independence, privacy and basic comfort. Policymakers are to ensure consideration of socio-cultural values of the people in physical developments to safeguard their cultural sustainability.

Keywords: Nigeria housing, indigenous housing, housing values, sustainable housing, means-end chain

INTRODUCTION

Stakeholders have identified exploration of indigenous building forms and materials as having high prospects for alternative housing provision in Nigeria (Olotuah, Olotuah, & Olotuah, 2018a, 2018b). Exploring indigenous housing is partly due to sustainable issues (Maina, Muhammad-Oumar, & Sa'ad, 2018) coupled with financial constraints to delve fully into massive construction, using conventional prefabrication methods (Aule & Jusan, 2019).

Though the problem of housing shortage could be seen as a global one, it is most severe in developing countries (Fariha et al., 2018; Zhang & Ball, 2016). Like other developing countries, Nigeria has struggled with a massive housing shortage, which has become even worse in the 21st century (Kolo, Rahimian, & Goulding, 2014; Taiwo, & Adeboye, 2013). In either case of conventional mass housing or indigenous housing transformations, there is a need to first understand the inherent socio-cultural values of the people for more sustainable development to check the "uncomfortable prototypes" scenario (Maina, 2013b). As a complex setting with more than 250 ethnic nationalities (Abubakar, 2015; Lodson, Ogbeba, & Elinwa, 2018), Nigeria is also home to a variety of special indigenous housing typologies, empirically developed over time. According to Maina (2013), older documentation on Nigerian indigenous architecture paid more attention to ethnographic records of vernacular housing typologies, construction techniques, local technologies and construction materials by scholars such as Dmochowski (1988, 1990), Moughtin (1985), Schwerdtfeger (1982) among others. In recent times, however, studies are also focusing on inherent socio-cultural values, symbolic form, interpretation of meanings, spatial configurations, and strategies for indigenous housing improvements.

This study is set to explore the built environments of the *Tiv* people of central Nigeria, with their unique house forms developed over time based on their cultural and social values, as influenced by climate and locally available building materials (Bohannan & Bohannan, 1955, 2017; Sai, Bergsma, & Akiga, 2015). Emic studies affirmed that *Tiv* people use specially selected mud in either raw or processed sundried adobe bricks to construct their circular-shaped houses (Ogundele, 2005; Olotuah, Olotuah, & Olotuah, 2018a). Roof framing is often made using bamboo, canes, reeds, and palm fronds, usually tied in place with some forest climbers or ropes specially twisted with termite-resistant material. The conical roof is placed on the circular wall and covered with woven spear grass or some other specially selected grass, forming a thatched roof finish (Inga, 2000; Ohiaeri, 2020).

Therefore, this study seeks to investigate the underlying meanings and consequential values for the choice of housing shape, building materials, and compound setting of the *Tiv* people of central Nigeria. The study adopted a qualitative research approach, eliciting socio-cultural principles through the Means-End Chain (MEC) laddering interviews, as shown in Figure 1.
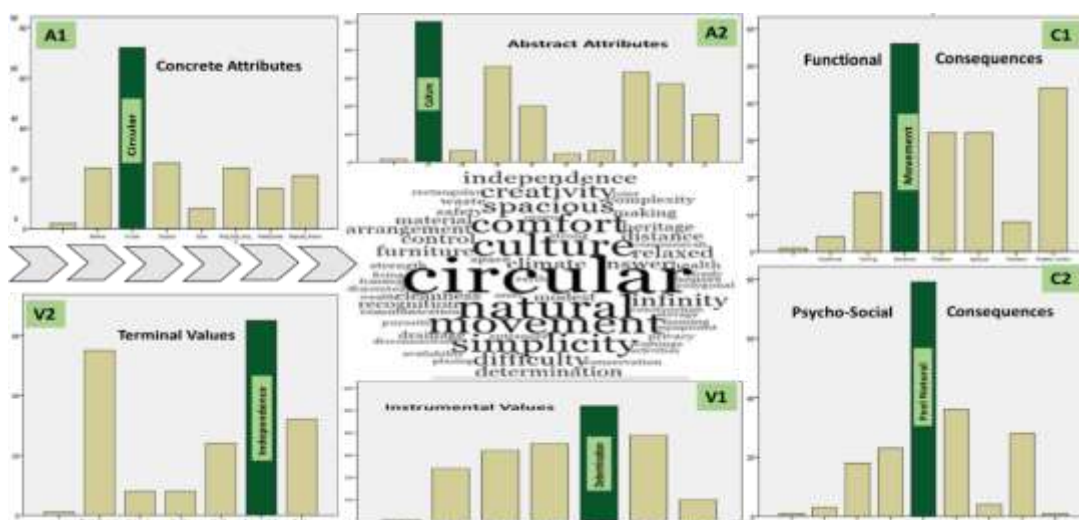

Fig. 2: *Summarised MEC ladder from respondents*

MAIN RESULTS

A ladder could be seen as a series of responses forming linear or branched associations in a MEC interview. Figure 4 below represents summarised direct ladders for the 24 respondents to elicit housing meanings and values in Benue state Nigeria. From known to unknown (Shafique & Majid, 2020; Zinas & Jusan, 2012) concrete to abstract attributes (Johnson, Lehmann, Fornell, & Horne, 1992), housing as a complex product was first categorised into eight components, namely: wall shape, wall materials, roof shape, roof frame, roof cover, compound shape, compound setting as well as general settlement pattern. Respondents were able to identify the most concrete attributes such as house shapes, building materials and compound settings, progressing into the more abstract meanings, consequential utility, and values in trying to justify the "why" of each component.
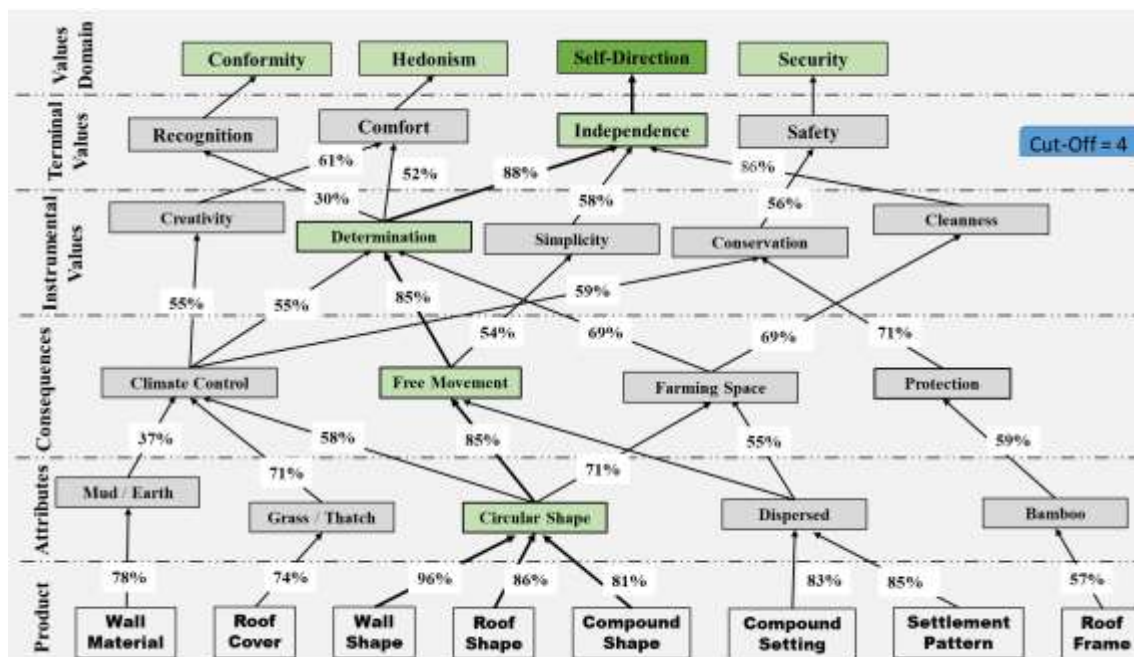

Fig. 6: *Hierarchical value map linking attributes to values of Tiv indigenous houses*

Using Microsoft Excel, an implication matrix representing the number of times each element leads to another was computed for each housing component. With 24 respondents above the minimum number required for MEC analysis, factors are considered viable when they have four direct connections (Fabbrizzi, Marinelli, Menghini, & Casini, 2017; Mirosa & Tang, 2016). The coding of the elements was arranged in ascending numerals with the order of Attributes, Consequences and Values, respectively.

CONCLUSION

Laddering interviews were carried out following the Means-End Chain research model to extract meanings and values in *Tiv* indigenous housing. The results show that most houses were circular, constructed in a dispersed setting to facilitate free movements and ensure some level of control over prevailing climatic factors simply. The people claim the local houses also represent their cultural heritage in a natural setting to achieve independence and basic comfort. In developing a mass housing scheme or improving the existing ones,

meaningful values of the people should be considered to ensure their cultural sustainability. This study should be significant to policymakers as well as prospective developers in the housing sector in Nigeria.

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Mobility-aware Void Avoidance and Mitigation for Energy Efficiency in Underwater Wireless Sensor Networks

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ABSTRACT

Underwater Wireless Sensor Networks (UWSNs) provides sensor to sensor communication in an acoustic environment in order to collect data. The data collection process requires highly optimized communication concept, which involves routing and deployment of node for data transmission. In the routing process, void hole is often encountered due to dispersed node distribution, which leads to packet drop/loss. Consequently, solutions have been proposed for handling void hole and mitigating it occurrence. However, there is a need to further explore the void recover concept. In this paper, we propose a Communication Void Avoidance and Mitigation (CVAM) algorithm based on node mobility displacement and communication range adjustment strategies. CVAM avoids communication void by estimating node displacement before data packet forwarding. Further, it mitigates void by adjusting the transmission range of the forwarding node in a dynamic and robust manner. To evaluate the performance of the proposed CVAM algorithm, extensive simulations have been performed using NS-2 AquaSim. The simulation results are compared with state-of-the-art algorithms. CVAM outperformed the benchmarked algorithm in terms of packet delivery ratio, and total energy consumption.

Keywords: Void hole, Node displacement, Mobility-aware, Underwater wireless sensors networks, Routing, Energy efficiency.

INTRODUCTION
In recent time, the Underwater Wireless Sensor Networks (UWSNs) has become a viable and suitable technology for surveillance of wide areas of acoustic environments.

Conventionally, UWSNs comprises of sinks (sonobuoys) deployed at surface of the water and self-configured sensor nodes deployed in underwater environment [1, 2]. Each underwater sensor node performs the task of observing and collects events of interest in its surrounding area. Further, the sensor nodes work in a collaborative manner to gather and deliver data to the sink node. The sink nodes are responsible for collecting data from the individual sensors in the acoustic environment [3-5].The UWSNs has a number of application areas including military, industrial and scientific for data collection, disaster prevention, ocean exploration, navigation assistance and pollutant content surveillance [6-8]. Even though, the UWSNs has proven it potentials, it is currently faced with a number of challenges namely, constrained by some networking challenges and costly network deployment, which are often caused by the acoustic channel. The underwater acoustic transmission suffers from varying and high bit error rate, large delays, high energy depletion, intermittent connectivity and limited bandwidth [9-11].In designing routing algorithms for UWSNs, the previously mentioned channel characteristics initiate some challenges, which negatively impact on the network performance. Consequently, the employment of conventional proactive routing is not feasible for UWSNs. This is because it requires the update of routing record to every node within the network. Reactive routing is often not feasible since it generate routing routes on-demand [12, 13]. In this light, geographic, pressure-based and opportunistic routing concepts have proven to be promising in UWSNs [14-21].1

MAIN RESULTS
The PDR has been observed alongside the different number of nodes. The PDR has been employed to evaluate the performance of the mitigation scheme. From Fig. 3, the results demonstrate that, the packet delivery ratio increases as the node density increases for both CVAM and A-DBR algorithms.
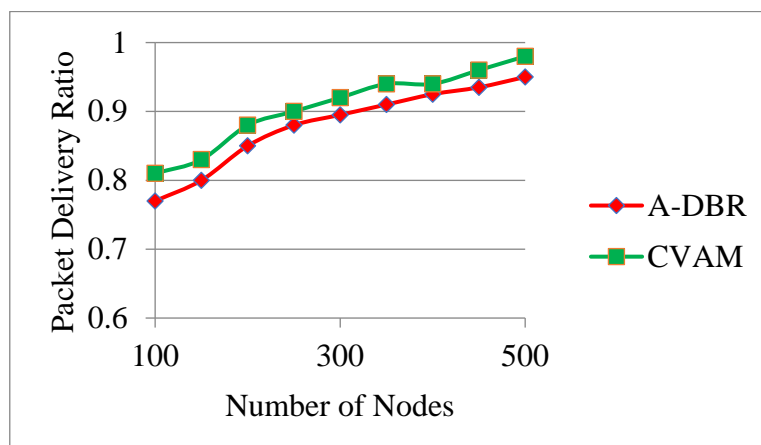

Fig. 1 Packet Delivery Ratio for Various Numbers of Node

Table 1: Simulation Parameters

Simulation Parameters	Values
Area of Deployment	1250 × 1250 × 1250m
Network Topology	Random
Number of Sink Nodes	3 to 7
Number of Nodes	50 to 400
Transmission Range	250m
MAC Protocol	Broadcast Protocol
Initial Energy	100J
Communication Medium	Acoustic Waves
Bandwidth	10kbps
Velocity Signal	1500m/s
Horizontal Node Movement	0 to 3m/s
Vertical Node Movement	0m/s
Idle State Energy Consumption	0.01mw
Transmission State Energy Consumption	2w
Receiving State Energy Consumption	0.75w
Size of Data Packet	64 byte
Hello Message Interval	100s
Simulation Time	1500s
Number of Runs	50 times

CONCLUSION

In this paper, a communication void avoidance and mitigation algorithm for underwater wireless sensor networks has been proposed. The CVAM algorithm focuses on recovering from void in the case it occurs. The mitigation concept employs dynamic adjustment of the communication channel by increasing the transmission coverage of the forwarding node in order to detect new neighbours.

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A COMBINED DROUGHT FORECASTING INVOLVING WAVELET-GROUP METHODS OF DATA HANDLING

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ABSTRACT

Time series forecasting is an important research area meant to improve the effectiveness of forecasting model in the area of drought, one of the natural disasters bedeviling some parts of the world. This happen especially in the areas where the rainfall is not in abundance. Consequently, this aspect of research area serves as a challenge to many researchers and drought planners. Many of the existing methods are yet to yield accurate and acceptable results which leads to the discovering of new ideas and methods to address the situation, hence, this effort to explore a new method known as combined wavelet-Group Methods of Data Handling (CW-GMDH) model that could effectively improve the single models. The complex nature of time series data does not make it possible for any single model to yield results that will be suitable for all situations and therefore, a combined model that will provide a better result is then proposed. The paper therefore introduces a wavelet into Group Methods of Data Handling (GMDH) by integrating discrete wavelet transform (DWT) to obtain the modify wavelet-GMDH (MW-GMDH) and transfer functions such as sigmoid and Radial Base Function (RBF) to obtain sigmoid wavelet-GMDH (SW-GMDH) and RBFW-GMDH models. To assess the effectiveness of these models Duku-Lade irrigation station in Kwara state, Nigeria was used for the collection of rainfall data transformed to various Standardized Precipitation Index (SPI) data. The incorporation of the wavelet to the existing GMDH models has positively enhanced the performance of the combined model. The results showed that combined model produced the lowest value of 0.0239 and 0.0211 for RMSE and MAE and highest value of 0.9858 for R, respectively. The percentage improvement shows reductions in RMSE and MAE by 42.3% and 80.3% respectively. The combined model proved to be efficient and reliable when compared with single models.

Key words: GMDH, W-GMDH, DROUGHT, SPI, TIME SERIES

INTRODUCTION

Drought forecasting is an important area of research of time series intended to improve the efficiency of forecasting model in the area involving natural disasters. One of such natural disasters bedeviling some parts of the world is drought. This occur especially in areas where there is scarcity of rainfall. Shijin, (2012) described forecasting which feature as one of the vital research areas in the study of the hydrological time series. Time series forecasting generally applied in many researches which has become a significant method to drought forecasting (Han et al., 2012). Drought forecasting is an essential tool used to implement appropriate moderation actions to reduce undesirable impacts on the socioeconomic events of man in a location.

To achieve this, the study intends to use the MW-GMDH, SW-GMDH, RBFW-GMDH and combined wavelet-Group Methods of Data Handling (CW-GMDH) model. This model is the wavelet-Group method of data handling (W-GMDH) as a single model before it is combined. The model is very important and relevant in drought forecasting using the standardized precipitation index (SPI). The GMDH system was originally discovered and offered by an Ukrainian scientist, Ivakhnenko and his Colleagues in 1968 which bring about mathematical models of complex systems to handle data samples with observations (Ivakhnenko, 1971). The SPI as a used data is obtained from the rainfall data obtained from the Duku-Lade irrigation station. SPI is the data that is usually used for drought forecasting and it used for this study. SPI developed by Mckee et al., (1993) which is used in over 60 countries was applied as a drought indicator (Svoboda & Hayes, 2010).

MAIN RESULTS

Table1 Comparison of All the Best Models and the Proposed Model of Training and Testing

Model	Training			Testing		
	RMSE	MAE	R	RMSE	MAE	R
MW-GMDH	0.2215	0.2002	0.9604	0.0275	0.0222	0.9782
SW-GMDH	0.2930	0.1421	0.9619	0.0249	0.0236	0.9815
RBFW-GMDH	0.2042	0.1105	0.9735	0.0252	0.0223	0.9843
CW-GMDH	**0.2033**	**0.1102**	**0.9743**	**0.0239**	**0.0211**	**0.9858**

Table1 shows that CW-GMDH model is the best when compared with the other three models. CW-GMDH model has the least value of RMSE and MAE and highest value of R in both Training and Testing phases.

Table 2 The Percentage Improvement of the Models for SPI Data for Duku-Lade

Model	RMSE %	MAE %
MW-GMDH	15.1	5.2
SW-GMDH	4.2	
RBFW-GMDH	5.4	11.8
CW-GMDH		5.7

CONCLUSION

In conclusion, the results showed that combined model produced the lowest value of 0.2033 and 0.1102 for RMSE and MAE and highest value of 0.9743 for R, respectively in the training phase, while 0.0239 and 0.0211 were the lowest values for RMSE and MAE and highest value of 0.9858 for R, respectively in the testing phase. The percentage improvement shows reductions in RMSE by 15.1%, 4.2%, and 5.4% with respective to MW-GMDH, SW-GMDH and RBFW-GMDH, respectively. Similarly, the percentage improvement shows reductions in MAE by 5.2 %, 11.8%, and 5.7% with respective to MW-GMDH, SW-GMDH and RBFW-GMDH, respectively. The combined model proved to be efficient and dependable when compared with single models such as MW-GMDH, SW-GMDH and RBFW-GMDH

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RELATIONAL DATABASE IN CONCEPTUALIZATION OF LAND REGISTRATION FOR THE ADOPTION OF LADM IN NIGERIA

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ABSTRACT
The conceptual model speak clearly the data which are held in reserve and recaptured as part of the total system design. As you would expect, this means that relational database models describe the tables and data completely and allow creation of DDL script to create and setup a database. The internal structure of model package incorporates models of how components are on the inner held together to offer both inside and outside services. These composite arrangement structured figures detail the associates and dependencies within components, tables, classes, objects or parts and supported interfaces.

In this study, figure1 exemplifies how the enterprise architect was used in UML diagram to distribute function to particular inner object in a table for task in the database. Every table is accompanying to each other and unswervingly connected with the VersionObject, and the tables are lay open to deleting and updating, sooner or later. Similarly, the AdministrativeRoleParty , the administrative post is subject to variations when the tenancy of office finish. Nevertheless, the authorization of the certificate of registration is lay open to the accretion of the order of each offices.

The anticipated conceptual model for land registration in Nigeria was produced, NG_PartyOwnershipType denotes the client applying for the certificate of occupancy in land registration system with all the official papers needed to be included with the application as NG_RightDocumentType. The procedures and the papers are worked upon by NG_PartyRoleType. While the other codeList are sweeping statement of the NG_PartyOwnersipType.

Key words: Land administration Domain Model, Conceptual, Model, Relational Database, Adoption.
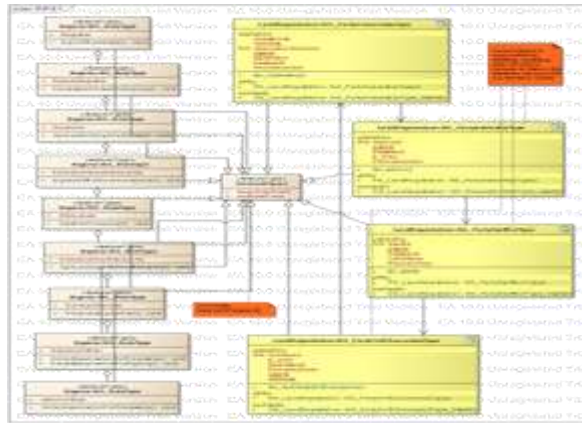
Figure1 Proposed conceptual Model for Land Registration

Figure 1 is the proposed conceptual Model for Land Registration in Nigeria. The model provides an abstract related to Party (people and organization), BasicAdministrationUnit, rights, responsibilities and restrictions (ownership rights) SpatialUnit (parcels, legal space of building and utility networks) and SpatialSource (surveying a spatial representations (geometry and topology) with the terminology for land administration based on the national system [6]. The terminologies used are as simple as conceivable in order to be convenient in practice and permit a common depiction of steps in different states of the federation. It may be applied at whichever level, which indicates the significance of the model in the entire world. These are distinguished in the figure.

i.   Components: The element in the package encompasses modelled elements and their vital features. These consist of additional depiction crossing point ports and other right of entry or internet essential modules. The connectivity and internal configuration of these are modelled in the internal configuration and connections packages.

ii.   Inner Configurations: The internal configuration features suggestion of the interior working and dependencies of elements. By means of an abstract essential diagram, they displays how the elements achieve its behavior relationship and make available interface behavior to other elements contained by the system.

iii.   Connections: The association classes model the reliance and connections between the number of components, and how every single one is used as part of a helpful system to attain the vital tasks. As you would expect, components reveal interface which are used by added components.
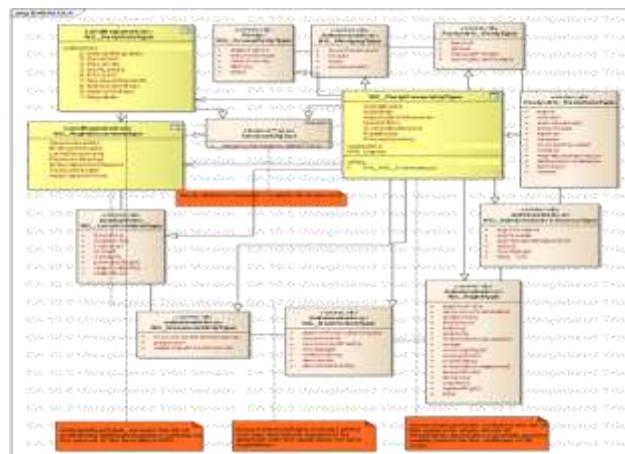

Figure 2 Class modelled With Associated CodeList

Figure 2 Class modelled With Associated CodeList. The recommended models are the products of academic study towards the implementation of the model that may possibly be successfully used and internationally recognized for land administration. The intention has been to develop a specialized model by means of existing material contained by the physical content of land administration in the study area. At present, land and cadastral restructuring system are continuing in a number of states to motivate land security and market budget in the country. All struggles have been put in the direction of making the system to be in line with global standards.

The projected comprehensive country profile for Nigeria may possibly consist of the class diagram which is offered in this research work. The package general idea indicates all classes generated for the country profile are created on LADM basic and standard classes, and all classes are subclasses of class versionobject excluding anticipated NG_Source for the reason that it concerns authentic documents but NG_Source has a LifeSpanStamp as a feature. Also NG_BoundryFace is contained within in the profile since it can be applied in the future. For now 3D volume titling is not popular in Nigeria.

Conceptualization of land registration in relation database

The presentation and putting into practice of conceptual model have need of an adequate study of the softwares and the appreciative of the platform for the correct and useful application of the model. The requirement test is very imperative in this research in order to meet the managers' requests. Figure 3 below is the flowchart of the requirement of LADM_NG_LandRegistration suggested for Nigeria. Agreeing with [4], [5] and[7]. used the UML requirement in a relational database, with UML package from Enterprise Architect and then created the carrying out in PostgreSQL and the final outcome agreed with Object Relational mapping for Portugal driven country profile. [6], optionally verified the platform that permit the specification abstract and conceptual model into a relational database for LADM_CV by by means of Visual Paradigm UML. VP_UML has the ability of performing the entire methods to the application in the database.

Development of land registration in UML diagram

UML which is the Unified Modelling Language is a graphic informational tool for drawing software concept diagram. It can be used to draw an anticipated system design, draw a tough domain and before now technologically advanced software putting into practice [1],[4],[5] and [6]. The UML illustration which signifies suggested NG_LandRegistration in Figure 2 has been clarified in the preceding section. The UML diagram was brought in from Enterprise Architect to Visual Paradigm and was changed for the reason that of the platform well-matched before it was matched. Figure.2 shows the class diagram signified in ORM of _NG_LandRegistration before it was matched and converted, while Figure 4 is the ERM subsequently been matched.

Figure 3 Generation of Entity Relational model (ERD)

Figure 3 The class diagram was transformed to ERM in imperative to explain the entire reasonable structure of NG_LandRegistration which is ready up of theoretical and conceptual model. Having remained changed, it is conceivable to assess the comprehensive programs and the classes which store the facts of the origin of the database [2]. Alternatively, it can be understood that the generalized class at the UML class diagram drawn by lines and columns in a RD, stand for all the features of Class NG_VersionObject and keeps the info of other classes in the model. Automatic database of NG_LandRegistration_db was formed in the PostgreSQL 9.3.16, PgAdmin III Version 1.18.1 with spatial expanded Postgis 2.0 with thorough knowledge declaration as shown below.

Data necessities studied

The main phase of database design is the data requests investigation; this was completed to decide the kind of data to be put in storage in the database so as to get it up the exact reason, having gotten certain facts from user's requisite previous in this research study. The features was well-defined in full for the data and the limitations that may be required for the recurrent procedures that the DBMS will be used for. Correspondingly in this work, it was convincingly and unquestionably to design a simple dynamic and static relational database with all open source software that are enthusiastically obtainable.

Generation of SQL database in Visual Paradigm for Postgres

The SQL codes were made at Visual Paradigm where the model was changed, Data Definition language (DDL) which is in control of amendment, making and administration of the structure of the database despite the fact, Data Manipulating Language (DML) is in charge of the making of the structure, putting in the data and its controlling. Nevertheless, Visual Paradigm as talk about previously in the work has scripts by this time linked to the database and carry across to Postgres to implement and stored in the database management system (DBMS). Meanwhile bring up to date, editing and erasing can be done at this stage as shown in the Figure4 low, data can also be loaded into the database so as to have reasonable query results.

Figure 4 Generation and Database Manipulation

Figure 4 shows the screen print of the exportation of the relational entity model to the Postgres database. The most common and popular way of the database manipulation is by using the SQL commands "SELECT, INSERT, DELETE AND UPDATE. This is done by preparing a script using SQL editor or graphical query builder that is made available in PgAdmin. The executions of the command are carried out through the line of command of the database.

Significant of attribute database and spatial queries in ArcGIS

ArcGIS Desktop is made up of a typical and shared uses that are accessible exact from the beginning of the menu, [3], these consist of ArcMap and Arc Catalog. ArcMap is the main plotting application which allows one to yielded maps, query attributes, evaluate spatial associations, and layout concluding the projects.

The adjustment as it was described previously, map making was completed established on the data gotten from the field. The geo-referencing was completed by means of four coordinates gotten from the field and was digitized and come out with a composite plan of the area of study figure 5.
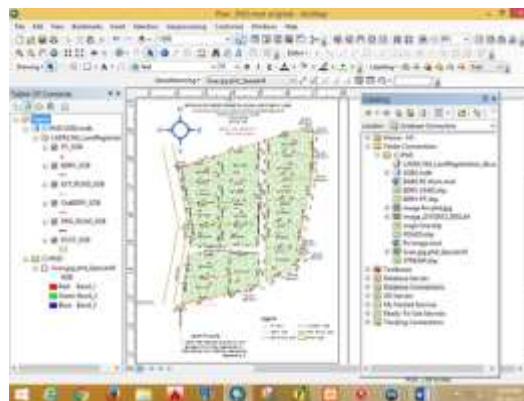

Figure 5 Screen print of composite plan of the area of study

In this study, there are rooms for thorough investigation when looking in the internet for information on the subject of the certificate of occupancy (C of O) that are been allotted out to the public as made in the dynamic database management system (DBMS). The record keeping in the past for the C of O was so bad, therefore, the work is a step forward in the right direction. The quest inquiry on the web is suitable for mortgaging institutions especially the banks, when the certificate is to be used as suttee to get a loan in addition to improve in the land businesses. Despite the fact that features and spatial query outcomes are beneficial to the lands offices for organizational managerial assignments when internet are not accessible just as it is been produced in the static database management system (SDMS). They are correspondingly worthwhile as a canter check for the genuineness of the C of O used in the land business marketplace.

As a result of the outcome of this work, it is established that Visual Paradigm, PostgreSQL and AcrGIS has been an improved platform for the conceptualization of Nigerian land registration and land titling as established on Land Administration Domain Model (LADM) and its approval, acceptance and implementation as it is done with the relational database.

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COMPARATIVE STUDY OF THE POTENTIAL OF *Aspergillus species* "KOJI" AND SWEET POTATO AMYLASE FOR HYDROLYSIS OF CASSAVA PEEL FOR ETHANOL PRODUCTION.

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ABSTRACT

The high cost of enzyme importation for ethanol production has necessitated the search for local enzyme sources. The potential of Koji and red sweet potato enzymes for cassava peel hydrolysis and subsequent ethanol production through simultaneous saccharification and fermentation (SSF) and separate hydrolysis and fermentation (SHF) were studied. Koji enzyme was prepared by inoculating *Aspergillus niger* isolated from bread into boiled rice while red sweet potato (*Ipomoea batatas*) was homogenized in a blender with 100 ml acetate buffer (pH 4.8). Enzyme activity of koji and sweet potato enzyme were determined. Hydrolysis was carried out under three conditions; SSF at 27 □C and 100 □C, and SHF at 50 □C. The fermentation lasted for eight days at 27 □C. Starch, sugar, and ethanol concentrations were determined at 48 hourly intervals. The enzyme activity of koji and red sweet potato enzymes were 8.04 and 7.2 amylase units/ml respectively. Starch concentration during fermentation decreased from 8.04mg/ml to $0.07^{\pm0.01\pm0.01}$ for koji while for sweet potato enzyme decrease to $2.2^{\pm0.1\pm0.1}$. Sugar concentration increased but later decreased at 192 hrs. The values after 192 hrs were 1.1, 1.5, and 1.2% for koji and 1.3, 1.7, and 1.5% for red sweet potato enzymes respectively at SSF (27 & 100 °C) and SHF 50 °C. Ethanol was highest in koji fermentations at 144 hrs with the following values 1.34, 1.40 & 1.34% (SSF at 27 °C, 100 °C, and SHF at 50°C) and 1.22, 1.28, and 1.22% for sweet potato enzyme respectively. The study showed that the koji enzyme was superior to the red sweet potato enzyme and SSF at 100 °C starch gelatinization produced more ethanol than SHF. The significance of the study is that Koji and red sweet potato have the potential of hydrolyzing cassava peel starch for ethanol production.

Keywords: Cassava peel, Koji enzymes, Saccharification, Fermentation, Hydrolysis,

INTRODUCTION

Ethanol (ethyl alcohol, grain alcohol) is a colorless volatile flammable liquid that is produced by the natural fermentation of sugar. In dilute aqueous solution, it has a somewhat sweet flavor, but in more concentrated solutions it has a burning taste [1]. Ethanol, CH_3CH_2OH, is an alcohol, a group of chemical compounds whose molecules contain a hydroxyl group, $-OH$, bonded to a carbon atom [2]. The term biofuel is used here to mean any liquid fuel made from plant material that can be used as a substitute for petroleum-derived fuel. Biofuels can include relatively familiar ones, such as ethanol made from cassava, sugar cane, or diesel-like fuel made from soybean oil made from lignocellulose biomass [3].

Biofuels can be produced by many different types of substrates. Among these, is cassava (*Manihot esculenta*), a plant with high starch content [4]. Cassava starch is considered a cheap, abundant, and renewable resource for the production of alcohol, glucose syrups, and dextrin [4]. Moreover, it is easily produced in tropical and subtropical zones, mainly in Asia, South America, and South Africa.

Nigeria is the largest producer of cassava in the whole world [5]. Waste is generated from cassava during the processing like peels. Cassava peels could be potential raw material in the generation of biofuel [5]. The technological availability and awareness of Africans especially local farmers to the economic potential of utilizing cassava waste in bio-ethanol production poses a great problem [6]. The source of enzyme extraction and the conditions of operation of enzymes such as pH, temperature, reaction time, enzyme concentration, viscosity, mixing rates, etc. insoluble solutions must be optimized to improve the economic and technological feasibility of the bio-process [7]. Therefore, the work was to assess the potential of local substrates for enzyme production and the efficiency of SSF and SHF for ethanol production.

MATERIALS AND METHOD

Cassava peels, rice, red sweet potato, potato dextrose agar (PDA), *Aspergillus species,* from bread mold, *Saccharomyces cerevisiae* commercial baker's yeast, koji enzyme, red sweet potato Amylase, potassium-Iodide (1.2 M and 2 %) (Fisher), Tetraoxosulphate (VI) acid (Sigma-Andrich), Potassium dichromate (CVI), Sodium thiosulphate-pentahydrate (0.03 M) (Loba Chem), hydrochloric acid (BDH), citrate buffer sulphate (pH6.0), Iodine (0.2 %), Acetic acid (1 M) (Fluka). All chemicals used are of analytical grade.

Fermentation Process

Hydrolysis and fermentation of cassava peels:

Hydrolysis and fermentation of cassava peels using Koji enzymes were carried out under three different conditions.

(1)   Cassava peels flour (2.5 g) + 2.5 g Koji Enzymes and dry yeast (0.5g) were mixed in 50ml distilled water and incubated at 27□C. (SSF)

(2)   Cassava peel flour (2.5 g)+ 2.5 g of Koji Enzymes were mixed in 50 ml of distilled water and maintained at 50□C for 30 minutes, cooled to 27□C and inoculated with 0.5 g dry yeast (SHF).

(3)   Cassava peel flour (2.5 g) was gelatinized in 50ml distilled water at 100□C, cooled to room temperature, 2.5 g of Koji Enzymes was added and then inoculated with 0.5g yeast. The above method

The above preparations were fermented according to the method of Mulak and Ogbonna (2015)[8] for eight (8) days at room temperature. During the fermentation, ethanol, starch concentration, and enzymes activity were determined at 48 hourly intervals. Similar experiments were performed using red sweet potato enzymes in place of Koji enzymes. Ethanol concentration in the samples was determined using the method for determination of ethanol concentration in an aqueous solution by Outreach College of the Science University of Canterbury.
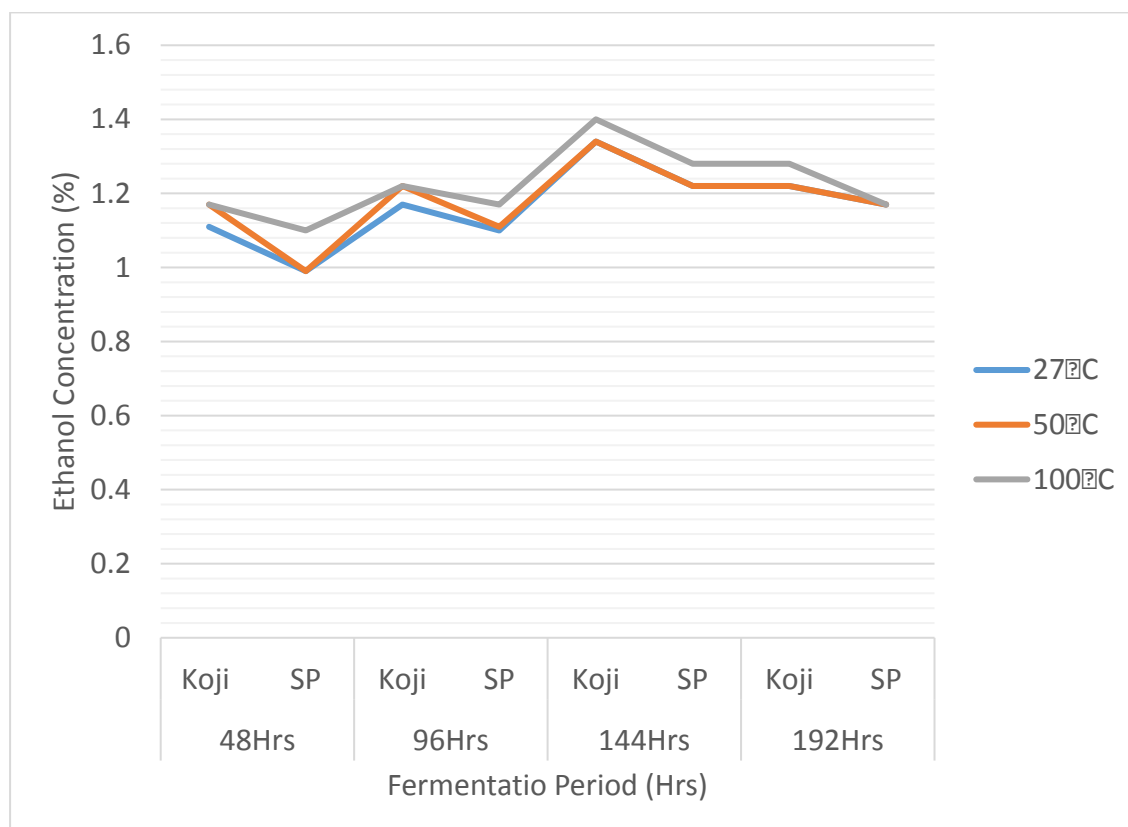
MAIN RESULTS

Figure 1. Determination of Ethanol Concentration during Fermentation.

The ethanol concentration during fermentation is presented in Fig. 4.5. The ethanol concentration increased as the fermentation period increased up to 144 hrs. The highest ethanol content was produced by the koji enzyme at 144 hrs. Generally Koji enzyme

hydrolyzed starch produced more ethanol than red sweet potato enzyme hydrolyzed starch. The range in values is between 1.11 to 1.34 % for Koji enzymes and 0.99 to 1.28 % for red sweet potato amylase enzyme. The trend in ethanol production in each category was 100 □C > 50 □C $\approx\approx$ 27 □C

CONCLUSION

In conclusion, the present study has demonstrated that koji and red sweet potato enzymes could be a source of local enzymes for starch hydrolysis. Koji enzyme demonstrated great hydrolytic ability and was superior to sweet potato amylase enzymes. This research also proved that Simultaneous Saccharification and Fermentation (100 □C and 27 □C) produced higher ethanol than Separate Hydrolysis and Fermentation (50 □C). Also, SSF at 100 □C was better than SSF at 27 □C.

Acknowledgment:

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A META-ANALYTIC REVIEW OF APOLOGY AND REQUEST STRATEGIES OF LIBYAN UNIVERSITY STUDENTS AND THEIR MENTORS

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ABSTRACT

The ultimate aim of this review is to explore the request and apology strategies of Libyan university students and their mentors. The study examines the linguistic and pragmatic competence of students while making any request or apology. The current meta-analysis not only aims to offer reliable and quantitative measures of the speech act of request but also illustrates the apology and request strategies of Libyan students and mentors through a description of some variables like design process, proficiency level, analysis pattern, etc. Hence, an overall of 15 studies were recovered through a diverse inclusion and exclusion criteria. The articles chosen for the review is taken in the time period from 2005 to 2021. In this study, a brief explanation of the outcomes and the detailed discussion of theoretical, practical, and methodological inferences offer solutions to solve various challenges on the request instruction and build way for effective future research.

Keywords: *Meta-Analysis, Apology, Request, pragmatics, speech act*

1. INTRODUCTION

Across all human cultures, conversation is a fundamental component for face-to-face interaction. The need for maintaining peace and order, as well as the need for the effective functioning of organisations and society has prompted the search for efficient communication and suitable strategies (Dozie and Otagburuagu 2020). Pragmatics refers to the study of linguistic acts and the situations in which they are accomplished. It acknowledges the role of cultural and social factors in the communication activity between two speakers (Youssef 2012). Speech Act is defined as the action of verbal speakers commenting as aspect of the pragmatics field. In specific circumstances, the reaction of

Target Language speakers is the Speech Act that includes request, apology, compliment, refusal, etc. (Mansor 2017). Specifically, the Inter-language study on apology pays attention towards the ability of the native speakers in performing the probable act through the target language. The essential concern of inter-language phenomena that includes the communication of two key languages is on the primary language or the influence of mother tongue on target language creation which is the language into which interpretation takes place.

After being internationalized, English becomes a crucial language, with people speaking it all over the world. Libya is a country where Arabic is spoken by the majority of people, in which English is one of the most commonly spoken foreign languages. Amidst an orientation toward direct speech act, which is the tradition of native Arab speaking people, Libyans who deem their education in Western European countries have high fluency in English (Masaoud 2019). It is critical for native Libyan people who speak English to make requests and apologise in a polite manner in English during group discussions. The art of using the target language to express cultural expressions as an attribute of grammatical competence was explored (Qari 2017). Such an influence of culture on the request and apology act of speech that is desire of being direct in one but awkward in the other would result in a differing opinion between students in group discussion and yet having the similar goal and approach. This is explored in the following paper in order to help Libyan students overcome barriers to English communication notwithstanding their fluency in the language.

The rest of the sections are described as follows, section 2 explains the research methodology; section 3 details the research questions, analysis and its results; section 4 details the discussion of results and finally the section 5 concludes the paper.

2. Research methodology

This section discusses the methodology used for getting the articles interrelated to current research study through the online community. The research is made based on the meta-analytic review. The SLR emphasis some of the specified research questions that aids to distinguish and examine the research facts that are related to the questions. The analyses include several stages that comprises of resource collection from standardized journals to undertake an organized literature review. The source identification, eligibility, data screening, data inclusion and exclusion, data extraction and synthesis are all carried out.

2.1. Keywords detection and searching procedure

The keyword detection and searching procedure is undertaken through filtering the search items and fixing the period of research. The searching area is restricted to the electronic databases through the pilot search, with the limited search period from 2000 to 2021. The search was made through the online systematic records by an online electronic search that relies on some of the journal databases such as Google scholar, Scopus, Elsevier, Wiley online library, mdpi, etc.

2.2 Inclusion and exclusion criteria

After fixing the keyword and searching procedure, the inclusion and exclusion criterion is carried out to choose and evaluate the quality of primary studies. This criterion assists to select the studies that are relevant to the current research study. Moreover, the papers that

entirely focus on corporate governance and voluntary disclosure are alone included for study, all the others are excluded. Table 1 depicts the Inclusion and exclusion criteria for current review procedure

Table 1: Inclusion and exclusion criteria for current review procedure

Measures	Included papers	Excluded papers
Availability of Literature	full-text	Papers with no availability of full text is excluded
Language	English	Non-English papers are excluded
Timeline	Between 2000 and 2021	Gray papers (the papers in the period below 2005 are excluded)
Research question	Papers that responds to at least one research question	Duplicate papers are excluded

2.3. Data abstraction and synthesis

Data extraction and synthesis is the essential stage to be carried out followed by the study selection criteria. It was accomplished through study analysis and extraction of beneficial data from the collected works. Initially, 250 articles are taken for review, which includes the records obtained through database searching and additional records obtained from other sources. Then, the review process is undertaken to select the required articles for analysis. It includes 4 stages namely Identification, Screening, Eligibility and selection. In the initial phase, the keywords utilized in the searching procedure of the study are determined. In this stage, 80 duplicated articles were removed. Followed by this, the next stage is screening in which 90 articles were found to be suitable to be reviewed by removing the articles chosen in the year below 2005. The third phase is eligibility, in which the whole articles were examined. After an in-depth study, a total of 65 articles were neglected from the study as they didn't emphasis on corporate governance. Finally, 15 articles were chosen for qualitative investigation. The complete review process is depicted in fig.2.
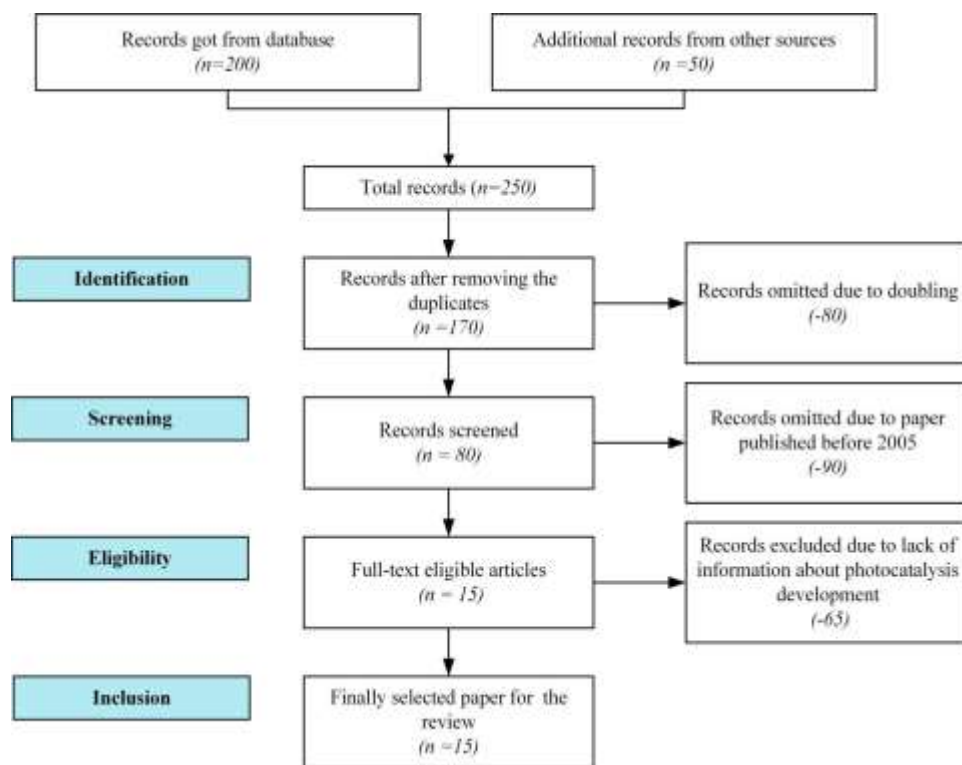
Fig.2 Complete flow of review process

3. Research Questions

On pursuing the review of present literature and finding the gap in the literature, this paper has specified subsequent research questions. They are as follows,

1.   Why is it necessary to consider the speech act of apology and request?

2.   Is there any difference in conversation strategies among native Libyan people and English people?

3.   What is the effect of cultural background on the speech act of Libyan people and the English Speaking people?

Table 2: Design study and analysis

No	References	Participants	Proficiency	Data collection method	Design process
1	(Bataineh and Bataineh 2006)	Undergraduate EFL students	English	Questionnaire forms	Experimental type
2	(Dozie and Otagburuagu 2020)	undergraduates of Igbo	English	Discourse Completion Task	Experimental type, quantitative data analysis
3	(Youssef 2012)	Post-graduate students	English	Natural conversations and Role-Play	Experimental type
4	(Awedyk 2011)	Native Norwegian speakers	English	Discourse Completion Test, Questionnaire forms	Experimental type
5	(Sattar and Farnia 2014)	University students	English	Discourse Completion Test	Quasi-experimental type
6	(Masaoud 2019)	Omar Al-Mukhtar University students	English	Discourse Completion Test	Experimental type
7	(Mansor 2017)	Libyan-arabic people	English	Qualitative analysis	Experimental type
8	(Hamza 2007)	Arabs and British Speakers	English	Qualitative analysis, Face-to-face casual conversations	Quasi-Experimental type
9	(Tabatabaei 2018)	Turkish EFL learners and native speakers	English	Oral Discourse Completion Task	Quasi-Experimental type
10	(Megaiab, et al. 2019)	Libyan students and their lecturers	English	Qualitative analysis	Experimental type

11	(Muthusamy and Farashaiyan 2016)	Post-graduate students	English	Written Discourse Completion Task Questionnaire and semi-structured interview	Experimental type
12	(Yassin and Razak 2018)	Secondary school students	English	Discourse Completion Test	Experimental type
13	(Qari 2017)	University students	English	Discourse Completion Test, questionnaire	Quasi-Experimental type
14	(Alshalfouh Zarmuh and Megrrawi 2018)	School students	English	Discourse competence	Quasi-Experimental type
15	(Aseeri 2021)	University students	English	Discourse Completion Test	Experimental type

3.1 Research question results

1. Why is it necessary to consider the speech act of apology and request?

Speech acts are frequently performed while speaking vocally in a first or second language. Speech acts are actions accomplished by utterances like delivering instructions or making promises. It could be either a direct or indirect utterances like a word, phrase, sentence, paragraphs, etc., which acts for a communicative purpose like requesting or apologising. Speech acts are real-life encounters that necessitate not only language competence but also the proper application of such language within a given culture to avoid misunderstandings.

2. Is there any difference in conversation strategies among native Libyan people and English people?

The language of a society reflects its culture. The native people employ a variety of general phrases that are distinct from those used by others. "'Instead of making a direct request, native pupils utilise words such as 'excuse me' or 'please' to make a courteous request. When students communicate with one another and with their instructors in a group discussion, the language used by them to share ideas is ultimately English. The students are either native English speakers who speak Arabic or native Arabic speakers who speak English. To express politeness, native Arab students employ indirect discourse act. When making a request, Arab students confront a number of issues. It is because others perceive their courteous request as unpleasant because of their different cultural background, which has shown them that direct demands are rude. Being courteous in the English language is challenging for non-native speakers of English language. Across cultures, the manner in which one makes a polite request differs. As a result, when Arab students translate their

requests straight from Arabic to English, they are frequently misinterpreted or their petitions are rejected. In comparison to native Arab students who speak English, native English students employ highly rhetoric and morphological words.

3. What is the effect of cultural background on the speech act of Libyan people and the English Speaking people?

Libya, an Arabic country is benefited from colonisation through adopting a new language. The students' cultural backgrounds have a significant influence on their request and apologise tactics. Because speech acts are strongly rooted in a student's socio-cultural context, they are frequently influenced by it. When native Arabs attempt to make a request, even if they have an advanced degree of English knowledge, the impact of their cultural background appears to be unavoidable. Students' requests and apologies differ depending on the community, as they inadvertently use phrases to apologise or request in their own language and culture depending upon their corresponding speech community style.

4. Discussion

The use of English as a foreign language in Arab countries and the influence of several external and internal factors are widely discussed in the article. The most common method employed in each article is Discourse Complete Test (DCT) for data collection. The main advantage of DCT methods is that the data can be gathered and developed rapidly and also a huge number of respondents can be enquired effortlessly and hence could make sure the feasibility of statistical analysis. The findings revealed that as there were fewer linguistic terms to address the discourse in the target language, there was a large transfer of first language elements into the target language to meet the conversational demand. The number of papers chosen for review is framed in table 3 and represented in fig.3.

Table 3: No. of review papers chosen for analysis in the time period of 2005 to 2021

Year	No. of papers chosen
2005	-
2006	1
2007	1
2008	-
2009	-
2010	-
2011	1
2012	1
2013	-
2014	1
2015	-
2016	1

2017	2
2018	3
2019	2
2020	1
2021	1

No. of papers selected for review for the time period from 2005 to 2021
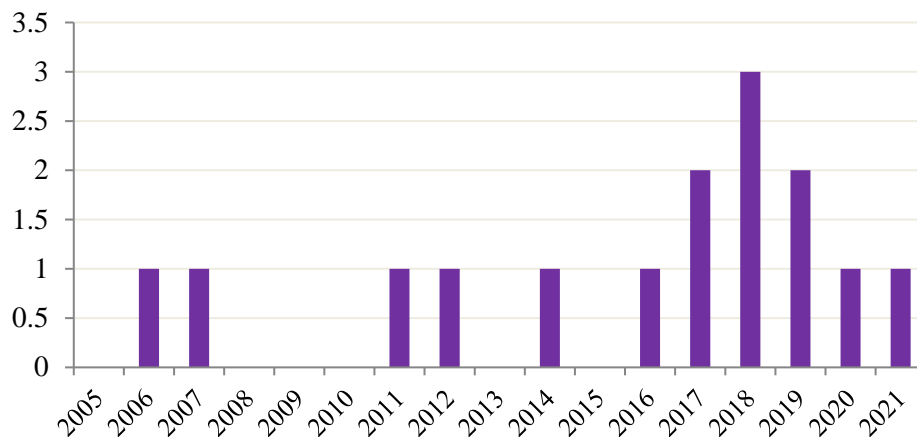

Fig.3 No. of review papers chosen for analysis in the time period of 2005 to 2021

5. Conclusion

The value of the apologising and requesting act of speaking cannot be overstated. Ideologies are perceived differently by people from various cultures. The meta-analyses found that teaching was usually efficient and favourable to the speech act of request, and that some mediator characteristics, such as competence level and age were indicators of this performance. Despite the fact that their goals or ideologies are the same, native Arabic-speaking Libyan students and native English-speaking teachers do not communicate well due to cultural differences, with directness in one being considered unfriendly in the other.

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SCHOOL DROPOUT FORM AMONG JUNIOR SECONDARY SCHOOL IN KEBBI STATE, NIGERIA

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ABSTRACT

The main aim of this paper is to determine the form of dropout among Junior Secondary Schools Students in Kebbi State. To give this paper 5 research questions were asked and answered, 3 hypotheses stated and tested at 0.05 level of significance. The design of study was exposit fact using the past school attendance registers as the major instrument. The samples of the study consisted of 140 Junior Secondary Schools and 140 Vice Principal Academy. The collected data were expressed in percentage of dropout in JSS II and a decline in JSS III, a higher number of dropouts are female students, a higher number of dropouts in rural schools, a higher number of dropouts in mixed schools, a higher number of dropouts in public schools, a significant difference on percentage of dropouts between mixed and single sex schools and a significant difference on number of dropouts between schools in Urban and Rural Areas. The paper concluded that, most important factor, which influenced form of dropouts, was students' sex.

Keywords: mixed, urban and rural, dropout, schools, sex, private, public.

INTRODUCTION

Tinto (1973) Define dropout as that which classifies any person who leaves their institution of registration, is geared primarily to the concerns and policies of specific institutions of higher education while Cullen (1973) see dropout as that which includes only those who fail to receive a degree/certificate from any college, is directed to national levels, rather than to institutional concerns. While Ajala (2012) stressed that, school dropout is the untimely withdrawal from school. These students who withdraw from the school prematurely end up not obtaining any evidence of graduation. The issue of dropout is a global problem confronting the education industry round the world. Researchers like Ajaja (2012) Mohsin, Aslam and Bashir (2004). Decos (2005), Bridgeland, Dilulio and Morison (2006), and Oghurbu (2008) have since buttressed this fact.

The problem of dropout in Junior Secondary Schools in Nigeria has been with us for many decades. Fafuwa (1983) highlight that, dropout is one of the most serious problems that have continued to bedevil out educational system since independence in 1960 from the Colonial

administration. Ajaja (2012) inform us that, even before our independence, the problem of dropout has already established its grip on our educational system. This can be buttressed with the remark made by Nuffield foundation in 1953 that, in the West coast on Africa, a considerable proportion of student's dropout of school each year.

Survey by both the print and electronic media tends to indicate that over 85% to 90% of the criminal activities perpetuated in Nigeria are done by youths who dropped out of school. This sad development has become a cause of serious concern to all well meaning Nigerians and her friends. This tends to suggest that, Nigeria's educational system is in trouble and thus needs a very serious attention in refocusing it and restructuring it for the attainment of national goals. Patric (2012).

Decos (2005) commenting on the importance of graduation from high school noted that: with the economy changing from a dependence on manufacturing towards more reliance on technology, services and a "knowledge economy", the need for education beyond Junior School has grown. Ajaja (2012) maintained that, Nigeria of today, senior school certificate is considered as the minimum required for most jobs and status positions. This development he maintained has a serious implications for the economic well being of dropouts and the society at large. In this era of global economic meltdown as a result of covid 19 pandemic as well as economic competitiveness, Nigeria as a nation that has vision must make concerted efforts to raise the educational attainment of all its youth who are leaders of tomorrow.

All over the world, reasons why students dropout from school can be categorized in to four clusters: school related, job related, family related, and community related. A research conducted by Frendenberg and Rugils (2007) identified twenty four factors under family cluster; three factors under community cluster and twelve factors under school cluster. The factors identified under status, racial or ethnic groups, male special education status, law family support for education, low parental education, residential mobility, low social conformity, low acceptance of adult authority, higher level of social isolation, disruptive behaviour conduct, being academic problems in early grades, not liking schooling, feeling of "not fitting in" and of not feeling unsafe in school (especially in this period of kidnapping in secondary schools), not engaged in school being suspended or expelled, conflict between work and school, having to work and school, having to work or support family, substance use and pregnancy. While in community cluster, the following factors were identified: living in a low income neighborhood, having peers with low educational aspirations and having friends or siblings who are dropout at early stage of secondary school. Under school related cluster, these factors were, identified; low socio-economic status of school population, high level of racial or ethnic segregation of students, high proportion of students of colour in secondary school, higher proportion of students enrolled in special education, location in central city, large school district, school safety and disciplinary policies, higher-stakes testing, higher student to teacher ratio, academic tracking, discrepancy between the racial or ethnic composition of students and faculty, and in to high for 9th and 10th graders.

While job related cluster include: Those students who could not work and school at the sametime, those who had to do a job to survive and those who found job.

The studies conducted by National Centre for Education Statistics (1998/1999), Vermont Agency of Human Services (1999/2000), Decos (2005) and why students drop out of school in U.S(United States). These include:

i.   Classes not interesting

ii. Missed school for many days and could not cope again
iii. Spent a lot of time with those not interested in school
iv. Have absolute freedom to do what I like and
v. Failing in school

While Tinto and Cullen (1973) argue that, in dealing with the effect of individual and institutional characteristics upon individual integration into academic and social systems of the college, it is as noted, important to distinguish between academic dismissal and voluntary withdrawal. This (according to Tinto and Cullen) is so not only because these behaviours involve different persons but also because they result from different patterns of interaction within the College setting. Thus, although academic dismissal is most closely associated with grade performance, dropout in the form of voluntary withdrawal is not. Such (according to them Tinto and Cullen) withdrawal, instead appears to relate to the lack of congruency between the individual and both the intellectual climate of the institution and the social system composed of his peers. In this respect, voluntary withdrawals are most frequently found to be both "Social Isolates" and/or deviants" regarding the intellectual norms of the institution.

Academic dismissal according to (Vincent Tinto 1973) are often lacking in both intellectual and social development or are lacking in both intellectual and social development are socially integrated to an extreme. While Hackman and Dysinger (1970) maintained that, dismissal have often been found to be unable to meet the intellectual and social demands of the college that academic demands go unmate. In either instance, grade performance is the single strongest predictor of academic dismissal.

Most of the researchers on the causes of dropout in Nigeria isolated the following:

i. Parents poor educational background
ii. Parents inability to pay school fees for their children/ward
iii. Failure in school examination
iv. Poor state of facilities in schools
v. Unemployment of graduates
vi. Broken homes
vii. Types of parents occupation
viii. School discipline policies
ix. Teenage pregnancy
x. Early marriage
xi. Early ambition for self business and employment.

Literature on dropout isolated five predictive factors for dropping out of secondary school. These include:

i. Grade retention (being held back to repeat a grade?
ii. Poor academic performance
iii. Moves during high school
iv. High absenteeism
v. Misbehaviour

The students with the above characteristics have a very high tendency to dropout of school. The aftereffect of dropout for both students and the society are substantial and serious. The decision to dropout is a dangerous decision for the student and his parents particularly in this age of technologically controlled economy in which workers needs a lot of skills to compete in the workforce. Dropouts are likely to be unemployed than the school mates who graduated. More likely to live in poverty, begging, thuggry, receiving public assistance, in

prison on death row/long years jail term, unhealthy divorced and untimely single parents with children who will dropout from high school themselves. According to National Bureau of Statistics (2010) National Literacy Survey indicates that, the youth literacy rate in any language was 85.6 percent. The youth literacy rates were 94.3 percent and 81.0 percent for urban and the rural areas respectively.

According to the survey (2012) the overall youth literacy rate among the males was 89.4 percent while that of females was 81.6 percent. Among states in Nigeria, Abia and Lagos maintain the lead with 96.6 and 96.5 respectively, while Yobe and Kebbi had the lowest youth literacy rate of 61.9% and 61.6%.

Table 1: Youth Literacy by Place of Residence

YOUTH LITERACY	URBAN	RURAL	OVERALL
English	90.0	68.9	76.3
Any Language	94.6	81.0	85.6

Source: National Literacy Survey 2012

Improving graduation rates is a specific objectives that can bring educators together for research, intervention, and advocacy to improve the lives and wellbeing of young people. (Freudenberg and Ruglls 2007).

Although a comprehensive analysis or multidisciplinary studies on strategies to reduce the incidence of dropout is beyond the scope of this study, Bridge land (2006) advocates on what might help students stay in s school are highlighted below:
a.   Improve teaching and curricular to make school more relevant and engaging to enhance the connection between school and work;
b.   Improve instruction and access to support for struggling students
c.   Ensure strong adult student relationships within the school
d.   Build a student's relationships within the school
e.   Improve the communication between parents and school.

From the foregoing an attempt was made to explain the meaning of school dropout, discussed the seriousness of the problem, x-rayed the causes and characteristics of possible dropouts, highlighted the consequences of dropout, and finally the strategies to reduce dropout. Instead of replicating studies that dealt on the above recurring variables, this paper concentrated its efforts on dropout form in junior secondary school and its environment. It is intended that the finding of this research will provide the necessary information that will enhance the quick implementation of recommended strategies that will reduce the incidence of dropout in our schools.

Statement of the Problem
This study was carried out to correct the imbalance in research efforts on our knowledge of school dropout. Most of the researches on dropout have been centered on causes, effects, challenges and remedies. Most if not all the researchers in Nigeria on the same subject matter

followed the same pattern. No studies to my knowledge in Nigeria studies dropout problems using the parameter "form of dropout".

Methodology

Design of the Study
The design employed for the study was expost factor. This entails the use of past records of subjects to arrive at conclusions about them. For this study, the school class attendance registers were used to determine the incidence of dropout and percentage of dropout among schools.

Population and Sample of the Study
The population of the study consisted of all Junior Secondary Schools and their students (Public and Private) in Kebbi State. Kebbi State is divided into three senatorial zones: Kebbi North, Kebbi South and Kebbi Central. The three zones put together have 21 Local Government Areas (LGAs) four emirate councils (Gwandu, Argungu, Yauri and Zuru and 35 districts, with the total population of 3,238,628 as per 2006 National Census).
The sample of study consisted of 140 Junior secondary schools randomly selected to reflect school types (single sex and mixed, private and public) and school environment (urban and rural) of the 140 Junior Secondary Schools, 30 of them were private schools (10 from each senatorial district), public schools of 600 mixed schools 25 from each district mad 30 single sex schools (10 from each district). A sample of 140 Vice Principal Academy (V.P.A) was used as sources of data collected.

Instrument
One major instrument was used for data collection. The instrument was the school attendance register which included those for JSS 1, JSS II and JSS III. The school attendance register are school records kept by the Vice Principal Academies. No form of validation was carried on the instrument. The reasons was because the instrument is an original source of information.

3.1   Procedure for Data Collection
The data used for the study were collected by a team of five persons. These included 4 research effective assistants and the researcher. For the effective collection of data from the sampled schools the 140 schools were shared among the researcher and the research assistants. Each person collected data from 30 schools were shared among the researcher and the research assistants. Each person collected data from 30 Junior Secondary Schools. Through the assistance of Vice Principal Academics of each sampled school, attendance registers of each class in each sampled school as they moved from JSS I through JSS III were collected analyzed and incidence of dropout recorded. The duration of data collection was two weeks. Fridays were excluded from days of data collection because of school labour, and cleaning the school compound, and to enable the researcher and research assistants to attend the Friday prayers.

RESULTS
Generally the result indicate the following:
i.   Percentage of dropout was highest in JSS I using all the parameters stated.
ii.   Percentage of dropout declined during transition from JSS II to JSS III using all parameters.

iii.   Percentage of dropout was highest in rural schools
iv.   Percentage of dropout was least in private schools
v.   Percentage of dropout among female students was higher than that of the males using all the stated parameters.

The above result specifically shows the following:
i.   On single sex schools, the percentage of dropout was highest in girls schools than in boy's schools.
ii.   The percentage of dropout was higher in mixed schools when compared with single sex schools. The percentage of dropout was higher among the female students than among the male in mixed schools.
iii.   The percentage of dropout was higher in public schools than in private schools – both with male and female students. In the public schools, the percentage of dropout among female students was higher than among males.
iv.   In rural schools, the percentage of dropout was as higher as 35.59%. The female dropouts in rural schools were higher than males, 42% as against 21.32%.
v.   The percentage of dropout in Urban schools was lower when compared with rural schools, 25.82% as against 42.37% percent of dropout was still higher among female students in Urban Schools, 28.21% for females as against 21.52% for males.

Discussion
The findings of this study are most significant in the sense that its area of focus broke away from the usual procedure for studying students dropout from schools. The previous areas of emphases on dropout studies centered on causes, effect and remedies. These have made the comprehension of dropout problems incomplete. This study, which centered on form of dropout among Junior Secondary Schools student has taken over knowledge of dropout to a higher level.
The two most significant findings of this study as regard the form of dropout are:
i.   That the incidence of dropout is highest, in JSS I
ii.   That the incidence of dropout decline in JSS II.

This tends to suggest that when students are promoted to JSS II their attitudes towards schooling is improved resulting in their willingness to remain. This may be the reason why the incidence of dropout of students decline after promotion to JSS II. These findings suggest that the appropriate time to act so that the incidence of dropout among students can be reduced significantly when they are the in JSS I. It therefore follows that no effort should be spared in JSS I to encourage and make students to remain in school.
On the relationship between sex and dropout from school, this study found that female students are the most vulnerable group that dropout from the school especially in Kebbi State rural community. This is true considering the variables of school type and school environment used in the study and the findings using all these parameters, the female students recorded the highest incidence of dropouts. This situation may have been created by issues of early marriage and teenage pregnancy that most often associated with females. Compulsory marriage by parent is another issue which is forcing the girl child to dropout of school system. This position agrees with the findings of Kaufman & Jeffery (1992), Swanson (2004) Green and Marcus (2002), Balfanz, and Nettle (2004), Green and Marcs

(2005) and Ajaja (2012). They all found that females dropout of school most than there males counterpart.

The significant difference found between the number of students who dropout from schools in single sex and missed schools to the detriment of mixed schools is not surprising. Firstly, the incidence of dropout being highest among mixed schools may have been caused by some immoral relationships among students, which most often result in expulsion (e.g. teenage pregnancy, cultism, and other serious misbehaviours). Secondly, putting two groups who do not have the same abilities together create frustration and complex problems, which may result in dropout if students of same sex are put together, they perform better than those mixed and the incidences of complexes are minimized. This agrees with the findings of Ajaja, Kpangban and Onwuegbu (2007). They found students in single sex schools to be better than those in mixed schools in science achievement tests.

On school environment, a significant difference was found in dropouts to the detriment of rural schools on comparison of schools located in urban and rural einvornments. This however, contradicts the finding of an earlier study carried out in South Eastern part of Nigeria. Okoye (1991) found a higher incidence of dropout in urban areas particularly among the males. He explain that the reason for that was because of the influence of markets, which draw attendants in shops from the young males in the environment. This position agrees with the findings of Bridgeland (2006) and De Cos (2005). They found that some students dropped out of school because they found a job and could not combine schooling and working.

The above explanation cannot be used to explain why there are more dropouts in rural schools than urban ones as found in this study. The situation can be explained with the following reasons. (1) In the rural areas, there is higher poverty rate among parents. This may have influenced their inability to meet the financial demands for their children schooling. This agrees with the findings of Sweeten (2004), Kaufman, (2001); Iceland (2003), and Schargel (2001) that isolated economic reason as one of the reasons for dropout. (2) Most of the parents in rural areas are illiterates who do not know the value of education. (3) Most of the pupils in rural schools have very poor primary and junior secondary school background. This most often result in high failure rate among the students and eventual dropout from school. This position agrees with the findings of Mohsin, (2004). They found poor primary education as one of the major causes of dropout in Punjab, Pakistan. (4) Most students are used in farming activities, which is the dominant occupation of parents in the rural areas. (5) Most students are used in farming activities, which is the dominant occupation of parents in the rural areas. (5) Most females in the rural area are given out in marriage very early. This is because most parents in rural areas are very reluctant in sending their female children to school. (6) The very poor state of all resources for teaching and learning in rural schools does not encourage the youths to have faith in education and remain in school.

The findings of this study generally portray one obvious fact which is that the incidence of dropout from school is high in Kebbi State, Nigeria. This therefore tends to suggest that the development may be responsible for the eruption of so many social vices in the Nigerian nation. Such social problems include: very high level of unemployment; high level of youths restiveness across the country; very high level of robbery, assassinating and kidnapping high level of prostitution both within the outside the country; and very high incidence of child abuses leading to teenage pregnancy and the problems associated with it.

The problem of unemployment as found in Nigeria is not entirely due to lack of spaces in the existing industries, ministries and parastatals. To some extent, the issue can be explained through the angle that most of the unemployed youths are not employable because of lack

of appropriate skills required for the existing jobs. Recent advances in technology have fueled the demand for a highly skilled labour force which the dropouts do not have. This makes them more likely to be unemployed than the high school graduates.

Again the high level of youth restiveness may also be linked to the very high incidence of dropout from school. This is hinged on the fact that the members of various militant groups across the country are made up of youths of ages between 15 – 20 who dropped out of school. In the south-south part of Nigeria, there are different militant youth groups used by politicians to advocate for resource control in Niger-Delta which is very rich in oil. In the Northern part of Nigeria, there are the "Almanajeries" Yandaba, Yantauri, Yan iskan gari, Sarasuka etc. Who are used by politicians in the North to protest political issues and policies. They kill, mame and burn down properties without any remorse of conscience.

While in the South West there are group of cyber criminals called Yahoo boys, Area boys, Oduduwa People Congress (OPC) and in south east, there are IPOB group who are agitating for seperation from Nigeria they kill security agencies and other innocent civilians especially those from northen Nigeria. There is also very high level of robbery, assassination and kidnapping associated with youths most of whom are school dropouts. In fact, Nigeria is today most insecure because of criminal youths activities. This insinuation agrees with the position held by both the electronic and print media from a survey that over 85% of criminal activities perpetuated in Nigeria are done by youths who dropped out of school. This again agrees with the position held by the National Center for Educations Statistics (2021) on the consequences of dropping out of school that school dropouts make up a disproportionate percentage of the nation's prisons and death roll imamates.

The high rate of prostitution in the country practiced both within and outside Nigeria can also be linked to school dropout because of the category of females involved. A reasonable percentage of females who dropped out of school engage in prostitution not for the sake of sexual satisfaction but because of financial difficulties since they are not employable.

The high incidence of dropout in Nigeria may also be linked to the high level of child abuses prevalent throughout the country. The abuses range from children being made to hawk when their mates are in school through going to the farm, to sexual abuses. The sexual abuses result in teenage pregnancies, early parenthood, and single parents who are unable to take care of themselves and their children. Stressing the inability of dropouts to take care of themselves, Bridgeland et al (2006) noted that students who dropout of school are often unable to support themselves and are twice as likely as high school graduates to slip into poverty from one year to the next.

All the developments as discussed above, which may be linked to the high incidence of dropout in Nigeria schools, tend to suggest that the high level of illiteracy as found among the youths in Northern Nigeria, Middle Belt, South Eastern Nigeria, South-West and and South-South part of Nigeria are products of school dropout. It was for the purpose of addressing the problems of school dropout and the high level of illiteracy found among youths that the Federal Government of Nigeria introduced the nine year compulsory Universal Basic Education (UBE) for all youths in Nigeria, the poor, Npower, sure P. And other programmes to help youth and most vulnerables in Nigeria.

While the results of this study as shown in the tables above seem to natural, common sense result, it is significant that the data now show that dropout is seriously influenced by sex, school type and environment. The pattern of dropout established with the data collected

provides an opening on the appropriate time to act to reduce the incidence of dropout in Nigerian Schools.

Conclusion

Generally, the pattern of dropout from school in junior secondary schools in Kebbi State shows a picture with high percentage of dropouts in JSS I and a decline of dropouts in JSS II. The pattern of dropout from school as found in this study is influenced by school types (Single Sex vs Mixed, and Public and Private), sex of students (males and females) and school environment (Urban vs Rural). It is concluded that the single most important factor which influence students pattern of dropout from school is the sex of the students. This is closely followed by the environment of the school.

The multiple factor associated with dropout rates and the varied nature of these factors from one community/country to another, suggest that no single type of intervention strategy can end dropout problem in any nation. It therefore follows that whatever strategies that are recommended, must be seen to suit the characteristics of the environment for them to make a significant impact.

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Table 1: Analysis of Dropout Pattern in Sampled Schools

Variable	No. of School Sampled	Total School Population in JSS I	Total Population in JSS II	No. of Dropouts after JSS I	% of Dropouts after JSS I	% of Dropout after JSS I	Total School Population in JSS III	No. of Dropout After JSS II	Total No. of Dropout between JSS I – JSS III	Total % of Dropouts in JSS I – JSS III
SINGLE SEX										
(i).Boys schools	15	2250	1866	384	12	1725	131	7.00	515	19
(ii).Girls schools	15	1950	1463	489	14.5	13.30	133	9.10	620	23.6
MIXED SCHOOLS	60	8700	7441	1259	14.85	6596	526	11.50	2104	26.35
(i).Boys (students)		5500	4785	715	13	4259	526	11.00	1241	24.00
(ii).Girls (students)		3200	2656	544	16.7	2337	319	12.00	863	28.70
PUBLIC SCHOOLS	90	13140	10780	2360	18.10	9288	1492	14.35	3852	32.35
(i).Boys (students)		7834	6512	1372	17.40	5621	891	13.69	2263	31.09
(ii) Girls (students)		5256	4268	988	18.80	3667	601	14.81	1589	33.61
PRIVATE SCHOOLS	30	2400	2145	255	10.55	2001	144	6.65	399	17.20
(i).Boys (students)		1100	994	106	9.64	932	62	6.20	168	15.84
(ii).Girls (students)		1300	1151	149	11.45	1069	82	7.10	229	18.55
URBAN SCHOOLS	30	5400	4664	736	13.82	4245	419	9.10	1155	22.92
(i).Boys (students)		3240	2828	415	12.72	2581	247	8.75	659	21.47

EFFECT OF LOCATIONAL ATTRIBUTES ON RESIDENTIAL PROPERTY VALUES OF BIRNIN KEBBI LOCAL GOVERNMET OF KEBBI STATE NIGERIA.

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ABSTRACT
The characteristics of residential locations such as proximity to places of employment, shopping malls, markets, public transport accessibility and sports facilities are among the major factors that decide house prices. The study aimed to examine the effect of locational attribute in determining residential property value in Birnin Kebbi Metropolis. To achieve the above aim, the following objectives must be considered appropriately. (1) To identify the types of residential property in Birnin Kebbi metropolis. (2) To identify the locational attributes that influence the property value in the study area. (3) To examine the effects of locational attributes on residential property value in the study area. To follow the research goals aggressively and achieve the study objective, quantitative research design was adopted. The data was obtained by means of a survey method where 420 questionnaires was administered to estate agent, estate surveyors and valuers and properties owners within four areas within Birnin Kebbi Metropolis. There were also direct findings to further support the questionnaire study. The study finds out that the residential property in the areas is: one bedroom, two-bedroom flat, three-bedroom flat, duplex and tenement buildings in the study areas. The locational attributes in the study include: Accessibility, proximity to work place, proximity to market, transportation, demand pull and demand push among others. Government should improve on some of the locational attributes highlighted above in order to attract more private investors to real Estate and at same time diversify the economy of state. Government should take a look at the transportation system in the state and improve on the design at same time start thinking to rail system of transportation as it is been done in other states across the country.

Key words: Location, Residential, Property, Residential Property, Locational attributes, Public Transport.

INTRODUCTION

It is common knowledge that residential property prices are crucial to the development of dwelling characteristics and the impact of locational externalities. The physical and structural characteristics of houses, such as building age, construction quality, room size, number of rooms, number of toilets and bathrooms, quality of building materials and housing layout plan have a positive or negative effect on house prices. Similarly, the characteristics of residential locations such as proximity to places of employment, shopping malls, markets, public transport accessibility and sports facilities are among the major factors that decide house prices (Usman, 2007).

In the traditional property valuation procedure, the location of the property is considered the most significant factor in assessing the value of the property, because the physical structure of the property depreciates over time. The land underneath the physical structure is what increases in value, and hence the most popular slogan we generally hear from real estate practitioner's is' location, place and location'(Dziauddin & Idris, 2017).

The property value composition theory explores location as a cumulative effect of a set of locational attributes (Kauko, 2003; Dziauddin & Idris, 2017). In other words, features such as the central business district (CBD), parks, shopping centers, schools, mass transit systems, highways, etc. may make a positive contribution to the growth of residential property value, particularly in urban areas. It should be noted that the advantages of local attributes are realized predominantly in the form of externalities, hence they are shared collectively by a large number of citizens and houses [Kauko, 2003; Orford, 1999]. Externalities can be both positive (beneficial) and negative (harmful).

Assessment of residential housing values is very complex, dynamic and challenging. It required an analysis of the various characteristics of housing qualities which are the basis of the determination of house prices. Residential location and dwelling attributes are among the factors that need to be critically examined and analyzed in order to determine the fair market value of the property. Furthermore, external factors such as population, employment, traffic congestion, proximity to work, access to public transport, proximity to higher institutions and environmental characteristics can have major impacts on rent (Oni et al., 2015).

Research Methodology

To follow the research goals aggressively and achieve the study objective, quantitative research design was adopted. The data was obtained by means of a survey method. A total number of 420 questionnaires was administered to Estate Agent, Estate Surveyors and Valuers and four selected areas that include GRA, Bayan Oando, Badariya, and Gesse area within Birnin Kebbi town. 390 questionnaires were retrieved from the respondents. Purposive and stratified random sampling were used in questionnaires administering. Descriptive mean scores and analytical methods with Likert scale was used as data analysis techniques.

MAIN RESULTS

Table 4.6   The Locational Attributes in the Study Areas

S/No	Location attributes	No. of Respondent	Percentage (%)
1	Accessibility	28	7.18
2	Proximity to Workplace	64	16.41
3	Transportation	58	14.87
4	Proximity to Market	39	10
5	Infrastructural provisions	83	21.28
6	Demand pulls and demand push	24	6.15
7	Population	94	24.11
8	Total	390	100

Source: Authors field survey 2021

The table above shows that the locational attributes in the study areas are: accessibility, proximity to work place, Transportation, proximity to Market, Infrastructural provisions, demand pull and demand push and population.

4.7   Effects of locational attributes on residential property value in the study area.

S/N	Locational Attributes	Strongly Agree (5)	Agreed (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)	Total	Mean Score	Rank
1.	Accessibility	229	138	09	14	-	1743	4.47	1st
2.	Proximity to Workplace	118	209	23	32	08	1567	4.01	6th
3.	Transportation	211	134	18	27	06	1705	4.37	2nd
4.	Proximity to Market	184	141	16	32	17	1613	4.13	4th
5.	Infrastructural provisions	151	172	22	17	28	1571	4.02	5th
6.	Demand pulls and demand push	236	101	04	12	37	1657	4.28	3rd
7.	Population	143	156	14	56	21	1514	3.88	7th

Source: Author's survey, 2021

The table above shows that the effect of locational attributes in the study areas using Likert scale which is as: Accessibility has the highest respondents with the mean score of 4.47, closely followed is the transportation with the mean score of 4.36, demand pull & demand push sits at third position with the mean score of 4.28, proximity to market enjoyed forth position with mean score of 4.13, proximity to work place enjoyed 5th position with the mean score of 4.02 while proximity to work place and population are in 6th and 7th position with mean score of 4.01 and 3.88 respectively.

5.1 Summary of Findings

The summary of findings to this research is as follows:

(b) The study revealed that the respondents are all educated with the minimum of primary certificate and maximum of master degree and this gives them edge in the area of filling questionnaires.

(c) The research revealed that many of the respondents have lived in the areas more than five years and above, this shows that they are familiar with study areas.

(d) The residential property in the areas is: one bedroom, two-bedroom flat, three-bedroom flat, duplex and tenement buildings in the study areas

(e) The locational attributes in the study include: Accessibility, proximity to work place, proximity to market, transportation, demand pull and demand push among others

(f) The study also revealed that locational attributes have effect on the residential property value in the areas.

5.2   Conclusion

This research examines the effect of locational attributes on residential property values with special reference to GRA, Gesse Badariya and Bayan Oando area in Birnin Kebbi town in which various locational attributes have been identified and their impacts as it directly or indirectly affects residential property values in the areas understudied.

However, recommendations have been made and if they are strictly adhering to; it will go a long way in solving the problem of real estate transaction and across the country.

5.3   Recommendations

Based on the summary of finding above, the followings are recommended:

i.   Government should improve on some of the locational attributes highlighted above in order to attract more private investors to real Estate and at same time diversify the economy of state.

ii.   Government should take a look at the transportation system in the state and improve on the design at same time start thinking to rail system of transportation as it is been done in other states across the country.

iii.   Estate Surveyors and Valuers should take the front sit in championing the creation of data base in the area of property value across the state.

iv.   Estate Surveyors and Valuers should create awareness on the importance of involving professionals in the area property management and estate Agency property across the state.

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Influence of Activated Carbon derived from Coconut Shell on the Morphologies, Filtration rate and Water Absorption Capacity of Polypropylene Air Filter

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ABSTRACT

The need to enhance the filtration efficiency of polypropylene (PP) air filter by coating it surface with fillers derived from biomaterials such as coconut shell is the motivation for this study. The uncoated PP air filter was produced by melt-blow method and afterward coated as presented in Figure 1. Extract from lemon juice containing citric acid, amino acid, and phenolic compounds was used to activate the burnt cocunut shell particles. From the SEM results (Figure 2), there was good interaction between the activated carbon and PP non-woven fabric, an evidence of good surface protection. There was high water resistance capacity for coated PP air filter relative to untreated PP as shown in Figure 3. This provides superior protection against bacteria inflow. The best filtration rank of 48% was recorded for coated PP compared to untreated PP (Figure 4), the presence of activated carbon on PP surface provides a cover which filter droplets and harmful particles emanating from the environment. From this study, the fundamental properties of activated carbon and its ability to act as a sustainable filler in air cleaning filter for removal of gases and vapors in the industrial environment and the home has been explored.

Key words: activated carbon, cocunut shell, polypropylene, air filter, filtration.

INTRODUCTION

In recent years, increasing awareness of environmental impact of organic and inorganic compounds has prompted the purification of air prior to discharge into natural air. Air pollution is a major problem in the global context. It has been reported as the leading cause of death and diseases (González-Martín et al., 2021). Activated carbon from coconut shell has more pores in micro pore range. Almost 85-90% surface area of coconut shell activated carbon exists as micro-pores. These small pores match the size of contaminant molecules in drinking water and therefore are very effective in trapping them. (Demirbas et al., 2004).

Other features identified as advantage in favour of coconut carbon are: Its a renewable source of carbon, it grows throughout the year, with harvesting generally occurring 3-4 times in a year and coconut tree can be preserved for many years. The high contamination by the SARS-Cov-2 virus has led to the search for ways to minimize contagion. Masks are used as part of a strategy of measures to suppress transmission and save lives (Herica D., et al, 2010). However, they are not sufficient to provide an adequate level of protection against COVID-19. Activated carbon has an efficient antibacterial action, adsorption and low cost. To reduce the exposure to the virus, numerous types of respiratory safety are used like the N95 respiratory mask, surgical mask, cotton cloths, etc. all these masks cannot filter and absorb the virus, and dust (Herica D., et al, 2021). It is essential to design the respiratory protector properly, which can filter efficiently. Masks made with activated carbon can filter the pathogens, smoke, dust, and hazardous gases even with particle with 0.3 microns size (Khayan, K., et al, 2019). Nonwovens are defined by ISO standard 9092 as a sheet of fibers, continuous filaments, or chopped yarns of any nature; formed into a web by any means, and bonded together by any means, with the exception of weaving or knitting (Merino, 2005). Melt-blown nonwovens are characterized by small-diameter fibers (less than 1μm), it offer excellent filtration properties, thermal insulation, and sorption capacity (Soltani I. et al 2018). Melt-blowing technology is used to produce both hydrophilic and hydrophobic materials and incorporate additives to improve filtration efficiency, moisture adsorption, and biocides properties. Xiao Y et al (2019) reported that fibre diameter, pore size, and real density have a great impact on the performance of the filter nonwoven in terms of protective and functional parameters. Hence, this study explore the potential therein in activated carbon extracted from locallly souced coconut shell to coat the surface of non woven polypropylene (PP) fabric to enhance its filtration efficiency.

Coconut shell was souced from a local market at Oyingbo, Lagos-Nigeria, 180 ml Lemon Juice was used to activated the carbon particles extracted from the coconut shell. 20 pieces of uncoated non-woven PP fabric was purchased from a market in Mushin, Lagos.
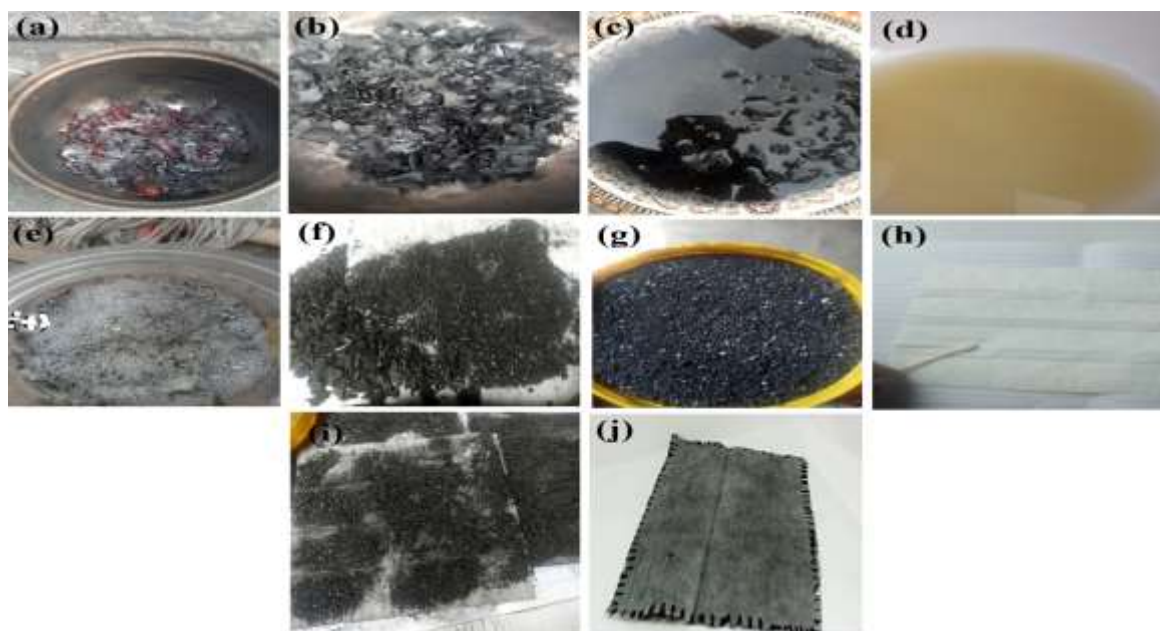
Sample Preparation

Figure 1. (a) Burning of coconut shell, (b) Burnt coconut shell, (c) Rinsed coconut shell, (d) Lemon juice extract, (e) Activation process, (f) Dried and crushed carbon, (g) Powder from

activated carbon, (h) untreated melt blown PP, (i) Coatinng process, (j) coated PP air filter.
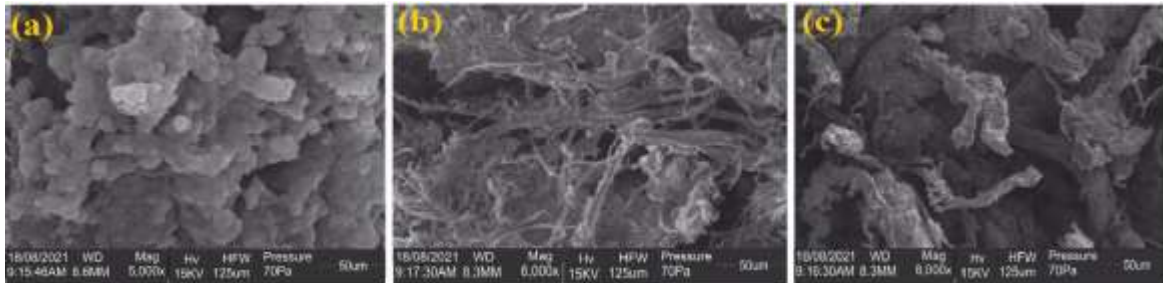
MAIN RESULTS

Figure 2. SEM images of (a) activated carbon, (b) uncoated PP air filter, (c) activated carbon coated PP air filter.
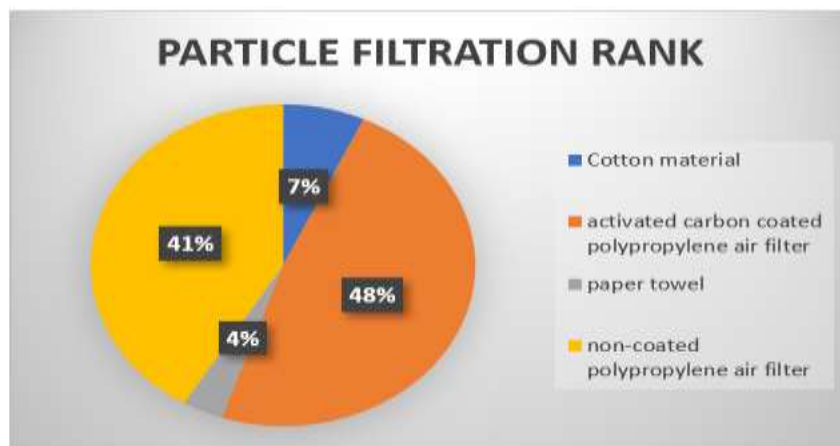

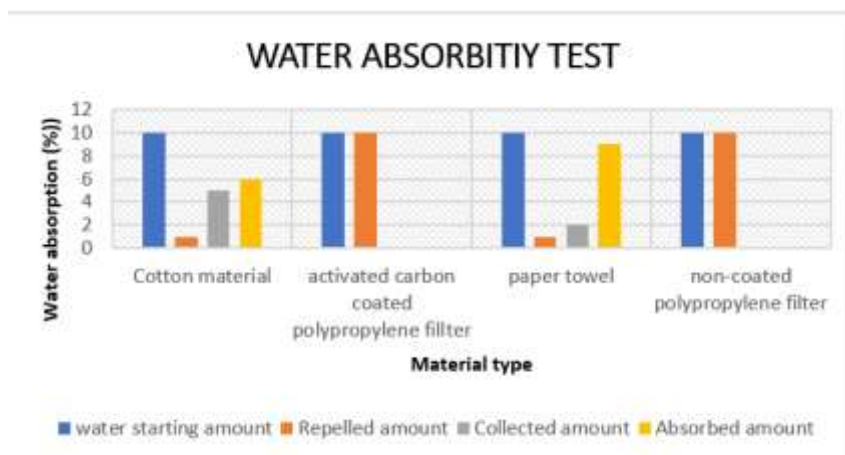**Figure 3.** Particle Filtration Percentage ranking.

Figure 4. Water absorption against material type.

CONCLUSION

It was established in this study that activated carbon coated air filter exhibits better trapping efficiency of pollens, and dust relative to other samples (cotton material, paper towel). Spun bond and melt blown PP proved to be a good precursor for coating the activated carbon. Although the world market of non-woven continuously grows, it faces the structural re-adjustment followed by the change of global economic condition. So therefore new innovations on non-woven can be incorporated with activated carbon for better coating efficiency.

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Recurent Neural Network Model for the Control of Temperature in a Multi-Circuit Air Conditioning System

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ABSTRACT

Air conditioning systems require energy input to remove heat from the indoor space making it thermally comfortable with good indoor air quality. Conventional centralized air conditioning system with the on/off control method uses a lot of energy as it is not efficient in controlling the compressor to reduce energy utilization while maintaing the indoor set point temperature. This could lead to over-cooling and high utilization of energy input. To ensure centralized air conditioning system does not overcool and waste energy, it is of great importance to control the system in a proper way. Fundamental to proper control is obtaining an accurate model. Thus, the focus of this study is to obtain a good model for a water-cooled centralized air conditioning system. A recurent neural network model is developed in this study utilizing the data driven method whereby the compressor power is the input and the indoor space temperature is the output. The result shows a good fit of the test performance which can adequately represent the behaviour of the sytem for controller design.

Key words: Energy Savings, Temperature control, Recurent neural network

INTRODUCTION

The goal of a Heating, Ventilation and Air Conditioning (HVAC) system is to provide an acceptable indoor air quality and thermal comfort [1]. An air conditioning system operates by transferring heat to the outside air from the air in the air-conditioned room. This is accomplished by removing heat from the space and moving it to some outside area [2]. In the evaporator, heat is transferred to the refrigerant, and heat is removed from the refrigerant in the condenser. The compressor pumps the refrigerant from the evaporator to the condenser. Through the air distribution system, the cool air can then be circulated throughout the building. Air conditioning systems follow a cooling cycle and require a lot of energy to operate. Thermal comfort, on the other hand, is a must in most occupied areas since it has an impact on the occupants' productivity, health, and thermal satisfaction [3]. The effective performance of air conditioning system with regards to energy efficiency and good thermal comfort relies largely on the control mechanism and optimization parameters [4]. It is critical to ensure that the HVAC systems do not overcool or overheat the indoor spaces by properly controlling the system. [5]. A good control system is necessary to guarantee that ideal thermal comfort criteria are met, optimum indoor air quality (IAQ) is maintained, and energy consumption is reduced [6]. In terms of thermal comfort and energy conservation, the on/off temperature control that is common in centralized air conditioning systems is not efficient. In a centralized air conditioning system, temperature management is critical since it leads to effective thermal comfort and energy savings. Controlling an air conditioning system is typically considered to be more demanding, sophisticated, and unique than other types of control systems [7]. The control system and optimization settings of an HVAC system play a big role in how effectively it works. Improving control algorithms to achieve higher efficiency is significantly more sustainable and cost effective than replacing HVAC equipment with more efficient current technologies [8]. As a result, there is a need for a good model as systems must be well modeled in order to evaluate and regulate energy usage and indoor air quality.

Enhancing the HVAC system control procedure requires correct modeling of the system [9]. The goal of this study is to develop model for temperature control in a centralized multi-circuit water-cooled package unit air-conditioning system using recurrent neural network to achieve higher energy efficiency while maintaining thermal comfort. The water-cooled packaged unit air conditioning system utilized in this study is a double refrigeration circuit unit. Each circuit consists of an expansion valve, a compressor, an evaporator and a condenser. The blower and duct network runs from the Air Handling Unit (AHU) room to the indoor space making up the air distribution section. The logging of parameters such as indoor temperature, indoor humidity, outdoor temperature, outdoor humidity, supply, mixed, and return air is part of the data collection process. The power consumption of the two compressors was measured using a power transducer. The data collected was separated into input and output data, which is an important stage in the model development process. The model input is the compressor's power, while the output is the temperature of the indoor space.

A recurrent neural network is a special case of Artificial Neural Network with the aim of predicting the next steps in sequence of observation by comparing the previous steps. The fundamental objective of RNNs is to foresee future trends by using sequential observations and learning from previous stages [10].

MAIN RESULTS

The data used in this study is taken per minute basis of two compressor input and a temperature output. The results for both the training and test performance of the RNN model are presented in figure 1. The result shows that the test performance which is the true performance of the model shows a good fit and it can adequately represent the behavior of the system.
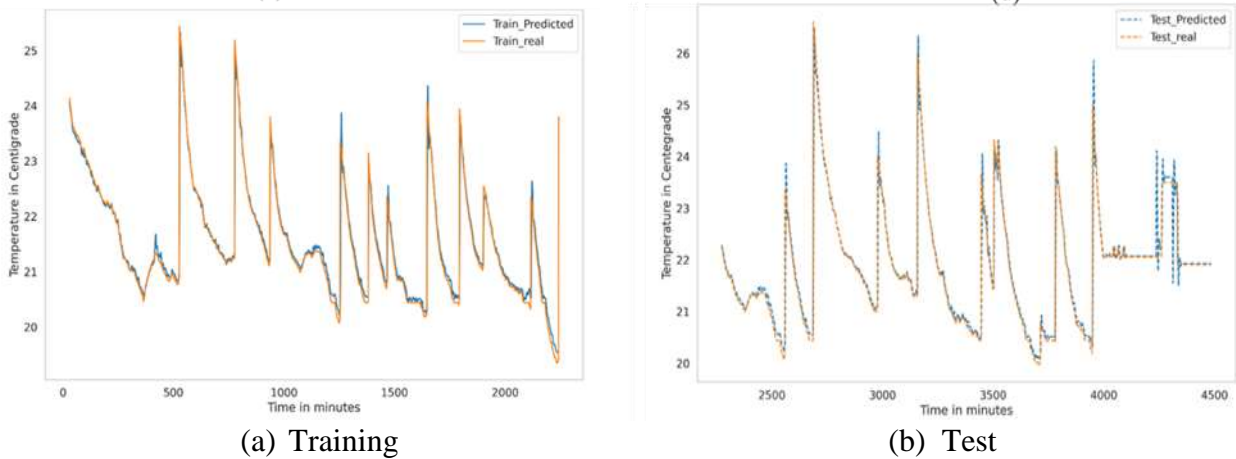

<div align="center">(a) Training   (b) Test</div>

Figure 1. RNN trainning and Validation Performance

The evaluation metrics that were used to measure the performance of the proposed RNN models in this research are the Coefficient of determination (R^2 or R-squared), Mean Square Error (MSE) and the Mean Absolute Error (MAE). The values obtained for this model are presented in table 1 below.

Table 1: Results of the RNN Model

	Coefficient of Determination	Mean Square Error	Mean Absolute Error
Training	0.9446	0.00601	0.02978
Test	0.9174	0.01112	0.03395

CONCLUSION

Suitable application of good control strategies is of paramount importance in order to

maintain a consistent indoor temperature and energy efficiency control of buildings. The right selection of an appropriate model of the system is crucial for establishing a control strategy that would save energy consumption while maintaining a comfortable indoor space temperature. This study will be valuable in the field of building and energy management research, particularly in the design of controllers for HVAC systems.

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AN APPRAISAL OF MILITARY INVASION OF SHANGEV-TIEV COMMUNITIES AND HUMAN RIGHTS VIOLATIONS IN INTERNAL PEACEKEEPING OPERATIONS

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Abstract

Military violation of huma rights in peacekeeping operations in Nigeria is fast becoming a norm rather than exception. Military peacekeeping operations however, cannot be implemented in isolation of human rights of citizens, the protection of their communities and objects of significance. The paper was an appraisal of the Nigeria military's invasion of Shangev-Tiev communities in Benue State-Nigeria. Air and ground offensives were deployed against unarmed civilians and their communities located more than 100 kilometres away from the conflict area. The aim of this qualitative study was to interrogate why the Nigeria government condones military excessiveness and human rights violations against unarmed civilians during peacekeeping operations. The collaborative military-political relationship incentivises and enboldens the military to violate citizens, institutional and constitutional provisions. The inherent language of violence embedded in the Constitution represents an acceptable culture of violence in the military that has become an acceptable as a norm. The involvement of the military in internal peacekeeping operations might contribute to immediate ceasefire, however, their continuous involvement leaves communities in crisis than therefore does not hold the solutions to sustainable peace processes.

Key words: Military-invasion, Benue-State, Shangev-Tiv, Killings, Human-rights

Introduction

On April 7, 2021, the Nigerian military took up arms against unarmed civilians in 15 communities of Shangev-Tiev of Benue State-Nigeria. In a show of military force, war planes hovered over these communities, and fired missiles that left civilian casualties, displaced residents, and destroyed livelihoods and property worth billions of naira (Sahara Reporters, 2021). Prior to this invasion, military sources alleged that its personnel on peacekeeping operations in North Central Nigeria were killed in a Benue Community of Bonta of Konshisha Local Government (Nwachukwu, 2021). The troop, was part of the larger contingent under the code name "operation whirl stroke", which was deployed for peacekeeping operations to settle communal clashes between Konshisha and Oju Local Government Areas of Benue State, stabilise the region and clear it of armed militia. The invasion which the military tagged as a self-defense operations to fish out killers of military personnel does not only call into questioning the legitimacy of the Nigerian military's use of excessive force against unarmed civilians but also points to the growing human rights abuse records of the Nigerian military against unarmed civilians (Adeakin, 2016). Military excessiveness and human rights violation of unarmed civilians and destruction of their communities as a form of collective punishment for the crime of criminal elements is fast becoming an acceptable practice of the Nigerian military on peacekeeping operations. In the Niger Delta, major confrontations erupted between unarmed civil protesters and the Nigerian military, which led to the extrajudicial killings, arbitrary arrests and detentions and the draconian restrictions on the freedom of expression, association, and assembly" (Human Rights Watch, 1999 and Amnesty International, 1994).

In 1999, the Nigerian government ordered military reprisal attacks on Odi communities in Bayelsa State as a collective punishment for the sins of armed militia alleged to have killed police and military personnel on peacekeeping mission (Ojo, 2009). In 2001, the Nigerian army, in a reprisal attack, carried out collective punishment and killed over 200 unarmed civilians; and destroyed homes, markets, farms and 7 farming communities and towns in Benue State, Nigeria (Human Rights Watch, 2002). The military invasion of the civilian communities followed an alleged killing by local armed militia said to have killed 19 soldiers on internal peacekeeping operations in Benue State. In 2008 post local government election violence in Jos, Plateau, Nigerian security forces comprising the police and soldiers deployed to quell the uprising, "gunned down residents in their homes, chased down and killed unarmed men trying to flee to safety, and lined up victims on the ground and summarily executed" a total of 133 persons (Human Rights Watch, 2009). Similarly, Amnesty International (2011) reported that the Joint Military Task Force sent to stabilise the northeast were found to have killed not less than 25 people while 45 people were wounded during their operations in northeast Nigeria. In 2016, the Nigerian security forces led by the Nigerian Army in a suppressive military stabilisation mission in the southeast, killed 150 pro-Biafran agitators- the Indigenous People of Biafra (IPOB) (Amnesty International, 2016). In 2017, the Nigerian military was said to have mistakenly bombed a camp where people internally displaced by the Boko Haram insurgents were accommodated in Rann, Borno State. A total of 10 foreign aid workers and 224 internally displaced persons were killed while 120 persons reportedly sustained various degrees of injuries (Kennedy, 2017 and Mitchell, 2017). In another operation in 2018, Military forces at a check point along around Abuja environs clashed with members of the Shia organisation who were protesting the detention of the leader and killed 45 of them within the space of two days

(Amnesty International, 2018a and McLean, 2018). In 2020 during the #EndSars nationwide protest by Nigerian youths against police brutality in the country, the Nigeria army again reportedly killed at least 12 unarmed #EndSars protesters in Alausa and Lekki areas of Lagos State (Amnesty International, 2020). In a similar trend, Nigerian soldiers and the police clashed with a pro-Biafra non-state armed group- the Eastern Security Network (ESN) and reportedly carried out extra judicial killings, arbitrary arrests and detentions of members of the ESN and the killed 115 persons during various operations in the southeast (Amnesty International, 2021). In September 2021, a Nigerian Air Force fighter jet again, mistakenly bombed a civilian community in Yobe State, Northeast Nigeria and killed 9 civilians while 23 people sustained injuries (DW Africa, 2021).

Sadly, military excessiveness in internal peacekeeping activities have largely remained unchecked (Adekunle & Nwaechefu, 2019) thereby, warranting sustained abuses and impunity. Although, the larger Nigerian populace, Human Rights organisations and international allies have drawn attention to the culture of violence and gross human rights abuse by the Nigerian military (United States Department of State, 2019 and Human Rights Watch, 2021), this has not succeeded in bringing the Nigerian government and the military command to address these rights abuses. Consequently, these abuses have continued to create security challenges, hardship on victims owing to massive destruction of property, livelihoods and objects of survival as well as human casualties. Yet, in most cases, victims of military victimisations often go without any form of justice, compensation and redress thereby, further emboldening their perpetrators. Moreover, when reports of rights violations committed by the Nigerian military are documented by human rights groups, government dismisses same with a wave of the hand, clears military of any crimes and alleges "harassment" against the state by rights groups (Amnesty International, 2018b and Adenekan, 2021). Often without investigations, yet alleges ploys by human rights organisations and supposedly sponsors of insecurities to discredit the country's efforts at addressing internal insecurities (Nwachuckwu, 2021 and BBC, 2018). As a way of pressuring Nigeria to address this institutional impunity, the US Congress once initiated a ban on sale of arms to Nigeria in regard to her poor human rights records and military excessiveness against innocent citizens (BBC, 2014). Nationally, several protests by Nigerian citizens have also been staged to draw government's attention to military excessiveness and human rights abuse (Onwuazombe, 2017). Additionally, despite evidential poor human rights records, there is hardly any institutional measures by the military to wholesomely take responsibility for its failure to protect civilians and for the military's grave violation of citizens.

Although military excessiveness and human rights abuses during internal peacekeeping operations in the country is not unusual (Ojigho, 2020 and Ojo, 2009). What is shocking is the acceptance by the political leadership of this persistent culture of impunity by those mandated to protect citizens and territory and thus calls to questioning, (i) why does the Nigeria political leadership condone military excessiveness and human rights violations against unarmed civilians and their communities? And, (ii) why is the discourse on military excessiveness and human rights violations under the cover of peacekeeping operations necessary?

Conceptual Clarifications

Peacekeeping and Peacekeeping Operations

Within the United Nations system, peacekeeping is a technique which refers to the preservation of the peace, no matter how fragile, in situations of ceasefire, and which is aimed to assist warring parties reach implementation of agreements that were successfully "achieved by the peacemakers" (United Nations, 2008). Its core priinceiples are (i) consent and approval of the political leadership; (ii) principle of impartiality- protecting all interests from violations, and (iii) principle of "non-use of force, except in self-defense" entails that military will exercise maximum restraint and avoid excessive use of force except under extremely necessary situations (Centre for International Cooperation, 2016). Withing the United Nations system therefore, peacekeeping operations are the armed operations approved and deployed by the United Nations Security Council as "interim measures to help manage a conflict and create conditions in which the negotiation of a lasting settlement can proceed." However, military peacekeeping operations have come to be used by national authorities in contexts that involve armed forces of a country in complimenting the role of the police in quelling internal destabilisations, protests, facilitating cease fire in communal clashes. Within the internal context therefore, military peacekeeping operations are guided and approved by the sending authorities (Federal Executive and national legislature) and the receiving authorities (State Executive) following mutually agreed upon terms and rules of engagement.

Human rights

Human rights are a set of universal "standards that recognize and protect the dignity of all human beings" (United Nations International Children's Emergency Fund [UNICEF], n.d.) without recourse to race, gender, religion, culture, tribe, political, social or economic class. They provide the basis for equality and how states and non-state actors, individuals and groups live in society and relate with their fellow human beings on one part and with the state and its institutions on the other. In this study, human rights are all the basic and fundament rights to life and everything in between that facilitates the protection of this life to its enjoyment, freedom and liberty to live freely and happily without violating others.

Methodology

The research was a qualitative case study of the military invasion of Shangev-Tiev Communities of Konshisha, Benue State-Nigeria. Owing to the novelty of this specific invasion and due to lack of access to the affected area as a result of ongoing military operations at the time, the study relied on secondary data. Instrument used for collecting secondary data was digital/online platforms. Official press statements were sourced from the official online handles of the Nigerian Army and Benue State Government. Internet search was conducted using phrases like "military invasion of Shangev-Tiev communities," "military killings in Konshisha Local Government," and "military killing of civilians in Benue State." The internet search was conducted between April 9 and April 20, 2021. Thematic analysis of the sourced data was conducted to identify patterns and themes that emerged out of narratives from the military and Benue State Government response following the military invasion. Findings: while military operations are approved by the sending and

receiving authorities; the Nigerian Military acted without the approval of the National Legislature, which has oversight function over military interventions in internal peacekeeping. Thus, military invasion violated the rights of unarmed civilians, territorial integrity, Constitutional provisions as well as contradicted the objective of military peacekeeping opearions.

The Role of the Military in Peacekeeping Operations

The broader aim of military peacekeeping operations in conflict situations is to observe cease fires, facilitate demilitarization and establish the path to peacebuilding processes, the protection of civilians and their objects. This role remains a critical part of these military involvement in local, national and international situations. Highlighting this role in their works, Rigby (2006) and Hultman, Kathman & Shannon (2013) note that the primary responsibility of the political-military collaboration in peacekeeping operations is to prevent humanitarian crisis. Specifically, this includes (i) protecting the civilian population; (ii) ensuring that conflict does not get escalated; (iii) guaranteeing that the military operations do not lead to reoccurrence or renewed offensives against the civilian population; and (iv) that at the end of the military mission, cease fire is achieved and a clear path to peacebuilding is established.

Although, the conceptualisation of military peacekeeping operations relates to International Arms Conflicts (IACs) and Non-International Arms Conflicts (NIACs), the concept and its application have been adopted in quelling national destabilisations and uprisings that do not bear the characteristics of IACs and NIACs (ICRC, n.d.). Consequently, their applicability in this study is the well-articulated expectations and rules of engagement required of the military for the protection of the civilian population and their objects of survival and significance (United Nations, n.d.; Krause, 2019 and International Committee of the Red Cross, n.d.). Furthermore, the code of conduct and expectations of the military in peacekeeping operations draws from the international humanitarian and customary laws, which stress the protection of persons and their fundamental rights in situations of conflicts and in all situations.

Although, military peacekeeping operations have gained currency especially in fragile states to quell internal disturbances and destabilisations, Galtung & Fischer (2013) note that military peacekeeping operations and interventions have only contributed to negative peace. They assert that military peacekeeping suppresses violence through brute force that further violates human rights, yet fails to address root causes. Consequently, scholars have argued that the role of the military in peacekeeping missions remains unclear given the negative implications associated with military excessiveness (Muggah, 2014; Krause, 2019; Day & Hunt, 2020 and Gorur, 2016). Koren (2014) argue that the continuous use of the military in peacekeeping missions despite track record of excessiveness might be due to the obvious relationship between the political and military leadership. They argue that this relationship significantly plays a complementary and supportive role where the political leadership uses the military as an attack instrument against a dissented civilian population. The study suggests that the military do exist to serve the interest of dictators, carrying out mass assaults and gross human rights violations against unarmed protesters during civil disobedience against the state. Instances of such military crack-down on

civilians included the Sierra Leone army during its civil war and the Nigerian army killing of the Ogoni Campaigners in favour of the state political elites.

Conclusion

Military impunity and culture of human rights violation in Nigeria can be traced to the 1999 Constitution of Nigeria (as amended) and therefore, regarded as a Constitutional challenge and inherent language of violence. Paragraph 217:1c of the Constitution: states, that military shall be responsible for "suppressing insurrection and acting in aid of civil authorities to restore order…" conversely, suppression is not a synonym for peacekeeping, NOT a language for protection of human rights and dignity of person, their communities or survival objects. It is a synonym for clampdown, destruction, conquest and defeat of the very fundamental human rights of the citizens. The continuous involvement of the military in civil processes hurts more than it heals. However, failure of the political leadership to tame the military has emboldened them and the invasion of Shangev-Tiev communities is part of that growing impunity. Constitutional and legislative reinforcements are required to address military impunity in Nigeria.

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CHARACTERIZATION AND WEAR RESISTANCE BEHAVIOURS OF ALUMINIUM ALLOY REINFORCED WITH AGRICULTURAL WASTES PARTICULATE AT DIFFERENT LOADS

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ABSTRACT

The research investigates the morphology and wear behaviours of Al-Mg-Si alloy reinforced with palm kernel shell powder (PKSP) for developing composites. PKSP of particle size of 100 μm was prepared for the studies at different weight percentages of 3, 6, 9, 12, and 15 PKSP were used to developed composites for the investigations. The PKSP was characterized by X-ray fluorescent (XRF). The morphology of the alloy and composites were characterized by scanning electron microscope (SEM) attached with energy dispersive spectroscopy (EDS). The XRF revealed elements such as carbon (C), oxygen (O_2) with other elements as traces. The PKSP as reinforcer had improved the morphology and wear rate behaviours positively. Morphologies revealed that the composites produced showed no voids and discontinuities of PKSP particulates in the composites. The wear resistance of the matrix and composites increase with increase in load and decrease with increase in the weight percentage of PKSP. The minimum wear rate was obtained at the load of 10N while highest at applied load of 30N. The wear rate of the alloy lost under load of 10N was 1.31 times greater than that of alloy reinforced with 15 wt. % PKSP with minimum wear rate. The composites could be used as brake rotors, pistons and connecting rods in the automobile industries.

INTRODUCTION

The growing demands in the automotive and aerospace industries for reduction in energy consumption and producing more fuel-efficient vehicles continues to be a big challenge. Aluminum matrix composites (AMCs) have unique combination of chemical, mechanical, and physical properties which cannot be attained with the use of monolithic materials [1]. This is why AMCs were regarded as promising materials for automotive and aerospace industries [2].

The automobile parts made from these composites include connecting rods, brake drum, cylinder head and were relatively low in cost of processing when compared to others. However, the problem with unreinforced aluminium alloys is the poor tribological properties which can be resolved by reinforcing the alloys with other materials such as fly ash, Al_2O_3, SiO_2, Fe_2O_3, TiC, B_4C, and SiC. With these reinforcements, their morphologies and tribological properties were greatly improved [3-5].

The PKSP is a great environmental threat causing damage to the land and the surrounding area where these wastes are being dumped. The effective way of utilizing the palm kernel shell powder was to subject it to treatment and convert it to powder under controlled conditions. Many studies have investigated the use of mussel shell powder as agro-wastes as reinforcement for automobile parts with improvement [14]. The weight fractions of palm kernel shell powder at particle size of $100 \mu m$ were varied from 0-15 wt. %. The PKSP was characterized by X-Ray florescence to ascertain the compositions and the morphologies of the alloy, composites and the wear mechanisms were investigated by scanning via electron microscope (SEM).

Therefore, this research work is part of effort aimed at considering the potentials wide range of agro-waste powders for the development of low-cost aluminium-based composites with the potentials use in wear applications among others.

MAIN RESULTS

Table 1. XRF Analysis of Palm Kernel shell powder

Elements	C	O	Si	Al	Fe	Ca
%	61.70	37.40	0.40	0.10	0.20	0.30

Table 2. Composition of Al-1.0Mg-0.8%Si alloy

Elements	Al	Si	Mg	Fe	Mn	Cu	others
wt.%	balance	0.8	1.00	0.03	0.10	0.15	0.10

Table 3. Summary of charge calculations in gramme (gm)

PKSP and Elements	0 wt.% PKSP	3 wt.% PKSP	6 wt.% PKSP	9 wt.% PKSP	12 wt.% PKSP	15 wt.% PKSP
Mussel Shell Powder (MSP)	0	25.45	50.90	76.34	101.79	127.24
Silicon (Si)	5.09	5.09	5.09	5.09	5.09	5.09
Magnesium	8.48	8.48	8.48	8.48	8.48	8.48
Aluminium	834.7	809.2	783.8	758.3	732.8	707.5
Total	848.3	848.3	848.3	848.3	848.3	848.3

Table 4. Wear analyses for matrix and composites at different applied loads (10, 20 and 30N)

Load (N)	Wt. % PKSP reinforcement	Wear Rate= mm^3/N-m
10	0 wt. % PKSP	2.77E-08
	3 wt. % PKSP	2.22E-08
	6 wt. % PKSP	1.80E-08
	9 wt. % PKSP	1.40E-08
	12 wt. % PKSP	1.01E-08
	15wt. % PKSP	7.01E-09
- 20	0 wt. % PKSP	2.99E-08
	3 wt. % PKSP	2.54E-08
	6 wt. % PKSP	2.09E-08
	9 wt. % PKSP	1.65E-08
	12 wt. % PKSP	1.27E-08
	15 wt. % PKSP	8.12E-09
30	0 wt. % PKSP	3.23E-08
	3 wt. % PKSP	2.75E-08
	6 wt. % PKSP	2.35E-08
	9 wt. % PKSP	1.98E-08

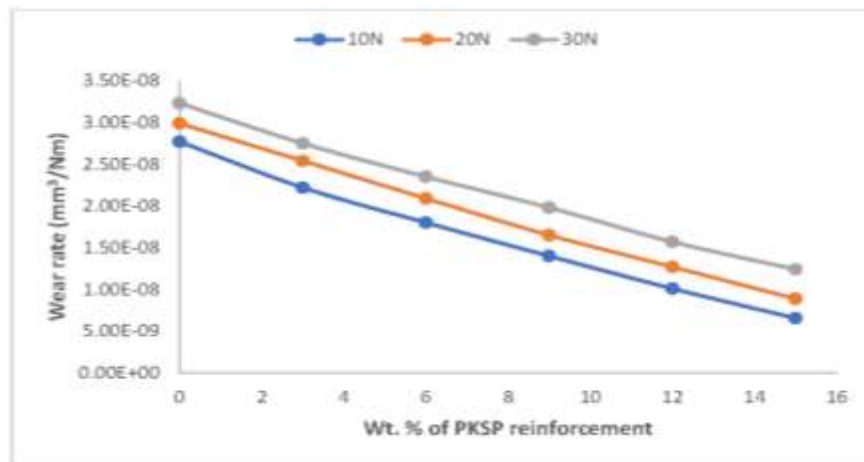|	12 wt. % PKSP	1.57E-08
	15 wt. % PKSP	9.89E-09

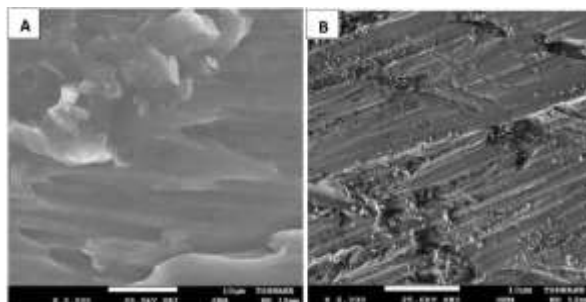**Fig. 1.** Variation of weight rate with wt. % of PKSP in AlMgSi at 10, 20 and 30N

Fig. 2. SEM image of AlMgSi alloy (a) at applied load of 10 N (b) reinforced
 with 15 wt. % PKSP particles with minimum wear rate at applied load of 10N

DISCUSSION OF RESULTS

The worn surface of the alloy in figure 2a without applied load showed the material removal line on the specimen only. Figure 2b showed the morphology of the composite at 15 wt. % PKSP particulates at minimum wear rate at applied load of 10 N. It was observed that larger plastic deformation was noticed on the composites under load of 30 and 20 N compared with 10 N. From the result, specimen under load of 30 and 20 N experienced greater weight loss when compared with that composite under 10 N. This is also similar to the findings of previous works [24,25].

CONCLUSION

The use of palm kernel shell powder (PKSP) of particle size $100 \mu m$ by dispersing it into AlMgSi via liquid metallurgy was carried out and the following conclusion were drawn from the results:

1. The palm kernel shell powder is a potential reinforcer that that had improved the morphology and wear rate behaviours on the alloy studied.

2. Microstructures clearly revealed that the composites materials produced by stir casting method showed no voids and discontinuities of PKSP particulates in the matrix which resulted in sound castings.

3. It was noted that the wear rate of the base alloy lost under load of 10 N was 1.31 times greater than that for the alloy reinforced with 15 wt. % of PKSP with better wear resistance. The wear resistance of the composites increases with increase in the applied load and decrease with increase in weight percent of PKSP as shown in figure 1.

4. The composites could be recommended to be used in tribological areas such as brake rotors, pistons and connecting rods in the automobile industries.

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Phytochemical Analysis and Antibacterial Activity of ginger (*Zingiberofficinale*) Methanolic extract Against *Escherichia coli* and *Staphylococcus aureus*,

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ABSTRACT

Escherichia coli and *Staphylococcus aureus* are among the most prevalent pathogens found in food poisoning. Infections caused by these organisms are associated with high mortality rate in hospitalized patients. This study is aimed at evaluating the antibacterial activities of Ginger (*Zingiberofficinale*), Against *Escherichia coli* and *Staphylococcus aureus* using agar well diffusion method. In phytochemical screening, the extract was tested for the presence of different chemical groups like Alkaloids,Flavonoids, Tanins, Steroids and Saponins.The result of this study revealed that the extract inhibited the growth of the microorganisms to varying proportion with zones of inhibition ranging from 7 to16mm. The extract produced the highest zone of inhibition on Escherichia coli (16mm) while Staphylococcus aureus(14mm) shows the least. Furthermore, the phytochemical screening of the extract revealed the presence ofAlkaloids, Flavonoids, Tanins, Steroids and Saponins in ginger. The presence of these phytochemical constituent in the extract could be responsible for the observed antimicrobial activity. The study confirms the use of Ginger extract in the treatment of wounds infection in the traditional medicine in different part of the world.

INTRODUCTION.

Ginger is used as a herb and also a spice, it is a member of the family *Zinberaceae*and its scientific name is *zingiberofficinale* (Kamrul*et al.*, 2014). Ginger is a thick scaly rhizomes which are aromatic, thick lobed, branched, have a scaly structure and they posses a spicy lemon like scent (Singh *et al.,* 2008). The syrup from from ancient ginger rhizomes is highly strong and plays role as powerful food maintenance (International Research journal of medicinal sciences., 2014). Ginger (*zingiberofficinale*) is a medicinal plant that have been

widely used all over the world, since antiquity, for a wide array of unrelated aliments including arthritis, cramps, rheumatism, sprains, sore throats, muscular aches, pains, constipation, vomiting, hypertension, indigestion, dementia, fever and infectious diseases. Ginger has direct anti-microbial activity and thus can be used in treatment of bacterial infection, ginger is relatively inexpensive due to their easy availability, universally acceptable and well tolerated by most people (Kamrul*et al*., 2014).

AIM OF THE STUDY

The aim of this Research is to determine the antimicrobial activity of ginger extract against some food-borne microorganism.

OBJECTIVES

1. To determine the antimicrobial activity of ginger extract against; Escherichia coli and Staphylococcus aureus.
2. To screen ginger for the presence of some phytochemical (alkaloid, flavonoid, tannins, saponins and steriods).

MATERIALS AND METHODS

In phytochemical screening, the extract was tested for the presence of different chemical groups like Alkaloids,Flavonoids, Tanins, Steroids and Saponins.The result of this study revealed that the extract inhibited the growth of the microorganisms to varying proportion with zones of inhibition. For sensitivity testing Mueller-Hinton Agar was prepared according to the manufacturer's instruction, autoclaved and dispensed at 20 ml per plate in 12 x 12cm Petri dishes. Suspension of microorganisms was made in sterile normal saline and adjusted to 0.5 Macfarlandstandard (10^8 Cfu/ml) (NCCLS, 2000). From the stock of 100mg/ml extract, serial dilutions were made to 50, 25, 12.5, 6.25, mg/ml (NCCLS, 2000). Each labelled medium plate was uniformly inoculated with a test organism by using a sterile cotton swab rolled in the suspension to streak the plate surface in a form that lawn growth can be observed. The inoculated plates were kept aside for 1 hour to allow the extracts to diffuse into the agar (Atata, 2003). The Mueller Hinton Agar plates were incubated at 37^OC for 24 hours. Antibacterial activity was determined by measuring the diameter of zones of inhibition (mm) produced after incubation. Ciprofloxacin and Agumentin were the positive control used.

RESULTS

Phytochemical screening of ginger. The result shows the presence of active principle such as Flavonoids, Tannins, alkaloids, Saponins, Steroids.

Test of Active Principles	Flavonoids	Tannins	Saponins	Steroids	Alkaloids
Ginger Extract	+	+	+	+	+

Key

+ Present

   The above table shows the result of phytochemical screening of ginger extract. It can be seen from the result that Flavonoids, Tannins, Saponins, Steroids and Alkaloids were found to be present.

Antibacterial Activity of Ginger Exract

TEST ORGANISMS	50%	100%	200%	400%	C
ZONES OF INHIBITION(MM)					
E.coli	10	12	13	9	35
S. aureus	7	13	14	8	12

   Key: C= Control. The above shows the result of antibacterial testing indicating zones of inhibition measured in millimetres. The positive control used was Ciprofloxacin and Augmentin are the Antibiotics.

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Improved automated Detecting of Tin (Cassiterite) Mineral Distribution over the Jos Plateau using Geospatial Remote Sensing

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ABSTRACT

Tin mineral (Cassiterite) SnO_2 ore was discovered in1884 by the National African Company in Nigeria. two major provinces are well known with the ore (the pegmatite province of Obudu and the younger granitic province of the Jos Plateau). Most past exploitation of these had been by clues, geochemical and geophysical techniques much more on the Jos Plateau and between then and now, what still remains? Satellite Remote Sensing is nowadays the most effective and cost effective technique to answer and perform regional predictions concerning natural resources endowment especially at these kinds of complex environments. This paper maps the surface rocks and the hydrothermal alteration zones to tin mineralization throughout the boundaries of Plateau state as a greenfield form of mapping involving four scenes of Landsat-8 imagery to narrow and highlight the potential regions of the tin mineralization. The hydrothermal alteration areas were classified as argillic, phyllic and propylitic all have association with tin mineralization, and where false color composites and band ratio technique as well as feature extraction by Example-Based Object Classification in ENVI 5.3 were exploited. This is an adoption of a powerful procedure that indicated the likely regions of mineralization. The results were added to the geological map of the region at hand as an update. And the Overall Accuracy of the image classification presented is 92.2982%; Kappa Coefficient = 0.8984. The overall results reveal the distribution of the areas of lithological units and the hydrothermal alteration areas along with high potential areas for tin mineralization and the methodology could be applied to similar environments with the landsat-8 data for mineral exploration.

Keywords: Satellite remote sensing, Tin exploration, Landsat-8, Band Ratio

INTRODUCTION

The use of satellite remote sensing overtime has proved that it is a valuable tool that provides new measures on how to explore and prepare to exploit potential mineral deposits that were not well known before now. The Landsat series since 1972 have advanced a vast array of studies in the geosciences and geology, where geological structures and mineralization distribution have been discovered at different kinds of environments. The different spatial, radiometric, and spectral resolution of recent remote sensing data have capacity for targeting potential areas for existing and new mineral prospects. Mineral resources take their origin from rocks and have been vital support to the proper functioning of economic growth of many nations as well as performing a crucial role in modern societal and technological advancement. They are also very essential in improving and paving way for quality of life and sustainable development (Lusty & Gunn, 2015). Increased demand for these resources becomes mandatory as human population and standards of living comfort grows (United Nations, 2013). Growth of material need for urbanization (Liang & Yang, 2019); needed in medical diagnosis and treatment (Rischen, Breuning, Bronkhorst, & Kuijpers-Jagtman, 2013); Military research in defense, precision, communication and armaments as well as in clean technology (Liu & Zhou, 2017; Graedel et al., 2015).

Aim:

The aim of the study was to identify regions of the distribution of the potential regions of the tin mineral throughout the state.

Scope:

The VNIR and SWIR portions of the sensor data were exploited in color composites, and band ratios to differentiate the rock types that host tin mineralization.

Materials and methodology:

Landsat-8 multispectral sensor in ENVI 5.3 were put to use for the narrowing of the likely areas of cassiterite deposits for exploration and further exploitation. This is achieved after undertaking image band stacking to form image cube, mosaic of these band in four scenes of the image data, pre-processing and specifically, performing the band ratio operation that highlight's the regional granitic rock regions of the entire state coverage. It is also noting here that the band ratio transformation has capacity to eliminate shadows and the topographic effects as the region is consisted of a complex topography and undulating edges with high elevation

Discussion and Result:

Band ratio 4/2 reveals rocks enhanced in landsat-8 image data rich in ferric iron oxides at hydrothermal alteration zones. Bands 6/7 enhances rocks that are rich in AL-OH (Clay and Sulphides) as well as porphyry copper deposits and vegetation. While 6/5 are indicative of ferrous iron however, this study is limited to showing regions of cassiterite where concentration was focused on the ferric iron oxides. The result of the band ratio 4/2 is shown in figure 1 in white patches.
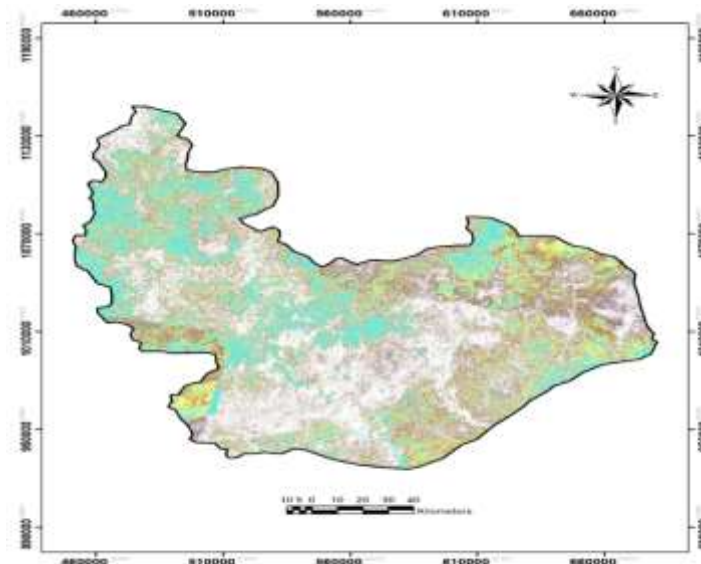
Figure 1 Band ratio 4/2 revealing regions of iron-oxides

The validation undertaken was by the use of confusion matrix and the Overall Accuracy for Landsat 8 image data of (figure 4.44) = (2241/2428) 92.2982%; Kappa Coefficient = 0.8984. Table 1

Table 1 The overall accuracy for classification

Class	AA Agric.	AA Water	AA Rocks	AA built-up Areas	AA Vegetation
Unclassified	0	0	0	0	0
Agricultural	162	0	183	0	1
Water	0	784	0	0	0
Rocks	0	0	443	0	0
Built-up area	0	0	0	663	0
Vegetation	0	0	3	0	189
Total	162	784	629	663	190

Conclusion:

The purpose of the study was to highlight the regions of spread of the tin mineral using the landsat-8 data in color composites and band ratios. The results obtained from the methodology was successful in revealing the lithologies and the likely areas of tin mineralization as well as the alteration rocks in the region.

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Improved Mechanical Properties of Maleic Anhydride Compatibilized Recycled Low- Density Polyethylene/Natural Rubber (r-LDPE/NR) Blends

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ABSTRACT

Low Density Polyethylene (LDPE) wastes has been a major environmental concern globally. To reduce the amount of LDPE leftovers in the environment and convert it into useful engineering material This study blends recycled

low density polyethylene (r-LDPE) with natural rubber (NR). Thermoplastic NR (TPNR) elastomer was prepared by blending NR with r-LDPE using compression moulding technique. Maleic anhydride (MA) was used as a compatibilizer to improve the compatibility between the elastomer and the r-LDPE. The tensile strength of the blends with MA and without MA were evaluated using the computerized universal mechanical testing machine (Instron series 3369) with a load cell 50KN. The flexural strength and abrasion resistance of the blends were also determined. It was observed that blends without MA had better tensile strength and flexural properties with a maximum value of 0.99MPa and 0.28MPa compared to blends with maleic anhydride with a maximum value of 0.36MPa and 0.23Mpa. However, the blends with MA showed better ductility compared to blends without the compatibilizer. The results obtained shows that TPNR blends prepared with compatibilizer showed better mechanical properties and this can be optimized to produce flexible hose and pipes.

Key words: Recycled Polyethylene, Maleic Anhydride, Natural Rubber, , Mechanical Properties.

INTRODUCTION

The indiscriminate disposal of plastic waste such as those from low-density polyethylene (LDPE) products is negatively impacting the environment. Though many legislations on reducing the disposal of plastic wastes have been enacted, LDPE wastes in the environment

has not reduced but rather its increasing at an alarming rate especially in developing countries such as Nigeria (Olofinnade et al., 2021). Plastics are utilized in a variety of applications including food packaging, distribution, and storage, healthcare, industrial and others. Their vast range of uses and demands adds to the ever-increasing number of solid wastes (Babayemi et al., 2019). LDPE is a variant of polyethylene, used in making products ranging from containers, dispensing bottles, wash bottles, tubing, parts of computer components, etc., its commonly use for plastic bags (Veethahavya et al., 2016). In recent years, polymer blends are widely used as an important strategy and cost-effective way to manufacture novel materials with specific features (Li et al., 2018; Khan et al., 2021). Several approches have used in the past to reuse and recylce LDPE (Youssef et al., 2015). In this study, we explore the abundant availability of waste LDPE and blend it with natural rubber (NR). NR is a common elastomer with high durability, elongation, and elasticity, as well as ease of storage, milling, and the ability to use various vulcanization techniques (Gordana et al., 2014). Mechanical blending of elastomers and thermoplastics such as LDPE are done with different techniques such as two roll milling, melt blending, and solution blending. The major drawback of TP elastomeric blends is the non-compatibility between two different phases. Compatibilizers are used to enhance their interfacial adhesion. In earlier study, compatibilizer improve the compatibility of blend components by enhancing the inter diffusivity characteristics of each blend component (Santos and Pezzin, 2003). Previously, MA has been used to improve the interfacial adhesion between waste polyvinyl chloride and acrylonitrile butadiene rubber (Ismail et al., 2004). The effect of MA and acrylic acid on NR/LLDPE and NBR/LLDPE blends properties was studied (Patel et al., 2006). In this study, MA was used as a compatibilizer in LDPE/NR blend and then we examine selected mechanical properties of the blend.

For this study, Nigeria standard rubber of grade NSR-10 was sourced from Rubber Research Institute, Iyanomoh, Benin City-Nigeria. r-LDPE was obtained from a recycling plant at Egbeda, Lagos-Nigeria. Analytical grade of MA was supplied by a chemical company in Lagos. Carbon Black and Tetramethylthiuram disulfide (TMTD) was supplied by Nigerian National Petroleum Corporation, Abule Ado, Lagos. Stearic acid, Zinc oxide and Sulphur were purchased from a chemical company at Ojota, Lagos.

Sample Preparation
Two- roll machine was preheated to 90°C. Stearic acid was added to the NR to open the molecules of the rubber to allow the incorporation of other ingredients. r-LDPE was added and then other compounding ingredients. Sulfur (cross-linking agent) was added last to prevent premature vulcanization. The blends with and without MA were prepared with NR/r-LDPE in the ratios NR:r-LDPE 95:5, 90:10, 85:15,80:20 and 75:25 respectively. After cooling, the compounded samples were compression moulded (model PID 28, Saumya India) at a temperature of 140°C for 10minutes (Patel et al., 2006). Dumbbell samples were analyzed for mechanical properties such as tensile strength, elongation at break, flexural strength and abrasion resistance based on standards test procedures.
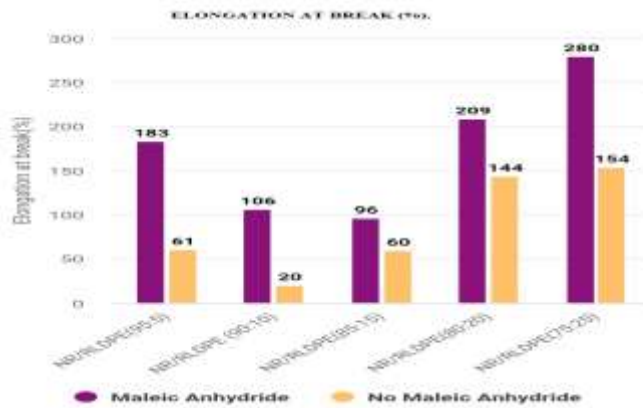
MAIN RESULTS

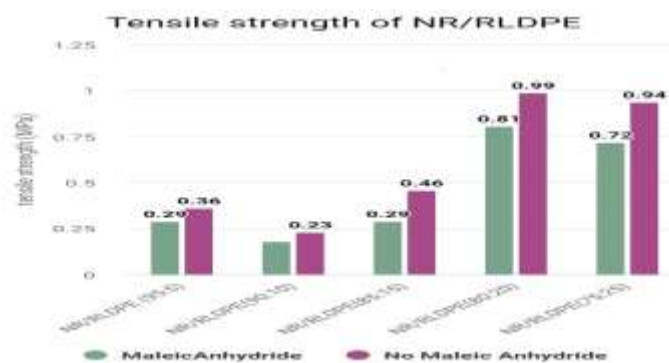**Figure 1.** Elongation at break of NR/r-LDPE and NR/r-LDPE/MA blends.

Figure 2. Tensile Strength of NR/r-LDPE and NR/r-LDPE blends
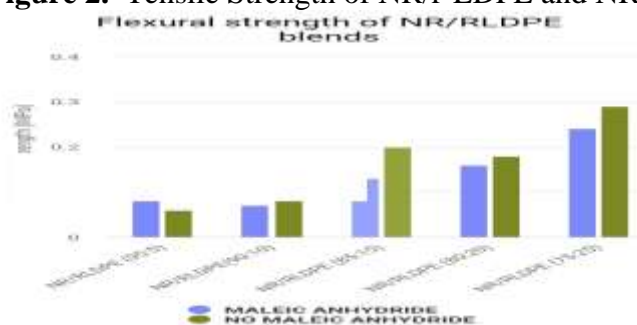
Figure 3. Flexural Strength of NR/r-LDPE and NR/r_LDPE/MA blends.

CONCLUSION

In this work, TP elastomer blends of NR and r-LDPE were prepared with and without MA. The mechanical properties of the un-grafted blends and grafted blends were comparatively the same though the grafted blends had better elongation at break than the un-grafted blends. The grafted blends could find application in the manufacture of hoses and pipes. Blending of waste thermoplastics with elastomers can be another alternative of reducing LDPE wastes

in the environment as the blend ratio of NR/r-LDPE (75:25), showed optimal mechanical properties.

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PERCEPTION OF NOISE POLLUTION IN MALAYSIA: QUESTIONNAIRE-BASED STUDY

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ABSTRACT

Noise pollution is still the third leading cause of environmental pollution on the planet today. Despite existing noise control legislation, it appears that the issue requires additional oversight by public authorities to ensure that the ceilings established for the various activities are met. People who are exposed to noise are more likely to develop a variety of auditory and non-auditory problems that have a direct impact on their persona, family, and work life. Excessive noise in environments where educational activities are taking place might cause lecturers, students, and staff to perform poorly. As a result, the purpose of this work is to investigate and, as a consequence, comprehend how foreigners in Malaysia perceived noise pollution. 321 volunteers, including lecturers, students, and staff, completed a questionnaire. The questionnaire results revealed that people perceive noise in the most diverse environments they regularly visit and can identify the source of the noise, but this perception is weak because the majority of people do not take measures to prevent or mitigate these noises. According to the findings, foreigners perceive Malaysia as a noisy in some areas and also consider noise as a harmful factor.

Key words: Perception, Noise Pollution, Questionnaire

INTRODUCTION

Noise pollution is defined as any unwanted and disturbing sound that is louder than the normal level that is comfortable to the human ear and has a negative impact on people and society[1]. According to recent review by the World Health Organization (WHO), at least 100 million of people get disturbed by road traffic noise in the European Union and in Western Europe alone, at least 1.6 million years of healthy life have been lost due to traffic noise [2]. Noise pollution can affect people both psychologically and physiologically such as hypertension, ischemic heart disease, annoyance, and most importantly, interferes with essential activities such as study, rest, sleep, communication and social activities [3][4]. In general, verbal communication, teaching and learning, mental activities, and sleep are frequently affected. When children are exposed to unpleasant sounds, their ability to read and understand can be delayed by up to one month[2].

Environmental noise pollution has an impact, not only on humans [5], but also on most animal species that inhabit the territories [6][7].The noise assessment and the reduction of its impact is therefore an important issue, widely supported by national regulations in many countries. In Europe, for example, the European Directive 2002/49/EC requires that cities with more than 100,000 inhabitants produce noise maps, thus, define action plans to limit noise annoyance, but also communicate to citizens about the quality of their sound environment [8].

According to a recent study in Spain [9] noise pollution has surpassed air pollution as the leading environmental risk factor in Barcelona. The primary strategies for combating noise pollution would necessitate accurate monitoring of environmental noise, timely dissemination of information and consultation with the population and parties involved, identifying and addressing local noise issues, and developing a long-term strategy for city planning and redevelopment. The European Union has embraced such techniques under the Environmental Noise Directive (END) 2002/49/CE [8]. Many countries have adopted a similar method to dealing with environmental noise challenges. However, people are not always aware of the effects that noise can have, particularly those who are exposed to lower noise levels over time [2]. As a result, the purpose of this paper is to identify the impact of noise on foreigners in Malaysia. Through the use of questionnaires, this study describes the local soundscape obtained from Malaysia and reveals how noise is perceived by foreigners.

This is an exploratory research, of descriptive character. The study included 321 volunteers from different nationality. The reason for including the foreigners in the study was to investigate how they perceived noise pollution compare to their countries. Most of the study sample consisted of students who were studying in Malaysian universities. We did not declare the objective of the research (to investigate the perception of noise) so as not to influence the respondents. We tabulated and qualitatively analyzed the answers for each question.

MAIN RESULTS

1. Gender

Frequency table represents how many observations fall in the given category. The frequency table as in Table 1 represents 321 respondents. The sample was characterized by homogeneous regarding sex: 204 (63.6%) males, and 117 (36.4%) females.

Table 1 Gender

Please state your gender

		Frequency	Percent
	Male	204	63.6
Valid	Female	117	36.4
	Total	321	100.0

2. Age group

Table 2 shows that the age group category 26 – 35 years old (40.2%) achieved the highest respondents among other groups. It is worthy to note that this group is made of people that need to focus on work and study to be productive.

Table 2 Age group

Please state your age group:

Category		Frequency	Percent
	15-25	83	25.9
	26-35	129	40.2
	36-45	87	27.1
Valid	46-55	19	5.9
	56 or above	3	.9
	Total	321	100.0

3. Location of participants

Table 3 demonstrates that 142 (44.2%) respondents live near highway/main roads, 60 (18.7%) live near constructions, 46 (14.3%) live near traffic light, 8 (2.5%) live near airport and 65 (20.2%) live in other areas such as industrial, residential, rural and campus areas. The majority of respondents live near highways/main roads which are frequently subject to noise pollution.

Table 3 Location of participants

Where do you live?

Location		Frequency	Percent
	Near Highway/Main roads	142	44.2
	Near constructions	60	18.7
Valid	Near traffic light	46	14.3
	Near airport	8	2.5
	Others	65	20.2
	Total	321	100.0

4. Knowledge of noise pollution

To check whether the participants are aware of noise pollution, the were asked a question as shown in Table 4. It can be seen that 22 (6.9%) respondents answered No and 299 (93.1%) answered Yes. That is mean most of the participants in this study are aware of noise pollution.

Table 4 Knowledge of Noise

Do you know what noise pollution is?

		Frequency	Percent
	No	22	6.9
Valid	Yes	299	93.1
	Total	321	100.0

5. Sources of noise pollution

To determine the sources that consider noisy by the respondents in Malaysia, they were asked three questions as depicted in Table 5. In the first question, the streets achieve the highest rate (46.7%) in terms of center of noise pollution and airports achieve the lowest rate (5.9%). This may be due to the fact that there is a high number of people living near highways. For the second question, most of the respondents (37.3%) find that transportation such as cars, motorcycles, trains, etc., are the main cause of noise pollution, while animals and birds (11.2%) are the least culprits. For the last question, people see differently about the main cause of noise pollution, but actually each factor (poor urban planning, social events and transportation) is considered cause of pollution according to the opinion of the majority (48.0%).

Table 5 sources of noise

	Sources of noise	Category	Frequency	Percent
	What places would you find a lot of noise pollution?	Streets	150	46.7
		Public places	93	29.0
		Constructions	59	18.3
		Airport	19	5.9
		Total	321	100.0
Valid	What are the main sources of noise pollution in your area?	Vehicle (Car, Motorcycle, Train,	120	37.3
		Human	90	28.0
		Mechanical machine	75	23.3
		Animals and birds	36	11.2
		Total	321	100.0
	What do you think is the main contributor to noise pollution?	Poor urban planning.	48	15.0
		Social events.	28	8.7
		Transportation.	91	28.3
		All of the above.	154	48.0
		Total	321	100.0

6. Noise impact on people

To investigate the influence of noise on people, they were asked five questions, whether they are sensitive or indifferent, if they can live in noisy places, if they consider the surrounding noise when choosing a house, if they consider noise to be harmful and if they can do their daily activities in the presence of noise. Table 6 is used to know how many respondents perceived the negative effect of noise. In the first question, respondents consider that a loud sound for short time makes them nervous according to the high rate (80.7%) that answered yes to this question, while the second question test their impact when living in a house for long time. It is normal to find that the majority of people (83.6%) cannot live in places with high noise, but they sometimes have to. The third question test if noise is one of the criteria when choosing a house. The results show that the noise issue is important to many of them and influences their home choice due to high rate (60.7%), followed by (27.1%) of respondents which are not sure about this issue and do not consider it as the main criteria. The fourth question investigates the community's perception about adverse effects of noise. A large proportion of people (68.5%) consider noise as harmful, and others (28.3%) consider that the harm resulting from it depends on the type of noise, but it remains harmful in general for the majority. The last question is the most important which to test if the people can do their activity in the presence of noise. Most (60.4%) cannot perform their activities while 26.8% reported that they maybe can do their activities in the presence of noise depending on the type of noise. The rest,12.8%, answered that they can perform their activities regardless of the noise.

Table 6 Noise impact

	Influence of noise on people	Category	Frequency	Percent
Valid	Does high level of sound make you nervous?	Yes	259	80.7
		No	62	19.3
		Total	321	100.0
	Can you live in places with high noise?	Yes	56	17.4
		No	265	83.6
		Total	321	100.0
	When you choose a house, do you consider the surrounding noise?	Yes	195	60.7
		No	39	12.1
		I'm not sure	87	27.1
		Total	321	100.0
	Do you consider noise pollution to be harmful?	Yes	220	68.5
		No	10	3.1
		It depends	91	28.3
		Total	321	100.0
	Can you study, work, sleep, etc., when there are loud noises?	Yes	41	12.8
		No	194	60.4
		Maybe	86	26.8
		Total	321	100.0

7. Do you agree to share your location for the purpose of data collection?

The locations of respondents are presented in a Google Noise Map as shown in Figure 1. The aim of this map is to know where the volunteers are staying in Malaysia. 125 (39%) agree to share their locations, while 196 (61%) disagree. We can see that most of the participants who shared their locations are from Selangor, Kuala Lumpur, Johor Bahru, Sabah and Sarawak.

Figure 4 Location of respondents

CONCLUSION

To understand the community's perception about noise pollution in Malaysia in terms of noise's sources, noise impact and awareness, a questionnaire in the form of survey was conducted. Our study of exploratory character and qualitative analysis, led us to the fact that the study group, formed by young people and adults, perceive noise as a harmful agent to the health of humans and, consequently, there is no prevention. The results showed that most respondents are concerned and bothered by noise, as well as they cannot perform their daily activities in the presence of noise. Noise pollution is an important issue to be considered in the planning of future townships and cities to guarantee a quality of life to the citizens.

Noise does not show its effects at first, but long-term consequences of exposure is detrimental to the individual because hearing loss deprives human beings of communication and contact with others, leading to isolation and social alienation. Avoiding exposure to loud sounds is the best way to prevent the development of hearing loss and other symptoms (tinnitus, difficulty understanding speech, irritability, fatigue, among others).

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ANALYSIS OF POVERTY STATUS AND INCOME DIVERSIFICATION STRATEGIES AMONG SMALL SCALE SORGHUM FARMERS IN KANO STATE, NIGERIA

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ABSTRACT
The study explored poverty status and income diversification strategies among small-scale sorghum farmers in Kano state, Nigeria. Multistage sampling technique was used to select 4 local governments namely Bebeji, Kiru, Garko, and Wudil out of 44 local government areas of Kano state. A total of 8 communities (2 from each local government) were selected to include (Gwarmai, Tiga, Yako, Dangora, Utai, Kansani, Garko, and Gurjiya), and 124 respondents were randomly selected using a well-structured questionnaire with the help of trained enumerators. Descriptive statistics and multiple regression were used as tools of analysis. The result revealed that the majority of the sorghum farmers were male, 98.3% were married, 20.8% had primary education and 15.8% had secondary education, about (63.4%) had one form of informal education with the other. The result also shows that age, education, household size, and farming experience had an influence on the farmer's income. The poverty incidence (Po) revealed that 69.18% were poor while 30.83% were non-poor, the poverty line was N6801.321, and the poverty depth index was 0.394 while the poverty severity among the poor was 0.790. The coping strategies adopted by the farmers to reduce poverty in the study area include trading which was ranked first 62.5%, Civil service second with 43.3%, tailoring, fishing, irrigation, and animal fattening (12.5%, 4.17, 6.67, and 8.33%), respectively.

Keywords: Poverty Status; Income Diversification; Sorghum Farmers; Kano state.

INTRODUCTION

One of the greatest challenges still facing most countries in sub-Saharan Africa is how to feed their ever-increasing populations. Agriculture, which is the main source of income for about 90% of the rural population in the region has not been a sufficient vehicle for solving household-level malnutrition and food insecurity (Nwozor, & Olanrewaju, 2019). This is because of low productivity and other hostile agro-ecological factors among others. Poverty and Food insecurity is a situation that exists when people lack secure affordable access to sufficient amount of safe and nutritious food to meet their dietary needs and food preference for normal growth and development and an active, healthy life (FAO, 2019). Meanwhile, it has been established in (Iqbal, et al. (2018) and (Odoh, et al. (2019) that in many rural areas, agriculture alone does not provide sufficient food opportunities, hence diversification into non-farm activities is seen as a form of self-insurance. This is because diversification offers people options for coping with crisis. The resultant effect of this is that rural households diversify their income sources by combining two or more jobs (multiple job holdings) to enhance consumption smoothing and acquire other basic needs (Alamba & Odoemelam, 2016).

ZONES	LGAS	VILLAGES	FARMER GRP	10% F.G	PPTN OF MEMBERS	SAMPLE SIZE (20%)
ZONE I	BEBEJI	GWARMAI	40	4	100	20
		TIGA	30	3	75	15
	KIRU	YAKO	30	3	75	15
		DANGORA	20	2	50	10
ZONE II	WUDIL	UTAI	30	3	75	15
		KANSANI	30	3	75	15
	GARKO	GARKO	30	3	75	15
		GURJIYA	30	3	75	15
TOTAL	4	8	240	24	600	120

Table 1 Sample frame and sample size

Source: preliminary survey 2018

3. Methodology

3.1 The Study Area

This study was carried out in Kano state. The state has 44 local government areas with a population of 9,383.682 people with an annual growth of 3.3% (NPC,2006). Based on this growth rate the population of the state would have grown to about 11,551,314 (NPC, 2006). It is characterized by tropical wet and dry climate. It has a daily mean temperature of 30° C during March-May. Lowest temperature is I5° C during the month of September to February. The wet season is from May to September and dry season from October to April. Annual rainfall ranges from 787 and The state is situated between latitude 13°53' North and 10°25' North and longitude 7°40' East and 10°53' East; it is 481 meters (or about 1580 feet)

above sea level (KNARDA. 2017). The state share borders with Katsina and Jigawa State to the North-west and North-east respective and Kaduna and Bauchi to the south. It has a total land area of 20,760 square Kilometers.

Model specification

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + U_t$$

Where;

Y = total annual income (components), X = *vector* of explanatory variables or independent variables, B = vector of unknown parameters, β_0 = intercept or constant, U = is a disturbance term, i = 1, 2 ... n (n is the number of possible observations), Y = Income of the household per year.(component) of income, X_1 = Age of the household in years, X_2 = Marital status (1=single, 0 otherwise), X_3 = Education status of the household (1 = formal education, 0 otherwise), X_4 = Household size (number), X_5 = Land size (hectares) for sorghum, X_6 = Level of experience (years), X_7 = access to credit, X_8 = Land ownership, X_9 = Number of income sources

4. Results

Table 2. Multiple regression estimates for farmers income

Variable	Coefficient	Standard error	T- Value	P- Value
Constant	0.786	0.744	1.057	0.293
Education	0.118	0.070	1.694	0.093*
Household size	0.027	0.014	1.874	0.064*
Land ownership	0.233	0.112	2.086	0.039*
Size of farm land	0.118	0.071	1.668	0.098*
Farm Experience	0.006	0.009	0.602	0.548
Marital Status	0.147	0.583	0.251	0.802
R – Square = 0.572				
R^2 adjusted = 0.559				
F- Value = 5.525				

Source: Field survey, 2018   * = Significant at 10% (P<0.1)

The result reveals that the R-square (R^2) which is the coefficient of multiple determination was found to be 57.2%, indicating the variability that 57.2% of farmers income was explained by the explanatory variables included in the models. The remaining 33.8% were not explained by the explanatory variables. The F-statistics value of 5.53 and is statistically significant at probability level, suggesting that the R^2 is significant and the estimated linear regression equation has a good of fit. The variables included in the models were educational status, household size, land ownership, size of farm land, farming experience and marital status. Out of all these variables, it was observed that educational status, household size and farm experience positively influenced income of the farmers. The regression result revealed that income of the farmers increase while poverty level is reduced with educational attainment, this can be attributed to the fact that higher level of education is believed to be associated with access to information and exposure, it also raises individuals' chances of

earning higher incomes which has positive influence on household annual income. This result in line with studies of Bashir et al. (2012) and Amaza et al. (2009).

Conclusion

It can be concluded that income diversification in non-farm activities such as trading, civil service, fishing, bee keeping, tailoring, irrigation and animal fattening positively influence the small scale sorghum farmers. Descriptive statistic and multiple regression models have shown that educational status, household size, access to credit and annual income has contributed to income diversification strategies and help in reducing poverty in the rural area. On the other hand, high cost of improve technology, inadequate access to farm land, low income, poor access to credit, high cost of labour and high cost of mechanization are the major constraint of income diversification.

The study recommends that effort should be made to encourage rural households to form cooperative societies as a variable tools to reduce or alleviate poverty among rural household. Also There should also be better access to credit facilities through strengthening the Bank of Agriculture by policy makers to enable them finance farmers. Micro finance bank, non-bank, micro finance institution should be more involved in supporting sorghum farmers.

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IMPACT OF BANK CREDIT ON CAPITAL STRUCTURE OF NON-FINANCIAL FIRM'S IN AFRICA

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ABSTRACT

The main focus of this empirical study is to assess whether the bank credit improves access to non-financial firms' debt capital in Africa. This research uses a panel data model to analyze the relationship between bank credit and capital structure of non-financial firms' in Africa. The research used two-step system Generalized Method of Moments approach to evaluate panel data for the period 2010-2018 for 406 firms from eight African nations. The research finds evidence that growth in bank credit raises the debt capital of firms in African nations. The rise in bank credit has been shown to have positive influence on capital structure choices of non-financial firms in the selected African nations. In addition, the outcome revealed that firms in Africa prefer debt financing in their capital structure. This results illustrates the vital role played by financial markets in helping non-financial firms in Africa to get access to debt capital.

Keywords: Bank Credit, Capital Structure, Africa, Generalized Method of Moments

INTRODUCTION
Although literatures on capital structure is full of researches in rich and poor nations, there is a shortage of related studies on how a firm progress in its financial environment affects firms' funding choices. Limited studies in selected rich and poor nations that attempted to explore this issue show inconclusive results (Dang, 2019; Tai, 2017). This gives opportunity for yet more empirical evaluation. Firms in poor nations, especially in Africa, are limited in terms of funding availability, primarily from deposit money banks. Reforms in the financial sector is seen as a safer way of mobilizing capital investment and economic development

through opening firms to a range of available financing. Most of these poor nations has embarked on thorough financial reforms by World Bank and IMF policies. The reform outcomes were reported to have been very successful and have enable local firms to banking and stock market financing options. Therefore this study intends to explore the influence of bank credit on the capital structure of non- financial firms in Africa using recent data sets.

2. Overview of related literature

According to trade-off principle (Myers 1984), financial managers prefer a company's optimal debt-equity decision to be a trade-off between the benefits of having more debt and the debt costs. The optimal capital structure calls for a trade-off between the impact of corporate and personal taxes, bankruptcy and agency costs. This hypothesis reveals that companies with stable, productive assets and gaining sufficient taxable income are likely to have a high debt ratio since debt servicing does not appear to be at risk. Unlike the trade-off theory, the pecking order theory (Myers & Majluf 1984), implies that there is no such concrete, highly explained mix of debt-equity targets, and that managers prefer internal funding to external funding because of asymmetry of information between company insiders and outsiders. Because of this theory, the main assumption is that managers behave in the interest of current shareholders to maximize value of existing shares.

4. Methodology

This research sourced data for firm specific and macroeconomic factor from World Bank database and world development indicators (WDI). Our sample cover a period between 2010 and 2018 for 406 financial firm across 8 (Egypt, Ghana, Kenya, Mauritius, Morocco, Nigeria, South Africa, Tunisia) nations in Africa. The study employed two-step system generalized methods of moment (GMM) to analyze the data collected for the study.

Model Specification

$TDTA_{ij,t} = \lambda TDTA_{ij,t-1} + \beta_0 + \beta_1 BC_{jt} + \beta_2 Slog_{ij,t} + \beta_3 FA_{it} + \beta_4 PRFTS_{ij,t} + \beta_5 MTB_{ij,t} + \beta_6 NDTS_{ij,t} + \beta_7 INF_{jt} + \beta_8 INT_{jt} + \beta_9 GDPG_{jt} + \phi_i + \alpha_t + \mu_{it}$

Where: TDTA = Ratio of Total Debt to Total Assets, BC = Bank Credit, Slog = Log of Size; FA = Property, Plant, and Equipment ratio to Total Assets; PRFTS = Profits; MTB = Market-to-Book Value Ratio; NDTS = Non-Debt Tax Shield to Total Asset Ratio; INF = Inflation Rate; INT = Interest rate; GDPG = Gross Domestic Product Growth; MCGDP = Market Capitalization to Gross Domestic Product; φi= Firm-specific Effects; αt =Yearly Fixed Effects; λ = Adjustment Parameter; μ = Error Term

4. Generalized Method of Moments Results

The result show a direct significant and positive relationship between Bank credit, firm size, inflation rate, interest rate with capital structure (see Table 5c). Bank credit (BC) coefficient statistically significant and positive (0.043**) at 5% and the t-statistics is 2.36. Firm size (SLlog) coefficient statistically significant and positive (0.104*) at 10% and the t-statistic is 1.95. Inflation rate (INF) coefficient is statistically significant and positive (0.051**) at 5%

and the t-statistics is 3.87. Interest rate (INT) coefficient and t-statistic is 0.042** (2.46) positive and statistically significant at 5% significant level.

Table 1 Dynamic Estimation

Source:Researcher's computation using Stata 14

5. Conclusion

The study finds that aside firm- specific factors recognized in extant literature as responsible in explaining financing choices of firms, financial market development also accounts for funding decisions of non-financial firms. Generally, the study finds that bank credit is important to firms as it increases firms' access to funds and thus, enable firms to make an optimal capital structure decision. The findings from this study have some suggestions for policy implications. Given the relevance of capital market in Africa, policy-makers may enact policies that promote the development of the financial markets to enable firms have easy and more access to debt needed to finance profitable investments that enhance firm-value.

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DAMAGE IDENTIFICATION IN PLATE STRUCTURE USING CHANGE IN FREQUENCY METHOD

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ABSTRACT

Vibration based damage detection using the frequency change method has been used to identify structural damage in structures. Researchers have been attracted to frequency change method due to the ease and speed to perform this method. However, limited studies have applied frequency change method to identify support damage. Thus, this study applied a steel plate model via finite element modelling to identify support damage and plate damage. The natural frequencies of the plate in the undamaged and damaged states are collected and compared in order to classify damage. In this study, three damage locations were applied (corner, side and middle). Furthermore, varying degrees of damage severities were inflicted on the plate. The impact of different damage locations on change in natural frequencies is discussed. The results showed that damage is detected with the frequency change method, and the support damage has more effect on the frequency change than the plate damage. In addition, the location of damage influenced the degree of change in the natural frequency of the plate numerical model.

Key words: Structural health monitoring, Natural frequency, Plate model, Damage severity, Damage location

INTRODUCTION

Civil infrastructure systems are typically the costliest assets of any nation. Such systems can deteriorate at an unprecedented pace due to inadequate maintenance, premature loading and adverse environmental conditions such as earthquakes and strong wind impacts. At the early stages, crack initiation and propagation may occur at loads well below those needed for real

structural collapse, and damage is sometimes concealed inside the structure itself. These defects can not only diminish the structure's operations, but can also lead to loss of lives and properties. Many structural failure accidents also raised the value of how systemic testing may avoid such failures and thereby prevent loss of lives and assets [1]. To ensure adequate safety and an extended lifetime of structures, adequate continuous monitoring should be in place. This control covers the three key phases of determining damage: identification of damage, damage location and damage severity.

Change in natural frequency remains the quickest and easiest damage detecting method in structural health monitoring. The ease and speed of this method enables quick assessment of structures to enable early detection of damage. Thus, this study identifies damage in a steel plate model as well as the support of the plate by applying change in frequency method. The plate structure applied is a numerical plate model done using a finite element software. The first three natural frequencies of the plate in the undamaged and damaged states are obtained and compared to identify damage. The effect of different damage locations to change in natural frequencies is presented.

NUMERICAL PLATE MODEL

The numerical analysis involved numerical modelling of the plate to obtain the mode shapes using finite element software SAP2000. The plate model is square and has the four sides with fixed boundary conditions. The plate's dimensions are: length l = 560 mm, width b = 560 mm, and thickness h = 2 mm. The material properties are: mass density ρ = 7850 kg/m3, modulus of elasticity E = 200 GPA, and Poisson's ratio ν = 0.3. The plate model is divided into 784 square thin shell elements of the dimensions 20 mm x 20 mm. Figure 1 shows the numerical model of the plate with the four sides fixed. Furthermore, the damage locations considered in the plate structure (middle, corner, and side) are shown in Figure 1. The fundamental mode shape of the plate is shown in Figure 2.

The severity of damage was defined by parameters damage size and location. The damage area (size) was 80 mm x 80 mm, which translated to approximately 2.041% of the plate area. Table 1 shows five different cases of damage severities and thickness reduction applied to the plate. Damage was applied to the plate by decreasing the number of fixed supports of the plate. A damage of 5%, 10%, 20, 50% and 75% were applied to the plate structure. The method of damage infliction/thickness reduction is shown in Figure 3.
The varying degrees of the plate support damage is given in Table 3. This is done by assigning some nodes in the plate model as free. The percentage of the free nodes corresponds to the percentage of the support damage.

NUMERICAL RESULTS
Corner damage
Table 3 shows the natural frequencies of the plate model when varying damage occurred at the corner of the plate and at the support. Figure 4 shows a better representation of the natural frequency change with respects to damage. From Figure 4, it can be observed that both support and plate damage decreased the natural frequency of the plate. For example, the frequency decreased from 55.68 hz to 55.59 hz at 0% support damage severity when the plate middle damage severity increased from 0% to 75% severity. Similarly, the frequency

decreased from 55.68 hz to 26.84 hz at 0% plate middle damage severity when the support damage severity increased from 0% to 75% severity.

Side damage

Table 4 shows the natural frequencies of the plate model when varying damage occurred at the side of the plate and at the support. Figure 5 shows a better representation of the natural frequency change with respects to damage. From Figure 5, it can be observed that both support and plate damage decreased the natural frequency of the plate. For example, the frequency decreased from 55.68 hz to 54.43 hz at 0% support damage severity when the plate side damage severity increased from 0% to 75% severity. Similarly, the frequency decreased from 55.68 hz to 26.84 hz at 0% plate side damage severity when the support damage severity increased from 0% to 75% severity.

Middle damage

Table 5 shows the natural frequencies of the plate model when varying damage occurred at the side of the plate and at the support. Figure 6 shows a better representation of the natural frequency change with respects to damage. From Figure 6, it can be observed that both support and plate damage decreased the natural frequency of the plate. For example, the frequency decreased from 55.68 hz to 53.25 hz at 0% support damage severity when the plate side damage severity increased from 0% to 75% severity. Similarly, the frequency decreased from 55.68 hz to 26.84 hz at 0% plate side damage severity when the support damage severity increased from 0% to 75% severity.

CONCLUSION

The paper presented a damage detection method by using change in the natural frequencies of a plate structure. Both plate damage and plate support damage were studied. The plate structure was modelled by using thin shell element. Three damage locations (corner, side and middle) in the plate were considered with varying degrees of damage. The results showed that both plate and support damages decreased the natural frequency of the plate structure. Furthermore, the numerical analysis indicated that the change in frequency was affected by damage location. The highest value was the middle damage.

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Desertification and climate change study using multi-temporal remote sensing technique- the Yobe state perspective

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ABSTRACT

Desertification continues to pose treat to Northern-Nigeria, with more and intensive hit to those states that lie at the fringes of the Sahara Desert. At these regions, there is serious loss of grasses and vegetation due to the scourge of climate and backing of anthropogenic activities. The Land cover becomes bare completely during the dry seasons coupled with intensive grazing and erosion activities. Despite programs of tree planting in the past to combat this menace, the drought scourge is still forging ahead at an alarming rate, ravaging the entire Northern–Nigeria. This study is scoped at Geidam, Yobe State with the aim of monitoring the rate of encroachment to this area using geospatial techniques with vegetation indices in multitemporal analysis as the key element of evaluation to check the rate of change. Landsat 7 (ETM+) and Landsat-8 (OLI) data of two epochs of 1988 and 2018 were analysed. The images were geometrically and atmospherically pre-processed then classified, in indices and maximum likelihood (MLC) method of supervised classification to produce land cover maps of the two periods. The accuracy of the classification was assessed in confusion matrix and the results obtained reveals an overall between the ETM+ (92.32%, kappa 0.9) and Landsat-8 (96.74, kappa 0.95). While the classification of the land use land cover (LULC) reveals that built-up environments are on the increase by (+30.97%), water body receded by (-5.06%) and forest by (-23.48%) within the study period. This indicates clearly that as there is rapid urbanization, the vegetation is under stress perhaps of deforestation as the wood are source of energy for cooking and climate change impacts. This study should serve as a stepping stone to trigger interest in government and individuals to take the issues of tree planting more seriously to reduce heat scourge and combat the pose of desert treat.

Keywords: Change Detection, Remote Sensing, Classification, Landsat data

INTRODUCTION

The menace of moving desertification is always across international boundaries globally (). Nigeria is experiencing continual degradation and worst hit at the frontline states to the Sahara Desert, which is gradually creeping into the central states. Apart from vegetation disappearances, soils and barren land increase, there are issues of dust that is growing higher and extending into the middle of Nigerian states and the federal capital, all attributed to climate change. Mortality daily rate is said to be increasing by 8.4% as cardiovascular effects experiences are growing especially at the northern region whose predictions are also blamed on the outbreaks of the dust from Sahara Desert. The State of Global Air, 2018, has already alerted that Nigeria has the highest population-weighted annual average PM 2.5 concentrations among the top regions of the world. It has third highest premature pollution related deaths in the world and highest in Africa as compared with other continents. Even though that one third of the global landmass are getting worse like in Africa, 73% of drylands are affected, Asia 71%, Australia 60%, Latin America & the Caribbean 75%, North America, 74% and the condition gets worse when vegetation continues to recede (UNESCO). Desertification is really a significant ecological, economic, social and environmental problem that is ravaging the global environments in many regions and affecting millions of livelihoods (). We need to rise to effective monitoring (UN, 2019) and remote sensing technique is critical and the best alternative to provide up-to-date information regarding this. There are myriads of sensors orbiting earth and showing details to even regions that are facially harsh and inaccessible.

Aim: To highlight the rate of encroachment to this area using geospatial techniques **Scope**:

Materials and methods: Landsat multi-temporal data of two epochs, Landsat 7 (ETM+) and Landsat-8 (OLI) of 1988 and 2018 were analysed. The image data were both pre-processed, and processed using the RGB band combination then, carrying out ssupervised classification method with same number of classes. The maximum likelihood classifier was used taking clues form (Richards and Jia, 1999; Otukei and Blaschke, 2010). Training samples were created from ArcGIS software using bands 123 for 1988, and bands 345 as equivalent for 2018 as were researched by (Mallupattu et al. 2013).

Results and Discussion: Two maps are hereby presented showing the measures of performance over time figure 1 representing the two processed data of 30 years' gap.

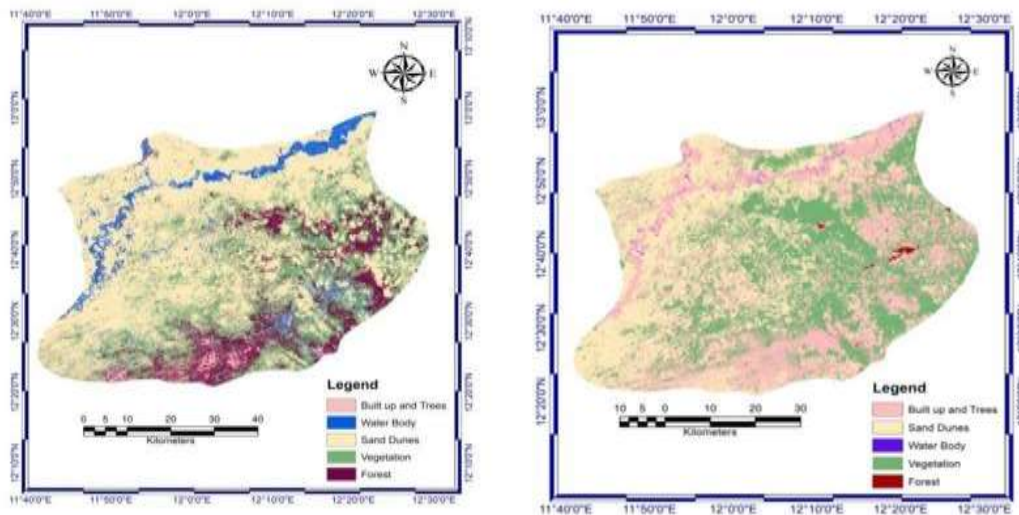Figure 1Classified images of the 1988 – 2018 of ETM+ and Landsat-8 (OLI) data

Table 1. The accuracies of the classified maps using confusion matrix

Image	Overall accuracy (%)	Kappa index
Landsat TM of 1988	92.32	0.90
Landsat OLI of 2018	96.74	0.95

Conclusion: The study looking at a gap of 30 years (1988 and 2018) was considered, and significant change in vegetation is on the negative, soils on the increase. These dynamics is essential for responding to, with urgency to minimize the receding vegetation by reintroducing programs such as afforestation and reclamation of erosion areas.

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Prospective Mapping of pyrophyllite mineral deposit groups using Remote Sensing imagery at hydrothermal alteration regions of Plateau State, North Central Nigeria

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ABSTRACT

The Pyrophyllite mineral has commercial and industrial importance so much so that the global market size for this mineral was valued with USD 151.7 million in 2019 and is expected to keep growing at a compound annual growth rate (CAGR) of 5.7% predicted between 2020 and 2027. Nevertheless, where the mineral is mostly found are schistose metamorphic rock environments where hydrothermal veins that are rich with mica and quartz exist. The rock category where this study is domicile is complex and a regional study of the entire Plateau state north central Nigeria will be quite difficult and costly with traditional geological mapping. The use of satellite multispectral remote sensing application is the best alternative with fast and cost-effective coupled with political unstable and complex magmatic and mountainous environment. Landsat-8 (OLI) multispectral data is put forward at greenfield prospective mapping to discriminate the potential areas of pyrophyllite mineral groups. Band Ratios (BR) transformation and RGBs are the methods adopted for the detection at sub-pixel deposits of Al-rich, Fe^{3+}-rich, Fe^{2+}-rich and Mg-rich pyrophyllite taking the advantages of the visible and near-infrared (VNIR) as well as the short-wave infrared (SWIR) bands of the two sensor data. The Jos Plateau contains great prospects for mineral resources because it hosts the three major rock types (Igneous, Sedimentary, Metamorphic) and has records of being one of the world's largest known deposits of columbite, the niobium ore and tin which are all intertwined within each other, and has relationship with prospects of pyrophyllite. The classification accuracies performed using confusion matrix reveals an overall of 92.3% with kappa of 0.9 which indicates that the

sensor and hybrid techniques for mapping in complex terrain environments is quite appreciable.

INTRODUCTION

Phyllosilicate is a member of the silicate mineral group which occurs at regions of schistose rocks. The nature of regions where these are found make them difficult and costly to explore through traditional means yet a commercial and industrial mineral that is needed in a vast array of ways (Kauffman et al., 1974; Lohmander, 2000; Bhardwaj, 2001; Qin et al., 2020). The global pyrophyllite market size was valued in 2019 at USD 151.7 million and is expected to keep growing at a compound annual growth rate (CAGR) of 5.7% predicted from 2020 through 2027. This mineral has Increasing demand much more in ceramics (MAR, 2020). They are discovered usually in two forms (Crystalline folia, Compact mass) in sheet like structure at gibbsite layer arrangement. They actually resemble talc in many ways as hydrous magnesium silicate material, and a commercial mineral distinguishable by eye from soapstone, commonly called the talcose rock (steatite). There are important properties of talc with chemical inertness, high dielectric strength, high thermal conductivity, low electrical conductivity, and oil and grease adsorption. Major markets for talc are ceramics, paint, paper, and plastics. Studies on the pyrophyllite reveal that a long time ago, they had been explored and mined globally by field and through laboratory measurements (Gruner, 1934; Wardle and Brindley, 1972; Lee and Guggenheim, 1981; Drits et al., 2012). In recent times, satellite remote sensing has overtaken the regional mapping exploration exercises (Son et al., 2014; Qin et al., 2020; Portela et al., 2021). There has been a global shortage of supply of pyrophyllite in the market due to the industrial shutdown that has been triggered by the COVID 19 pandemic. This disruption of supply of the raw materials has hampered full-scale operations in several industries. Asia-Pacific region according to records dominates the global use and demand for pyrophyllite on account of how there has been increasing investments that have been made into the product at several areas including much more, construction activities and the automotive industry. South Korea is identified to be one of the major producers of pyrophyllite followed by Japan and India. Also, Turkey is not left behind in European markets. The greatest concerns on this mineral is its contribution to Increasing urbanization and industrialization as development keeps growing in Asian countries such as China and India, and the implication of this is that there is anticipation that the drive to its demand shall continue to grow. A continental view and prediction was made from 2015 – 2028 and is indicated in Figure 2.
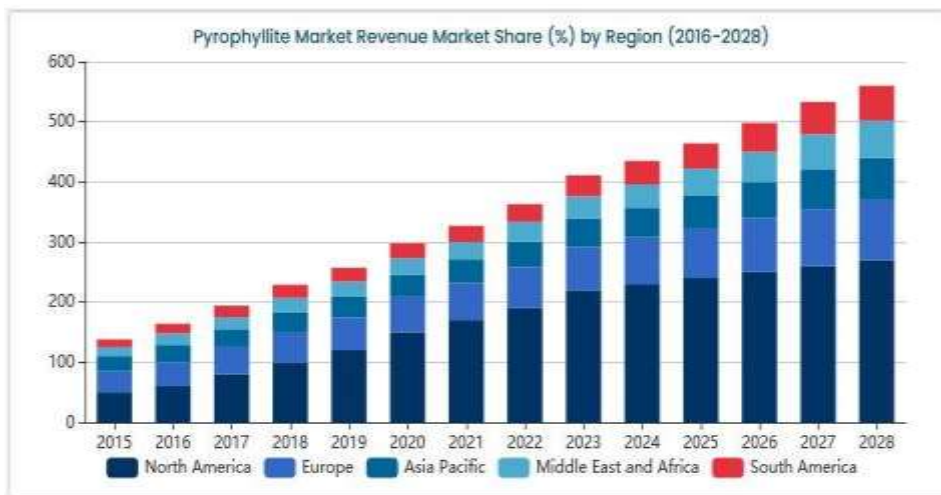
Figure 1 Continental market trend of pyrophyllite between 2015 – 2028 from Cognitive Market Research, 2021.

Aim: The study aims at evaluating how multispectral satellite sensor data could be used to show the distribution of the mineral in Plateau state by narrowing the regions of deposit so as to create interest in investment as well as being an eventual way to diversify, boost economy and a good support to the global SDG program ongoing.

Scope: this is an investigation of geological prospectivity that narrows potential regions of ore deposits by use of satellite remote sensing data. The study confines to the pyrophyllite group despite that the study area contain the three major rock types where variety of mineral types can be prospected for. The methodology takes cognisance of the processes of mineral enrichment by tracing the system of changes that take place in rock environments. The sensor data has 3 sub-systems but the study was limited to the VNIR and SWIR wavelength regions leaving out the thermal bands. The band ratio technique applied is very potent at regions of complex topography and reveals excellently the endmembers sort for individually. Ancillary data which are rock sample laboratory measurements and Insittu were all used as augment to validate the results obtained.

Materials and Methods

Four scenes of cloud free and terrain corrected Landsat-8 Level L1T data and 8 scenes of Sentinel-2 MSI were freely downloaded from the U.S geological Surveys Earth Resources Observation and Science Centre (EROS) (http://earthexplorer.usgs.gov. The image data were downloaded for December 2019 and 2020 of the dry season period without rain and clouds, (path/Row 187-188/053-054). The methodology involved pre-processing of the data to remove acquisition artefacts, processed through the use of band ratio spectral transformation method to reveal the individual mineral categories that have close association with pyrophyllite minerals. a classified map is produced showing the differentiations and validated with XRD and GPD Insittu measurements for more details.

Results and Discussion: the results of band ratio transformations for individual minerals Figure 2.
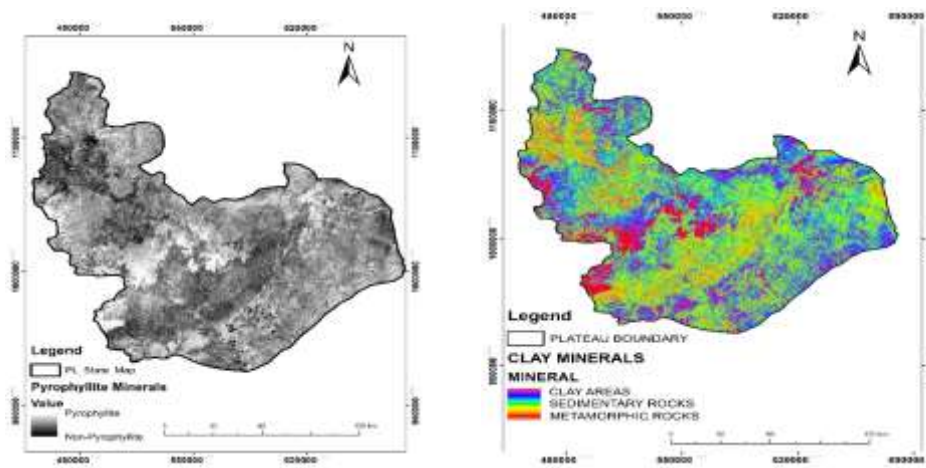
Figure 2 Band ratio 6/7 with white patches showing regions of pyrophyllite, and RGB 6/7, 6/5 and 4/2 showing associated mineral groups with relationship with pyrophyllite.

Discussion and Conclusions

Using the remote sensing approach to explore for the pyrophyllite group mineral type, the rock enrichment process is very important. And to discriminate the Pyrophyllite, it was discovered that they are prominent at different wavelength range, but more identified at the SWIR between 2.2 – 2.5 µm. The enrichment regions are where there are Al-rich rocks areas, where SiO_4 are identified through vibrational tones strongest at the Thermal infrared (TIR) wavelengths (8.8 – 12µm) while the Mg-rich regions exhibit Fe rich minerals by the actions of electronic transition processes at varying wavelength ranges, the hotspots of the electromagnetic spectrum are 2.29 – 2.31 µm; 2.33 – 2.34 µm and 2.35 – 2.37 µm. All the description fits metamorphic rock environment therefore, to identify the metamorphic rock regions of the Jos Plateau, we needed to find the distribution of Mg-rich rocks, dolomites, limestone basic volcanics and tuff.

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Market Analysis Report, 2020. Pyrophyllite Market Size, Share & Trends Analysis Report by Application (Refractories & Foundry, Ceramics, Fillers), By Region (APAC, North America, Europe, Central & South America, MEA), And Segment Forecasts, 2020 – 2027. Report ID: GVR-4-68038-834-3

Pour A.B., Sekandari, M., Rahmani, O., Crispini, L., Laufer, A., Park, Y., Hong, J.K., Pradan, B., Hashim, M., Hossain, S., Muslim, A., Mehranzamir, K. 2020. Identification of Phyllosilicates in the Antarctic Environment Using ASTER Satellite Data: Case Study from the Mesa Range, Campbell and Priestley Glaciers, Northern Victoria Land. Remote Sensing, vol 13 (1), 38 https://doi.org/10.3390/rs13010038

Son, Y., Kang, M and Yoon, W. (2014). Pyrophyllite mapping in the Nohwa deposit, Korea, using ASTER remote sensing data. Geosciences journal, vol 18, No 3, p, 295 – 305.

Wardle R, Brindley G W (1972). The crystal structures of pyrophyllite, ITC, and of its dehydroxylate. American Mineralogist 57 732-750.
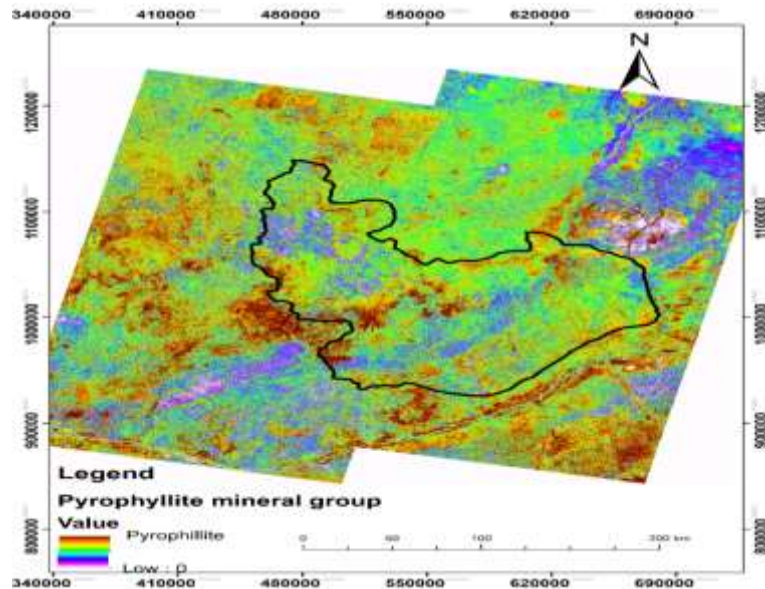
Figure 3   Mosaic of 4 scenes and boundary line of Plateau state

These sensor data were prepared and pre-processed in three steps (i) geometric corrections (ii) Radiometric calibration (iii) Atmospheric correction respectively. These data bands prepared were made to pass through enhancement processes to make the details in the image data legible and comprehensively able to be interpreted. The band ratio transformation technique is highly respected in geological mapping because of the capacity to divide data bands and produce results that are accurate while taking care of effects of topography, shadows, aspects and solar viewing angles of the sensor and their effects to the data. There is vast array of applications of the band ratio methods in geological application (Pour et al., 2020). The BR were used to enhance spectral difference between bands and as well reduce the effects of topography. They make after division an image that is of high relative intensity. The model for Ninomiya and Fu, (2003) and (2005) were applied to show the spread of the deposits throughout the state. To detect alteration zones of minerals, for exploratory activities, the BR techniques should be applied.

Results and Discussion

The USGS spectra for Pyrophyllite was extracted and superimposed on the spectral bands of Landsat-8/OLI, and indicated on it the convolve of B2, B4, B5, B6 & B7, the selected bands for RGB and BRs Figure 4.
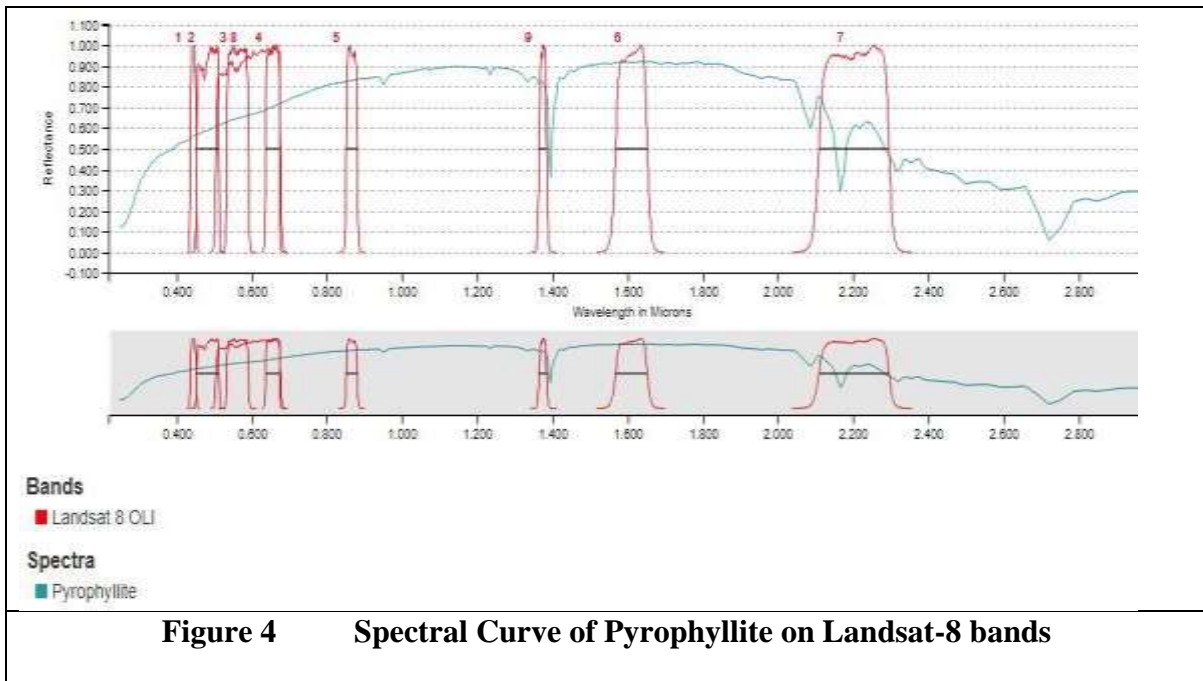
Figure 4   Spectral Curve of Pyrophyllite on Landsat-8 bands

From the spectral reflectance curve of the pyrophyllite mineral on Landsat-8 bands (Figure 4), it is evident that there are two strong regions of absorption (1.400 & 2.00-2.400 um) which are regions of band 6 and band 7 of the sensor data. Therefore, a band ratio with bands 6 and 7 produces a clear definition of the regions of the mineral as shown in Figure 5.
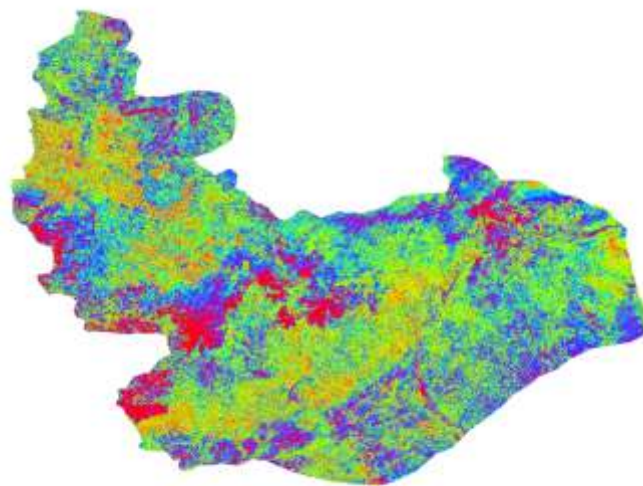

Figure 5 Band Ratio,6/7 showing regions of pyrophyllite in yellowish color throughout the state.

Other associated spectral mineral curves to pyrophyllite all embedded in clay rocks are kaolinite minerals with high absorption at (1.400 µm and 2.200 µm); montmorillonite at (1.400 µm, 1.9 µm and 2.200 µm) respectively. These three spectra are represented incomparison in Figure 6
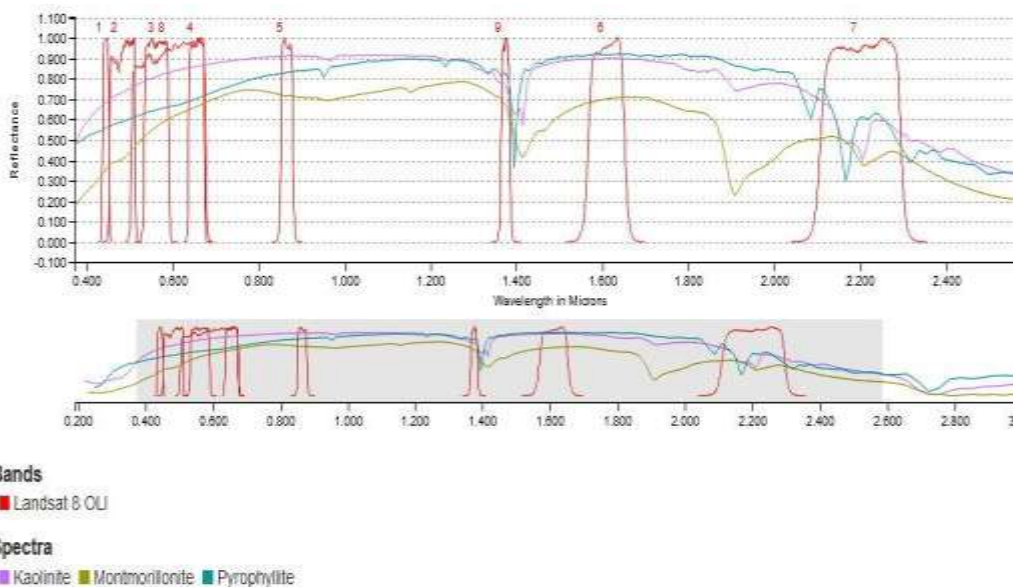
Figure 6 showing three spectral curves of kaolinite, montmorillonite and pyrophyllite

The RGB combination made to show prospective regions of the pyrophyllite is in regions of clay, iron oxides and ferrous minerals (metamorphic rocks), was made and is represented in figure 7. Where the yellowish patches are regions of clay minerals, revealed by BR 6/7, region of red patches are ferrous oxide minerals revealed by BR 6/5 and regions shown in bluish combinations are regions of iron oxide minerals.

Figure 7 Band ratio RGB of 6/7, 6/5, 4/2 to differentiate clays, iron oxides and ferrous iron

Conclusions

Using the remote sensing approach to explore for the pyrophyllite group mineral type, the rock enrichment process is very important. And to discriminate the Pyrophyllite, it was discovered that they are prominent at different wavelength range, but more identified at the SWIR between 2.2 – 2.5 µm. The enrichment regions are where there are Al-rich rocks areas, where SiO4 are identified through vibrational tones strongest at the Thermal infrared (TIR) wavelengths (8.8 – 12µm) while the Mg-rich regions exhibit Fe rich minerals by the actions of electronic transition processes at varying wavelength ranges, the hotspots of the electromagnetic spectrum are 2.29 – 2.31 µm; 2.33 – 2.34 µm and 2.35 – 2.37 µm. All the description fits metamorphic rock environment therefore, to identify the metamorphic rock regions of the Jos Plateau, we needed to find the distribution of Mg-rich rocks, dolomites, limestone basic volcanics and tuff.

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Wardle R, Brindley G W (1972). The crystal structures of pyrophyllite, ITC, and of its dehydroxylate. American Mineralogist 57 732-750.

Kyanite is one of the natural mineral resources in Nigeria, West Africa, it is a blue-green crystalline mineral that contains aluminium silicate and is mostly found in metamorphic rocks, sedimentary rock, or aluminum-rich metamorphic pegmatites. Kyanite is mostly formed during sedimentary rocks metamorphism mainly from the pressure alteration of clay minerals which at the time is very high. It is literally found in specific metamorphosed areas like in gneisses and schists and less often in eclogite or even in quartzite, it is also associated most times with other metamorphic minerals like staurolite, garnet, and corundum.

to extract Kyanite from its relative ore such as quartzite rock which is likely to contain other impurities such as rutile, mica, clays, iron oxides and other minerals, the rock is first mined and then crushed into smaller sizes.

Uses of Kyanite

- Aluminium silicate, used in heat-resistant ceramics.

- It is the basic material used in ceramic and refractory products.

- It is also used in electronics, electrical insulators, and abrasives.

- It is also used in a semiprecious gemstone.

- It is used in porcelain dishware's and plumbing fixtures.

- It's used in the manufacturing of refractory products mortars, bricks.

- Also used in the production of kiln furniture used in high-temperature furnaces.

- It is used in porcelain such as white porcelain insulator on a spark plug, bathroom fixtures, sinks, and dentures.

- It is used in railroad and automotive industries as heat resistance.

- Calcined kyanite like Mullite is used to make clutch facings and brake shoes.

Optimization and statistical modeling of esterification synthesis of ethyl pentanoate using a hybrid composite conjugated *Candida rugosa* lipase

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ABSTRACT

Ethyl pentanoate (EP) is "a promising green fuel" of the future because of its non-hazardous characteristic. This study aimed to optimize the esterification synthesis of EP by the silica/magnetite/graphene oxide matrix conjugated *Candida rugosa* lipase (CRL-SiO_2/Fe_3O_4/GO). The Fourier-transform infrared (FTIR) spectra confirmed the CRLs' presence on the surface of SiO_2/Fe_3O_4/GO. The L_{16} Orthogonal Array design (OAD)-assisted optimization to produce EP afforded an optimal condition that gave the highest ester yield (90.4%) in *n*-heptane, with a 3 mg/mL catalyst concentration, acid/alcohol molar ratio of 1:2, at 40 ℃ incubation temperature, 10% (w/v) desiccant concentration and with stirring at 200 rpm. The enzymatic production of EP was proven by mass-spectrometry (MS) analysis, which gave a molecular ion of m/z 130 ($C_7H_{14}O_2$). The results indicated the CRL-SiO_2/Fe_3O_4/GO's potential to catalytically transform pentanoic acid (PA) and ethanol to EP at high yields.

Keywords: Catalyst; Ethyl pentanoate; Fuel; Esterification synthesis; *Candida rugosa* lipase

INTRODUCTION

The declining fossil fuels supply and the rising global energy demand due to the increasing number of transportation vehicles, together with global warming and greenhouse gas emissions, have compelled both producers and consumers of energy to adopt alternative energy sources [1,2]. The wind, solar, and fuel cells are the only key sources of immediate energy used by various industries. However, their energy intensities are relatively low, thus less suitable for long-term practical applications. In fact, the catalytic

transformation of PA into the second-generation EP fuel is now of great interest [3]. EP has proven characteristics suitable for replacing existing cold flow enhancers in diesel [2]. It can also be used as an oxygenated additive to achieve good lubrication of diesel engine and flash point stability of petrol fuels [2].

Traditional extraction of EP from plants is laborious, time-consuming, and cost-ineffective, resulting in undesirable side products requiring further separation steps [4]. Likewise, the chemical route to synthesize EP involves the use of toxic homogeneous acid catalysts (i.e., sulphuric acid or phosphoric acid), which have implications for health and environments [5]. Moreover, the additional downstream product purification process becomes necessary to prevent corrosion when using EP as fuel. Alternatively, enzyme-based catalysts, especially ones immobilized on hydrophobic support matrices, are biocompatible with many practical processes while being environmentally friendly [6-8].

Among others, a rather long reaction time is required to obtain high EP yields by an esterification reaction [1]. This constraint and the cost implication associated with it has hampered the large-scale synthesis of EP. To solve the said issues, this study propose the immobilization of *Candida rugosa* lipase (CRL) on oil palm leaves (OPL) extracted silica which was coated over magnetite/graphene oxide composite ($SiO_2/Fe_3O_4/GO$). The resultant CRL-$SiO_2/Fe_3O_4/GO$ biocatalyst was used to catalyze the esterification of ethanol and PA in n-heptane as the solvent. Pertinently, this is the first report detailing the biotechnological route for synthesizing EP. In this study, five esterification variables were optimized using the L_{16} OAD matrix. The study hypothesizes that the CRL-$SiO_2/Fe_3O_4/GO$-catalyzed esterification of ethanol and PA will improve the yield of EP at low temperatures and reaction time.

MATERIALS AND METHODS

The biogenic silica (SiO_2) was synthesized from OPL as desiribed by Wong et al. [8], and was coated over the magnetized graphene oxide composite (Fe_3O_4/GO) as reported by Jacob et al. [1]. The $SiO_2/Fe_3O_4/GO$ was modified by 3-aminopropyltriethoxylsilane (APTS) and glutaraldehyde (GL) as described in the literature [4]. The yields of EP estimated by titration were calculated as the percentage (%) of PA converted to EP after a 3 h reaction [1]. The L_{16} OAD-assisted optimization of the EP synthesis was carried out for five variables viz catalyst concentration (CC:1.5-3 mg/ml), acid/alcohol molar ratio (MR:acid/alcohol: 0.5-2), incubation temperature (IT:40-70 ℃), desiccant concentration DC (DC:5-12.5%) and stirring speed (SS:150-300 rpm). FTIR spectra were acquired by Perkin Elmer Frontier Spectrometer (Frontier 100; USA), whereas the GC-MS data were recorded on a gas chromatography instrument (GC-7820A model) coupled with a mass spectrometer detector (MSD-5977E series) (Agilent Technology, USA). The titration was triplicated for accuracy and the data analyzed by a Design Expert 7.1.6 statistical software (Minneapolis, USA).

RESULTS AND DISCUSSION

The catalyst preparation was monitored by FTIR analysis to detect new functional groups before and after support modification and the immobilization of CRL. As seen in

Figure 1B, peaks at 3684-3022 cm^{-1}, 1644 cm^{-1}, 1044 cm^{-1}, 964 cm^{-1}, 798 cm^{-1} and 556 cm^{-1} were ascribed to O–H and N–H bond, C=O, Si–O–Si, Si–OH, Si–O and Fe–O bonds. The characteristic bonds indicate the presence of GO, SiO_2, and Fe_3O_4 on the surface of $SiO_2/Fe_3O_4/GO$ and $GL-A-SiO_2/Fe_3O_4/GO$ (Figure 1B(a, b)). The peaks also signified the existence of APTS and GL in the $GL-A-SiO_2/Fe_3O_4/GO$ support (Figure 1B(b)) [1,4]. Besides, the typical peak for methylene of the C–H bond in $SiO_2/Fe_3O_4/GO$ and $GL-A-SiO_2/Fe_3O_4/GO$ was also detected at 2918 cm^{-1} and 2850 cm^{-1} (Figure 1B(a, b)). Amide I, II and III peaks in CRL are seen at 1648 cm^{-1}, 1480 cm$^{-1,}$ and 1396 cm^{-1}, corresponding to the C=O, C=N, C–N stretching and N–H bending vibrations, respectively [5,6].

The L_{16} OAD model's sufficiency was first assessed by inspecting the residuals. The study expected to see the differences between the experimented and predicted results for the EP production. To analyze the residuals, the normal probability was plotted against the residuals as depicted in Figure 1B. It can be seen that the normal probability plot of residuals formed a straight line with aligning points. Since the plot is essential to show the adequacy of the model, this is considered an acceptable model [7].
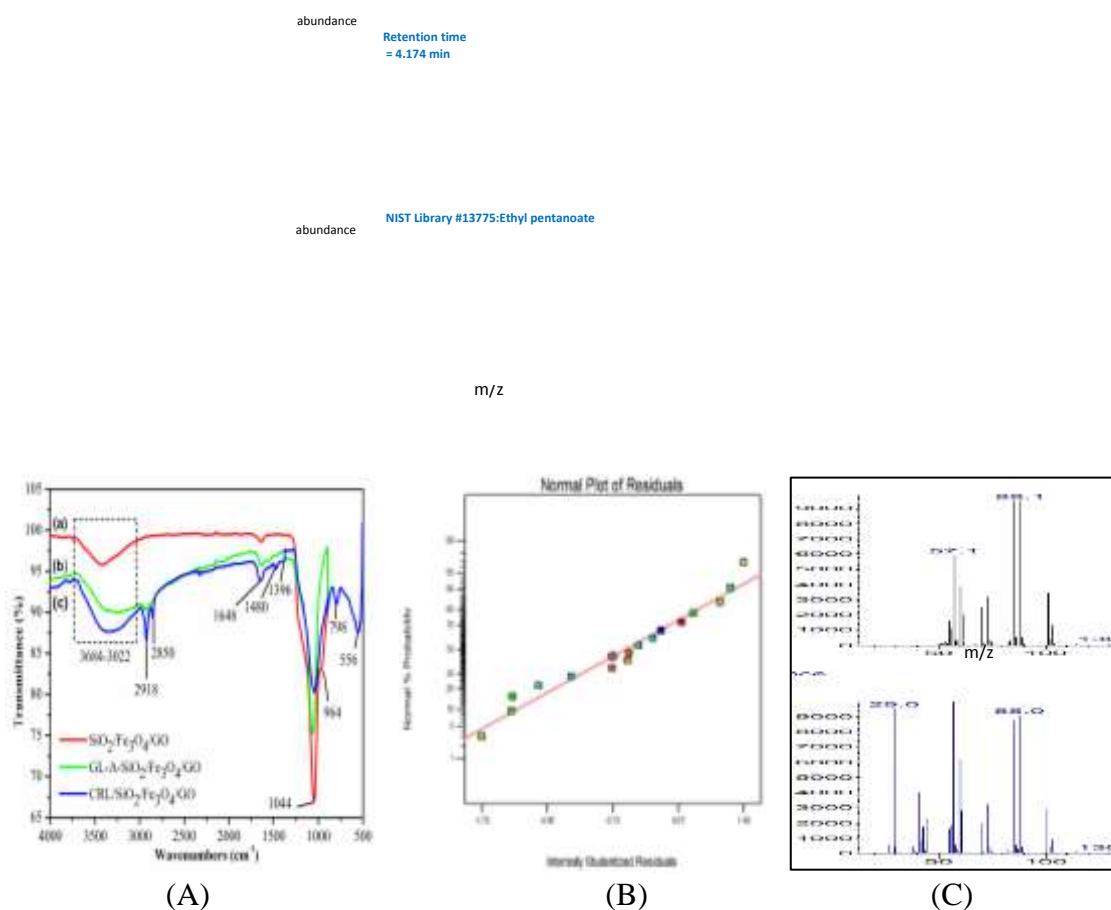

(A) (B) (C)

Figure 1(A). FTIR spectra of (a) $SiO_2/Fe_3O_4/GO$, (b) $GL-A-SiO_2/Fe_3O_4/GO$ and (c) $CRL-SiO_2/Fe_3O_4/GO$ (B) normal probability plot of residuals (C) GC-MS spectra of EP.

Table 1 showed that the linear model was adequate to analyze the experimental data (p-value = 0.0001). As shown in Table 1, all five parameters significantly contributed to EP synthesis (p<0.05). However, the acid/alcohol molar ratio (p<0.05) has the greatest effect based on the highest F-value of 486.92. In contrast, the amount of catalyst used has the least contribution (F-value = 62.85). These results were confirmed by the coefficient values of the tested variables in the mathematical model equation (Equation 1). Table *S1* depicts the experimental and predicted data that gave the highest EV yield at the 90.4% in the L_{16} runs.

Table 1: ANOVA for variables affecting the esterification synthesis of ethyl pentanoate.

Source	SS^a	DF^b	MS^c	F-Value	p-Value
Model	243.38	5	248.68	189.15	$10^{-4}*$
CC	82.62	1	82.62	62.85	$10^{-4}*$
MR	640.15	1	640.15	486.92	$10^{-4}*$
IT	93.96	1	93.96	71.47	$10^{-4}*$
DC	121.28	1	121.28	92.25	$10^{-4}*$
SS	305.37	1	305.37	232.28	$10^{-4}*$
Residual	13.15	10	1.31	–	–
Corrected Total	1256.52	15	–	–	–

a: sum of squares; b: degree of freedom; c: mean square; an asterisk ($*$) denotes a high significance.
CC: catalyst concentration, MR: molar ratio, IT: incubation time, DC: desiccant concentration, SS: stirring speed.

$$EP\ yield\ (\%) = 75.72 + 3.05*CC + 8.49*MR - 3.25*IT + 3.69*DC + 5.86*SS \quad (Equation\ 1).$$

The GC-MS was used to identify the synthesized EV (Figure 1C). Purified EV was affirmed by a single peak at 4.174 min. Aside from the $[M]^+$ peak matching the molecular mass (130 g/mol), the MS spectrum of EV revealed fragment ion peaks for $H_2C=C(OH)OCH_2CH_3^+$, $CH_3CH_2CH_2CH_2C\equiv O^+$, $CH_3CH_2OC=O^+$ and $CH_3CH_2CH_2CH_2^+$ at 88 m/z, 85 m/z, 73 m/z and 57 m/z, respectively. Finally, the EV product was confirmed by comparison with the NIST Library CASE #13775.

CONCLUSION

The study clearly demonstrates the successful application of the L_{16} OAD for optimizing the esterification variables to produce EP at high yields. The optimum EP value (90.4%) was achieved at a low temperature of 40 °C in just 3 h, indicating the high catalytic performance of the CRL-SiO$_2$/Fe$_3$O$_4$/GO. This statistical approach makes it possible to identify the significant reaction variables that profoundly affect EP production. Lastly, the CRL-SiO$_2$/Fe$_3$O$_4$/GO's fabrication was confirmed by FTIR, whereas the GC-MS data proved that the final product was EP. Future studies will examine the kinetics of the CRL-SiO$_2$/Fe$_3$O$_4$/GO-catalyzed synthesis of EP to better understand this catalyst's limitations.

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Fractional Order and Numerical Solution of Examination Misconduct Using Laplace Adomian Decomposition Method

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ABSTRACT

The fractional order model of susceptible students (honest), exposed students (lightly involved in examination misconducts), infected students (highly involved in examination misconducts) and the removed students (quitters) of examination misconduct is considered. The stability analysis of the scheme carried out and non-negative unique solution within the domain was verified. Laplace–Adomian Decomposition Method is applied to calculate an estimated solution of the system of nonlinear fractional differential equations. The solutions of fractional differential equations is obtained in the form of infinite series. The proposed series solution of the model converges swiftly to its precise value. The acquired results are related with the standard case.

Key words: Fractional Order, Numerical Solution, Examination Misconduct, Laplace Adomian Decomposition Method

INTRODUCTION

Education is one of the main channels to the socio-economic growth of every nation. In their view, an examination is one of the assessment tools used to periodically assess and evaluate products of the educational system. Education contributes towards building people's abilities, competencies and job readiness skills appropriate for the job market. This makes examination an essential function in the education system [1]. It's very important for every one of us to acknowledge the significance of proper education. The earlier this is acknowledged, the easier it will help us to live and work in future. Nevertheless, in Nigeria, an undesirable phenomenon can be noticed, which continuously disturbs the educational system in general. And this problem is examination misconduct [2]
Examination misconduct is anything done by an examinee, examiner, administrator, parent

or any other person, that goes against stipulated examination regulations. According to [3] examination misconduct includes: cheating at examinations, stealing of question papers, impersonation, disturbances at examinations, obstruction of supervision, forgery of result slips, breach of duty, conspiracy and aiding, and damaging or hiding other students' materials. In other words, any act of dishonesty, cheating or improper action carried out before, during or after examination against stipulated examination rules and regulations constitutes examination misconduct. The misconduct has become rampant in Nigeria and these continued to lower the standard and good quality of education of the country, the situation has become worrisome considering how the misconduct is affecting the performance of our students both socially and academically

Numerical Results

Table 3. Numerical solution of the proposed model using LADM at $\alpha = 1$

Time (week) t	$S(t)$	$E(t)$	$I(t)$	$R(t)$
0	600	250	100	50
0.2	$1.153579096\,10^6$	$-1.152973658\,10^6$	238.2175682	238.3879814
0.4	$9.504451033\,10^6$	$-9.505272830\,10^6$	1098.043858	1390.817387
0.6	$3.236213636\,10^7$	$-3.236661552\,10^7$	3343.099246	4394.066409
0.8	$7.703555566\,10^7$	$-7.704696972\,10^7$	7637.004111	10134.91324
1.0	$1.508336295\,10^8$	$-1.508563034\,10^8$	14643.37883	19500.13607

Table 3. Numerical solution of the proposed model using DTM at $\alpha = 1$

Time (week) t	$S(t)$	$E(t)$	$I(t)$	$R(t)$
0	600	250	100	50
0.2	$1.153520868\,10^6$	$-1.152999312\,10^6$	238.1847682	238.3799014
0.4	$9.503898118\,10^6$	$-9.505390978\,10^6$	1097.781458	1390.752747
0.6	$3.236017231\,10^7$	$-3.236691629\,10^7$	3342.213646	4393.848249
0.8	$7.703078400\,10^7$	$-7.704756655\,10^7$	7634.904911	10134.39612
1.0	$1.508241737\,10^8$	$-1.508573330\,10^8$	14639.27883	19499.12607

Conclusions

In this paper, a fractional order examination misconduct model is considered. The concern model is investigated for numerical solution by using LADM. The LADM is an effective tool to solve nonlinear models and is widely used in engineering and applied mathematics. Applying Laplace-Adomian Decomposition method to obtain the series solution of fractional the model and comparing of the results of the model at $\alpha = 1$ with classical Differential Transform Method are the main contribution of the work .The solution obtained through this method strongly agrees with DTM as shown in Table 3, 4 and figures 1-8. The effect of fractional parameter on our obtained solutions is presented through graphs.

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Numerical Solution of Fractional Order of Coronary Heart Disease Using Laplace Adomian Decomposition Method

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ABSTRACT

Coronary heart disease develops when the coronary arteries that supply oxygen to the heart muscle become constricted or clogged as a result of fat/cholesterol buildup within the arterial wall. In this paper, mathematical model of coronary heart disease is developed. The model analysis is carried out to establish the stability of the equilibrium points and basic reproduction number. To obtain the model's scheme of fractional differential equations, the Caputo fractional derivative operator of order is used. To find an approximate solution to a system of nonlinear fractional differential equations, the Laplace–Adomian Decomposition Method is used. It was possible to acquire the solution of fractional differential equations in the form of an infinite series. Numerical simulations are presented to show the methods reliability and simplicity.

Keywords: Fractional Order, Coronary Heart Disease, Numerical Solution & Laplace Adomian Decomposition Method

INTRODUCTION

Coronary heart disease (CHD) *equally recognized as Coronary Artery Disease, Coronary Micro vascular Disease, Coronary Syndrome X, Ischemic Heart Disease, Nonobstructive Coronary Artery Disease, and Obstructive Coronary Artery Disease.* It is regularly triggered by the collection of plaque, a waxy substance, inside the lining of larger coronary arteries. This accumulation can partly or wholly block blood flow in the large arteries of the heart. Certain forms of this disorder might be instigated by disease or damage affecting how the arteries work in the heart [1.]

It is the main cause of death universally. At the beginning of the 20th century, it remained an uncommon cause of death. Deaths resulting from CHD was at it peaked in the mid-1960s [2]. And then declined nevertheless, it remains an outstanding universal public health concern. With over seven million losses per annual credited to CHD. It is the foremost reason of death universal, a main source of debility, and a substantial economic liability [3]. Over half a century, numerous main risk factors have been acknowledged, such as smoking,

diabetes, and high levels of blood pressure and low density lipoprotein cholesterol (LDL-C) [4]

The high morbidity and death associated with the infectivity can be avoided, if it's promptly acknowledged and treated. Signs of the disease may be different from person to person even if they have the same type of coronary heart disease. However, because many people have no symptoms, they do not know they have coronary heart disease until they have chest pain, a heart attack, or sudden cardiac arrest [3].

The model formulation

The total human population at time t, denoted by $N(t)$, is sub divided into the sub-populations of susceptible individuals $S(t)$, those exposed to the disease $E(t)$. Individuals infected with the disease $I(t)$ and finally those that recovered from the infectivity $R(t)$. So that

$$N(t) = S(t) + E(t) + I(t) + R(t)$$

The susceptible population $S(t)$ is increased as a result of birth and immigration at a rate Λ and recovery at a rate δ. Susceptible individuals are exposed through risk factors which includes: (a sedentary lifestyle, lack of physical activity, poor diet, being overweight or obese: drinking alcohol, high blood pressure, tobacco use [4] at a rate τ. The exposed class progress to the stage $I(t)$ of the infectivity at a rate β_1. And the classes decreases due to natural death at a rate μ. The recovered class increase as result of recovery after medication from the infected class and decrease as a result of loss of immunity back to the susceptible class. And death due to infectivity at the infected class at a rate μ_0. The above mentioned assumptions and description above give rise to the following

$$
\begin{aligned}
D^{\alpha_1} S(t) &= \Lambda - (\tau E(t) - \mu)S(t) + \delta R \\
D^{\alpha_2} E(t) &= \tau S(t)E(t) - (\beta_1 + \mu)E(t) \\
D^{\alpha_3} I(t) &= \beta_1 E(t) - (\mu + \mu_0 + \alpha + \gamma)I \\
D^{\alpha_4} R(t) &= \gamma I - (\mu + \delta)R(t)
\end{aligned}
\tag{1}
$$

Stability Analysis and Equilibria

Disease-free equilibrium **(DFE)**

The model (3) has a DFE, obtained by setting the right-hand sides of the equations in (3) to zero, given by

$$
\begin{cases}
D^{\alpha_1} S(t) = 0 \\
D^{\alpha_2} E(t) = 0 \\
D^{\alpha_3} I(t) = 0 \\
D^{\alpha_4} R(t) = 0
\end{cases}
\tag{5}
$$

$$E_0 = \left(S^*, E^*, I^*, R^*\right) = \left(\frac{\Lambda}{\mu}, 0, 0, 0\right)$$

(6)

Theorem 1 The DFE of E_0 is asymptotically stable (LAS) if $R_0 < 1$, and unstable if $R_0 > 1$.

Reproductive number: The threshold result of this equilibrium is:

$$F = \begin{vmatrix} \tau \dfrac{\Lambda}{\mu} & 0 \\ 0 & 0 \end{vmatrix}, \quad V := \begin{vmatrix} (\beta + \mu) & 0 \\ -\beta & (\mu + \mu_0 + \alpha + \gamma) \end{vmatrix}$$

The threshold epidemiological of those involved in examination misconduct, denoted by $R_0 = \rho(FV^{-1})$, where ρ denotes the spectral radius, is given by

$$\mathfrak{R}_0 = \frac{\tau\Lambda}{\mu(\beta + \mu)}$$

(7)

CONCLUSION

In this paper, a fractional order model for Coronary Heart disease model is model. The concern model is explored for numerical solution by using LADM. The LADM is an effective gismo to solve nonlinear models and is extensively employed in engineering and applied mathematics. Applying Laplace-Adomian Decomposition method to obtain the series solution of fractional model and comparing of the results of the model at $\alpha = 1$ with classical Differential Transform Method is one the main contribution of the work and the extension of the existing models to include both the exposed class and the recovered. The solution obtained through this method strongly agrees with DTM as shown. The effect of fractional parameter on our obtained solutions is presented through graphs.

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Review of the impact of landfill leachate formation, toxicity evaluation, and treatment methods used in some of Nigeria's most populous cities

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ABSTRACT

Sanitary landfilling is the most common approach of reducing municipal solid waste; nonetheless, it produces highly toxic leachates that are harmful to human health. These leachates must be properly handled before being discharged into the environment. The seepage of landfill leachate into groundwater tables and aquifer systems significantly creates a possible danger and threat to human health and environment at large and remains a subject of concern in northern part of Nigeria. This review paper summarises the most recent findings on leachate formation, treatment strategies, and evaluation of leachate toxicity on waterbodies. A lack of base waterproofing and leachate treatment in regulated landfills across several cities in Nigeria leads in localised pollution, decreasing the quality of surface and groundwater. The biological approach (anaerobic and aerobic) is the most often used type of leachate treatment across the major cities in the country, mostly in higher institutions except for few areas like private organisation where advanced treatment methods, including membrane filtration, trickling filters, and Sequencing-Batch Reactors (SBR) are used. The regulatory agencies are poorly motivated by both government and public. This is because of poor funding, lack of adequate facilities, lack of awareness, low literacy level and politics.

Keywords: Landfill leachate, Treatment methods, Environmental assessment, and evaluation,

1.1 INTRODUCTION
Solid waste management is a critical environmental challenge in most Nigerian cities; where and how to dispose of these wastes have become a major worry in the country (Aluko et al. 2013), particularly in metropolitan areas, where people frequently dispose of waste in bodies of water. Globally, most MSW are dumped in landfills (Costa et al. 2019). This is a low-cost waste disposal option available in most communities (Awodele et al., 2016), but it pollutes the environment heavily. It is a prevalent practise in poor countries like Nigeria

(Amasuomo et al. 2016), and it accounts for over 50% of MSW for both rich and low-income countries, except for a few European countries. Whenever moisture and landfill waste mix, landfill leachates are formed (Chinade et al., 2017). If these leachates from dump sites are not adequately managed, they may have an adverse effect on the ecosystem. In Nigeria, the composition of landfill leachate varies according to geography (from south to north), city (states and local governments), and several other variables. This may be a consequence of rainfall, temperature fluctuations, low literacy, inadequate sanitation, and the poverty rate index.

Landfill leachate is a kind of wastewater with complex constituents and a high cytotoxicity that is generated when municipal solid waste is disposed of in landfills (Quan et al. 2020). Moisture above the field potential of landfilled solid waste initiates a series of physical and microbiological processes that convert contaminants to liquid, culminating in the formation of leachate (El-Fadel et al. 2013). Several complex factors should be considered when analysing landfill leachate, including solid waste composition, age of the waste, landfill operation, hydrogeological conditions in the vicinity of the landfill site, rate of water movement through the waste, landfill temperature, moisture content, pH, landfill chemical and biological activities, and seasonal weather variations. The most often utilised methods are divided into two categories: conventional and modern methods. Physical, chemical, and biological treatment methods are examples of conventional technologies. Three integration groups of physico-chemical, multibiological, and physico-chemical–biological processes are presented to modern methods (Pantelis et al. 2010). Although achieving satisfactory quality with a single method is challenging, a mix of physical, chemical, and biological processes is employed to efficiently treat landfill leachate. The purpose of this review article is to aid reading and allow for a better understanding of leachate development in Nigeria. The composition and formation of landfill leachate, with a focus on Nigerian cities, the leachate treatment technologies used in Nigeria and around the world, as well as prior studies conducted in Nigeria on landfill leachate treatment.

2.1 The characteristics landfill leachate in Nigeria

Several variables influence the characteristics of landfill leachate; humidity, temperature, pH, oxygen level, microbial activity, soil inflow, surface water flow, strength and conditioning particulate matter movement, regional precipitation patterns, landfill design and operation (size, depth, and lining system), topography, chemical equilibrium solubility, hydro-geologic variation, and local rain are all factors to consider when determining leachate characteristics (Kjeldsen et al. 2002). These Variables in leachate characteristics quantity, and quality can all be affected by landfill design and operation. (Kulikowska et al., 2008). Landfill leachate can be classified as acetogenic or methanogenic based on the regional variability of leachate characteristics during waste biodegradation (Ziyang et al, 2009). Acetogenic leachate has the highest chemical oxygen demand (COD), biological oxygen demand (BOD), and BOD:COD ratio due to the presence of organic pollutants (Robinson, 2007). The composition of leachate may change significantly between the aerobic, acetogenic, methanogenic, and stabilising stages of waste processing (Renou et al. 2008). Based on landfill age, three types of leachates have been identified: young, intermediate, and mature leachates (table 1).

Table 1: Relationship between age of the landfill and leachate physicochemical composition (Foo et al., 2009; Ziyang et al, 2009).

		Land fill leachate characteristics			
		Acetogenic leachate	Methanogenic leachate		
S/N	Parameters (mgL⁻1)	Young age (years) Less than 5	Middle age (years) 5-10	Mature age (years) (Greater than 10)	FEPA standard 1991
1	pH	Less than 6.5	6.5-7.5	Greater than 7.5	6 - 9
2	COD	Greater than 10000	4000-10000	Less than 4000	-
3	BOD	0.5-1.0	0.1-0.5	Less than 0.1	30
4	NH_3-N	Less than 0.4	NA	Greater than 4000	-
5	TOC/COD	Less than 0.3	0.3-0.5	Greater than 0.5	-
6	Heavy metals	Low-medium	low	low	Less than 1
7	Total Kjeldahl nitrogen	1500–4500	400–800	75–300	-
8	P	100–300	10–100	-	-
9	biodegradability	High	medium	low	low
10	Alkalinity	8000–18,000	4500–6000	-	-
11	Conductivity (µs.cm)	15,000–41,500	6,000–14,000	-	-
12	so_4^{2+}	500–2000	200–1000	50–200	-
13	Ca^{2+}	10–250	6200	5500	200
14	Mg^{2+}	40–1150	-	-	200
15	Fe^{2+}	500–1500	500–1000	100–500	10
16	Zn^+	100–200	50–100	10–50	<1
17	Cl^-	1000–3000	500–2000	100–500	-
18	Total dissolved solids (TDS)	10,000–25,000	5000–10,000	2000–5000	2000
19	Total coliform	-	-	-	400

*Unit in mg.L-1 not applicable to pH parameter. P-Prosperous; SO4-Sulphate (-) Not measured.

Ojoawo et al. (2012) conducted research on the characteristics of leachate in Nigeria considering major dumpsites in extreme southern part of the country and discovered that all the variables tested were significantly above or below the FEPA threshold limits as described in table 1. This may be linked to the poor waste disposal practise in the country and the characteristics observed were that of methanogenic stage of biochemical degradation of the waste materials. Furthermore, Ali et al. (2013) observed that alkaline pH was widespread throughout the methanogenic fermentation stage in all major dumpsites in some of the locations in the northern region. significant amounts of ash and slag from the

combustion of wood and agricultural residues in all sites increased the alkalinity of that area (Ali et al. 2013). Although pH alone may not be harmful to the environment, it may highlight potentially dangerous interactions between other chemical components in the solution.

2.2 Most popular practice methods for treating landfill leachate

There are now various landfill leachate treatment techniques available, all of which strive to satisfy the standard and comply with regulatory standards. Biological (activated sludge, aerobic and anaerobic stabilisation lagoons, and biological filters); physico-chemical (floatation, coagulation/flocculation, adsorption, chemical precipitation, air stripping, pH adjustment, chemical oxidation, ion exchange, and electrochemical treatment); and membrane filtration processes (microfiltration, ultrafiltration, and electrochemical treatment) (Raghab et al., 2013: Logan, 2012), as illustrated in table 2. The proposed treatment sequence, which included artificial wetlands, alum, and a trickling filter, produced effluent with decreased colour (97%) and metals (except nickel) (29% reduction from the influent values). Biological treatment reactors produced good reductions in suspended solids, with at least an 82.6% reduction in Trickling Filter in BOD, with an 84.2% reduction in SBR (Aluko et al. 2013). This is to stress that the biological (aerobic or anaerobic) process is the most common and oldest method of treating landfill leachate in Nigeria because it is simple to operate, low in cost, and requires less manpower. Despite its large land area, it is not environmentally friendly because it may pollute the air, contaminate groundwater, and pose a serious threat to the ecological system.

Table 2. Treatment performance of leachate regarding the age of the leachate (Deduced from Qasin and Chiang, 1994; Abbas et al., 2009; Costa et al. 2019).

Leachate Treatment	Landfill Leachate age (years)		
Methods	Young (Less than 5)	Medium (5–10)	Old (Greater than 10)
Combined treatment with domestic wastewater	Good	Average	Poor
Recycling	Good	Average	Poor
Aerobic process (suspended growth)	Good	Average	Poor
Aerobic process (fixed film)	Good	Average	Poor
Anaerobic process (suspended growth)	Good	Average	Poor
Anaerobic process (fixed film)	Good	Average	Poor
Natural evaporation	Good	Good	Good
Coagulation/flocculation	Poor	Average	Average
Chemical precipitation	Poor	Average	Poor
Carbon adsorption	Poor	Average	Good
Oxidation	Poor	Average	Average
Air stripping	Poor	Average	Average
Ion exchange	Good	Good	Good
Microfiltration	Poor	-	-
Ultrafiltration	Poor	-	-

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Nanofiltration	Good	Good	Good
Reverse Osmosis	Good	Good	Good
Microbial fuel cell	Good	Good	Good

Table 2: shows the various landfill leachate treatment methods and their toxin removal performance evaluations, as well as a treatment effectiveness evaluation based on MSW age. Biological activities are extremely efficient in cleaning up leachates from new landfills, as seen in Table 2 (less than 5 years). Biological treatment is used when there is a high concentration of easily biodegradable material in the leachate because it is simple and cost-effective (Bulc and Justin, 2007). This method is inappropriate for older landfills in the methanogenic phase (> 10 years) when the leachate includes difficult-to-decompose compounds such humic and fulvic acids and the BOD_5/COD ratio is less than 0.1 (Christensen et al. 2006). To satisfy current environmental standards, there has been an increase in the search for efficient techniques for treating existing landfills (Kurniawan et al. 2001). According to Ahmed and Lan (2012); COD, BOD, ammonia, and micro contaminants may be successfully removed from mature landfill leachate using a membrane treatment combined with biological treatment in a membrane bioreactor (MBR). Microbial fuel cells can collect large amounts of COD, BOD, and ammonia nitrogen from mature landfills (Mojiri, et al. 2016b). The microbial fuel cell has the potential to remediate harmful substances as well as generate electricity. Although concentrations beyond specific thresholds have an impact on the system electrochemical function (Haslina et al., 2021). Despite this, due to high installation and maintenance costs, some nations are unable to afford the costliest leachate treatment techniques (Vital et al., 2014). In Nigeria, the leachate treatment techniques utilised in both urban and rural landfills are vastly different. However, there is no defined procedure in Nigeria for dealing with landfill leachate. This aggregates to the outbreak of many diseases because of poor sanitation as reported by Unicef (2021).

2.3 The current practice of landfill leachate treatment in Nigeria
The most frequent and economically practical method of treating landfill leachate in Nigeria is a biological process, which has a high effectiveness in removing biodegradable organic matter (Aluko et al., 2013). The stabilisation pond (anaerobic and aerobic) is an example of this method of treatment, which is popular in both urban and rural areas (Trankler et al. 2005).
It should be noted that biological treatment is widely used in Nigeria for sewage treatment particularly in remote areas where adequate drainages and sewerage system are well planned. As a result of recent advancements, landfill leachates were a way of replicating a model that had been in place for decades in sewage treatment plants in some of the Nigerian cities. Despite the use of biological processes to treat leachate in Nigeria, other treatment methods such as membrane filtration, activated carbon processes, artificial wetlands, bioremediation, and various types of bioreactors are used in some of the country major cities to treat leachate effluent, even though biological is not recommended for low biodegradability materials (Christensen et al., 2001). In general, landfill leachate treatment is not properly handled seriously in Nigeria until recently, when floods and severe health risks affected many towns, resulting in the emergence of epidemic illnesses that ultimately resulted in fatalities.

2.4 Contemporary challenges resulted in the formation of landfill leachate in Nigeria
Nigeria is a developing country with scarce resources that are often mishandled (Amasuomo et al. 2016). Most of the trash is visible in slums, urban regions, and shanty communities

near human settlements. As the country's population continues to expand, the government's drive for industrialization, and internal migration also contribute to an increase in waste production.

The rise of unplanned settlements, transportation congestion, ignorance, instability, insufficient policy implementation, and the inability to enforce environmental laws or order are all contributing to Nigeria's waste management challenges (Ikpeze et al. 2015).

The surge of migrants looking for better pastures hasboosturban population and trash outp ut, resulting in a leachate plume (Aduojo et al. 2020). Insecurity in Nigeria contributes to current waste management challenges because many people have been relocated from rural areas, notably in the northern part of the country where security has deteriorated. As a result, people move from one place to another. The challenges are worsened by a lack of infrastructure and management attention. They dumped their wastes in the vicinity, resulting to high contamination of ground water by leachate plumes, poisoning their shallow wells. Ineffective waste management by individuals, such as households, high cost of waste disposal, a lack of awareness of multiple aspects affecting waste management at various stages, inadequate waste management infrastructure and expertise, rapidly rising economic growth, and the need for interrelationships between private and government to improve the functionality of the existing waste management systems are all factors contributing to landfill leachate development.

3.1 Conclusions

According to the review paper, waste management in many regions of Nigeria is subpar, intertwined with various challenges at every level of the management process and producing little benefits. It is possible to conclude that dumpsites are the source of groundwater contamination. Improper landfilling systems in Nigeria has resulted in poor hygiene, lack of access to clean water and sanitation by the municipality. It has been determined that most landfills in Nigeria release their leachate in violation of the standards. This resulted in many water-borne infections, particularly in the country northern region, where literacy level is low. To remediate highly contaminated leachates, a variety of sustainable methodologies and technologies have been developed and tested. The best treatment technology for landfill leachate is mostly determined by the leachate characteristic. The most widely used treatment technology of poor nations is biological method which is low in operational cost. Combining several optimal landfill leachate treatment techniques may improve the rate of pollutant removal from leachate-formed biowaste. This would assist Nigeria meet its national water quality criteria for assessing river water quality. Population expansion and modernization both contribute to a significant amount of municipal solid garbage and rubbish generation. As a result, the quantity of pollutant level of waste disposal leachate has significantly increased, and more attention must be placed on leachate treatment via different integration method. The government should ramp up public awareness campaigns targeted at persuading people to sort their waste at the source before disposal.

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PERCEPTION OF PHYSICS TEACHERS'CONTINUOUS PROFESSIONAL CAREER DEVELOPMENT AND CURRICULUM IMPLEMENTATION PRACTICES IN JOS NORTH SENATORIAL ZONE OF PLATEUA STATE

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ABSTRACT

The study investigated the "Perception of Physics Teachers' Continuous Professional Career Development and Curriculum Implementation in JOS NORTH Senatorial Zone of Plateau State" Survey research design was employed for the study. A total of 70 Physics teachers from Jos North Senatorial Zone of Plateau State made up the sample size of the study. Researcher designed questionnaire which was validated by experts in field of Physics and staff development was used for data collection. Pilot test of the instrument was conducted and reliability of 0.73 was obtained using Crombach Alpha. Two research questions guided the study. Questionnaires were administered to the sampled Physics teachers using research assistants and were immediately collected after they responded to it. The study revealed that teachers' qualification and teaching experience plays significant role on the implementation of Physics curriculum as perceived by Physics teachers in Jos North Senatorial Zone of Plateau State. On the basis of these findings, recommendations were made that Government should employ only the qualified Physics teachers to teach at secondary levels of educations. Government should also provide training and retraining opportunities periodically through seminars, conferences or workshops for all teachers at secondary schools level. This will improve teachers' Continuous Professional Career Development. Non-Governmental Organizations and other stakeholders should be encouraged to contribute in providing Continuous Professional Career Development programmes to teachers. This will help motivate the teachers hence, resulting to effective implementation of their respective curriculum. For further research, the area of school supervision should be looked into so as to ensure that the area addressed by this research is checked.

Key words: Career Development, Curriculum, Jos North ,Perception and Teachers

INTRODUCTION

The aim of this paper is to determine the Perceptions of Physics Teachers' Continuous Professional Career Development and Curriculum Implementation Practices in Jos North Senatorial Zone of Plateau State. Specifically, the scope of the paper includes the following 1.Determine the Perception of Continuous Professional Career Development and teachers' qualification on the Implementation of Physics Curriculum and Examine the perception of Continuous Professional Career Development on teaching experience and Implementation of Physics Curriculum among Physics Teachers in Jos North Senatorial Zone of Plateau State, The design used for the study is Descriptive Survey Research Design. The population for the study comprised of seventy (70) physics teachers (50 males and 20 females) from all the senior secondary schools in Jos North Senatorial Zone of Plateau State. All the seventy (70) physics teachers were used as sample size for the study .Questionnaire designed by the researcher was used for the study and named"Questionnaire on Perception of Physics Teachers' of Continuous Professional Career Development (QUPOCOPCAD). The questionnaire (QUPOCOPCAD) was validated by two experts It was thereafter pilot tested and reliability coefficient of 0.73 was obtained.

Questionnaires were distributed to the physics teachers of the schools through the research assistants. Face to face method was used. The research assistants waited and collect the filled questionnaires from the teachers on the same day. The data collected using the QUPOCOPCAD were analyzed using Mean (x) and Standard Deviation (SD). The study revealed that teachers' qualification and teaching experience plays significant role on the implementation of Physics curriculum as perceived by Physics teachers in Jos North Senatorial Zone of Plateau State.

MAIN RESULTS:The two tables can be seen in the main text on page 10-11

Table 1: Mean and Standard Deviation on the Perception of Continuous Professional Career Development on Teachers' Qualification and Implementation of Physics Curriculum in Jos North Senatorial Zone of Plateau State

S/N	Items	Mean	SD	Decision
1	Physics teachers' academic qualification brings about effective implement Physics Curriculum	4.58	1.02	Agree
2	Physics teachers' academic qualification makes his/her preparation and presentation in the classroom easier while implementing Physics Curriculum	4.55	1.01	Agree
3	Physics teachers' academic qualification simplifies his/her method of teaching Physics	3.68	0.16	Agree
4	Physics teachers' academic qualification makes his/her classroom management easier while implementing Physics Curriculum	4.58	1.02	Agree
5	Physics teachers' academic qualification affords him/her easy ways to assess and evaluate his/her students while implementing Physics Curriculum	4.97	1.04	Agree

	Grand Mean Total	**4.47**	**1.05**	**Agree**

Table 2: Mean and Standard Deviation on the perception of Continuous Professional Career Development on Teachers' Teaching Experience and the Implementation of Physics Curriculum in Jos North Senatorial Zone of Plateau State

S/N	Items	Mean	SD	Decision
6	Physics teachers' teaching experience is necessary for his/her ability to implement Physics Curriculum effectively	4.89	0.89	Agree
7	Physics teachers' teaching experience promotes his/her ability to prepare and presents lesson effectively in the classroom while implementing Physics Curriculum	4.13	0.63	Agree
8	Physics teachers' teaching experience influences his/her method of teaching Physics	4.64	0.84	Agree
9	Physics teachers' teaching experience influences his/her classroom management skill while implementing Physics Curriculum	3.83	0.13	Agree
10	Physics teachers' teaching experience promotes his/her easy ways of evaluating his/her students while implementing Physics Curriculum	4.51	0.81	Agree
	TOTAL	**4.40**	**0.66**	**Agree**

CONCLUSION

Conclusions were drawn from the research as, Teachers' qualification plays a significant role on the implementation of Physics curriculum and also Teachers' teaching experience has a significant influence on the implementation of Physics curriculum in Jos North Senatorial Zone of Plateau State. The researchers therefore recommend that only qualified teachers should be employed to teach in secondary school level of education in Nigeria and Teachers' teaching experience should be the basis for allocating teachers to teach a particular class or subject at every level of educational system in Nigeria. For further research, the area of school supervision should be looked into so as to ensure that the area addressed by this research is checked.
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GREEN SUPPLY CHAIN MANAGEMENT AND PERFORMANCE OF LISTED OIL AND GAS FIRMS IN NIGERIA: A MODERATING ROLE OF INTERNET OF THING.

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ABSTRACT.
Integration of Internet of Things (IoT) into an eco-innovation system in Green Supply Chain Management Practices (GSCM) and Firms Performance (OP) is an important and desired direction with sufficient and necessary potentials to improve supply chain especially in the oil and gas industry. Conversely, the complexity nature of oil and gas supply is capable of influencing oil and gas prices and ecosystem, owing to low environmental standards in the petroleum downstream sector (PDS) in Nigeria. Previous researches displayed a limited role played by GSCM practices on the OP. Therefore, this study investigates the moderating role of IoT on the relationship between GSCM practices and OP in Nigeria's PDS. A quantitative research approach was employed using a cross-sectional survey design. The participants were 365 which is a representative sample of senior staff from 7 companies operating in PDS selected using a stratified random sampling technique. The instrument of data collection was a developed and validated questionnaire designed to elicit responses on a 5-point scale. The data collected were analyzed using SmartPLS 3 by conducting the Partial Least Square Structural Equation Modelling (PLS-SEM) analyses. The results revealed that, GSCM practices has a significant relationship with OP ($\beta=0.91$, t=5.07; $p < 0.05$). Similarly, IoT has a significant moderating effect on the relationship between GSCM Practice and OP ($\beta=-0.051$, t= 2.44; $p < 0.05$).
Key words: internet of things, industry 4.0, organization performance, green supply chain management

1. The study examines the Effect of Green Supply Chain Management on the performance of listed Oil and Gas firms in Nigeria. Specifically, the study intends to;
i. Investigate the impact of Green Supply Chain Management practices on the performance of listed Oil and Gas firms in Nigeria.

ii. Investigate the impact of the Internet of Things (IoT) as a Moderator on the performance of listed Oil and Gas firms in Nigeria. In line with the above objectives, the following hypotheses were generated and tested at 0.05 level of significance in this study.

HO1: There is a significant relationship between GSCM practices on the performance of listed Oil and Gas firms in Nigeria.

HO2: Internet of Thing moderate the relationship between GSCM practice on the performance of listed Oil and Gas firms in Nigeria.

2.   Review of related studies Over the years, the office setting has changed dramatically, the workplace set up is probably one the environments most affected by technological advancements (Abbott et al., 2018; Hermann et al., 2016; Schallock et al., 2018). However, the office's equipment and tools are getting smarter by days, as time goes the workplace experiencing a major transformation into what is now being referred to a smart office (Sanders et al., 2016).

3.   Methodology and Models This study employed a quantitative research approach with a planned data collection and analysis using a cross-sectional survey design to assess the relationships between GSCM practice and Firms Performance in this study. The study also evaluates the moderating role of Internet of Things in the relationship between GSCM and Firms Performance. In a cross-section survey design, the researcher measures the outcome and the exposures in a survey participant at the same time (Levin, 2006; Setia, 2016). The study been a cross-sectional survey research was carried out using 365 staff of the seven (7) established subsidiaries of Nigerian National Petroleum Corporation (NNPC) operating in the Petroleum Downstream Sector (PDS) in Nigeria.

Table 1 Study's Participants

	Firms level	Population	Sample
1	NIDAS Marine Ltd	03	01
2	NIKORMA Transport Ltd	03	01
3	Pipelines and Product Marketing Company	04	02
4	Warri Refining and Petrochemical Company Ltd	15	07
5	Kaduna Refining and Petrochemical Company Ltd	15	07
6	Port Harcourt Refining Company Ltd	15	07
7	NNPC Retail Ltd	774	340
	Total	829	365

Table 2: Moderation effect of IoT (GSCM -> OP) Path

Path	Beta (β)	T-Values	P-Values
IoT -> OP	-0.025	0.936	0.350
GSCM -> OP	0.924	42.176	0.000

Moderating Effect 1 -> OP	-0.051	2.499	0.013

Assessment of Structural Model and results discussion

As presented in Figure 2 and Table 5, Internet of Things has a significant moderating effect on the relationship between GSCM Practice and Firms Performance in Nigeria's Petroleum Downstream Sector (β=-0.051, t= 2.438; p < 0.05). Similarly, this moderating effect means that with the highest level of Internet of Things application, the relationship between GSCM practice and Organizational Performance will be affected. Thus, this finding supports the hypothesis, which says that Internet of Things significantly moderates the relationship between GSCM practice practices and Organizational Performance. As depicted in figure 1 below.
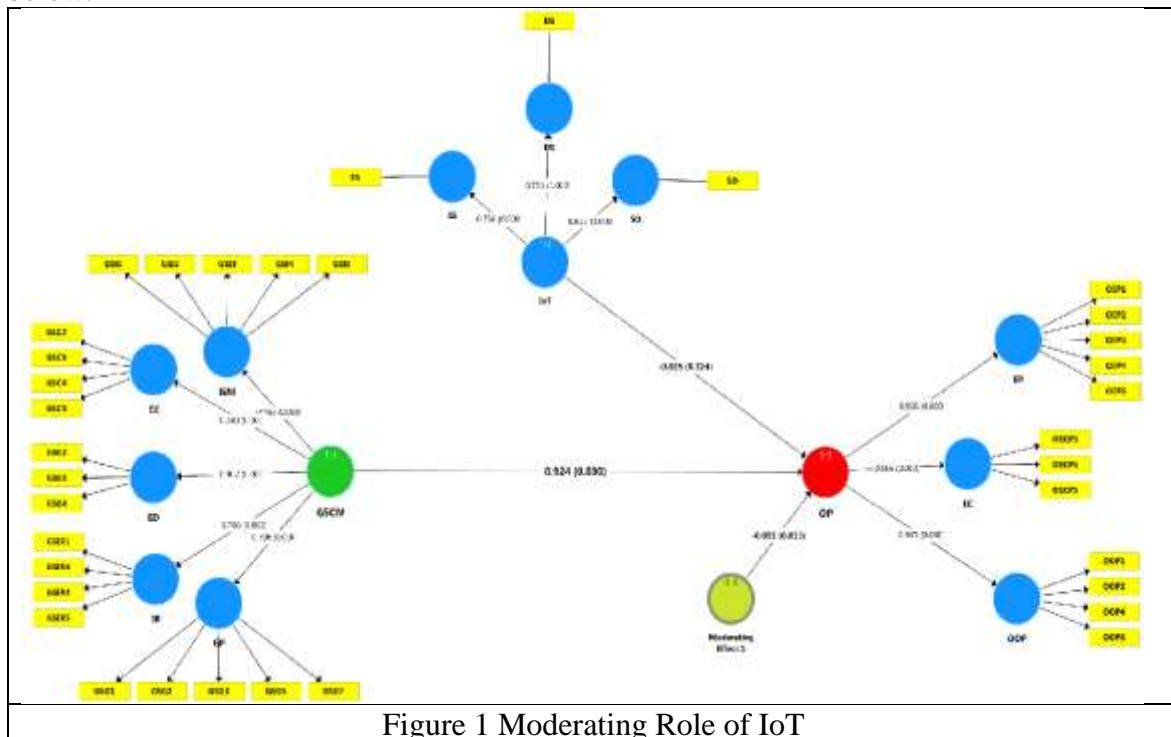

Figure 1 Moderating Role of IoT

4. Discussion of Finding

Finding on the moderating role of IoT on the relationship between Green Supply Chain Management practice and Firms Performance in Nigeria's Petroleum Downstream Sector, based on the structural model of the PLS-SEM, showed that, IoT have significant moderating effect on the relationship between Green Supply Chain Management practice and Firms Performance in Nigeria's Petroleum Downstream Sector. This finding means that, although relationship exist between Green Supply Chain Management practice and Firms Performance in Nigeria's Petroleum Downstream Sector, application of IoT help in strengthening the relationship between the two established constructs in the present study. Thus, implementation of IoT in Nigeria's Petroleum Downstream Sector helps to improve Firms Performance which implied that, improved ECP, EP and OPP can be facilitated by

application of IoT in the sector.

Implications, Conclusion and Recommendations

The finding of this study significantly fills the gap in the literature on the lack of GSCM practice with advanced technology in PDS of the economy. Nevertheless, given that integration of Internet of Things into GSCM practice framework is relatively new and promising domain in several sectors especially PDS, the integrated Internet of Things application/GSCM framework proposed in this study needs to be further strengthened through refinement and validation across different economy. This study established that, integration of IoT component with the GSCM practice in an eco-innovation system, that can ensure, ECP, OPP, and EP. Thus, the study contributes in helping practitioners, stakeholders and governments to address issues related to huge adoption of those environmental and technological aspects, as well as supporting the anticipated positive impacts through policies and green initiatives. The issue linked to effective role of Internet of Things application and PDS activities, furthermore, this research synthesizing some Industry 4.0 applications (Internet of Things) and Green practices, in an attempt to provides new way for the implementation of Industry 4.0 application sand proper utilization of innovative way for the firms Performance.

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Trends in Industry 4.0 Research: A Bibliometric Analysis of Publications in Internet of Thing Component.

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ABSTRACT
This research was carried out to provide a comprehensive bibliometric analysis of published research on Internet of Thing (IoT) in order to appreciate the trends and compare the publications contributions among different countries, institutions, authors, subject areas and other knowledge domains. The publications on the IoT were retrieved from Scopus database covering a period of 2009 -2018. A total of 9,367 articles were identified after different search steps. The analyses were conducted using bibliometric procedure. The largest number of publications were recorded in 2018 (3,712). The results further revealed that, China contributed the highest proportion of 3018(32.2%) publications, the USA was ranked second with total publications of 1348 (14.4%). The most productive journals of publications were IEEE Access and IEEE Internet of Things Journal with 465 publications each with total citation of 103,978. Similarly, the most productive authors were Yang, Laurence with 29 (h-Index 14), followed by Sangaiah, with 27 (h-Index) while Rodrigues is the least with 20 (h-Index). The top two authors have cumulative citations of 1,331. The bibliometric analysis of subject area revealed that, Computer Science with 2,987 (32%) followed by Engineering with 2597 (27.7%). However, among the top areas of research in IoT, business, management and accounting is ninth with a contribution of 188 (2%) publications only from 2009 to 2018. Additionally, affiliations, keywords, language, funding agencies information were clearly reported. Finally, this study provides an important inside for researchers in all the field of learning and serve as motivation for engagement in research activities as well as collaborations among scientist for meaningful research output.

Key words: Keywords: Internet of Thing, industry 4.0, smart factory, smart office..

1. The Internet of Things (IoT) is an emerging term that combines different technologies and approaches, based on the connection between physical things and the Internet (Hermann et al., 2016). According to (Schallock et al., 2018). IoT is the connection through the Internet of physical world objects, which are equipped with sensors, actuators and communication technologies. IoT can have multiple application domains, such as manufacturing, health, transport, and energy, facilitating the development of new applications and improving existing uses. The Internet of Thing (IoT) is a developing term, which combines different devices of technology and methods for connecting between the Internet and physical devices (Hermann et al., 2016). IoT is defined as an integrated connected system where devices communicate through a broad network such as the internet (Sanders et al., 2016). In a manufacturing environment, this enables production lines and machinery to communicate and share information in real-time, creating a more collaborative and effective system (Levin, 2006) Cloud systems or cloud computing enable firms to store big amounts of data that can be accessed from anywhere (Setia, 2016).

2. Objective of the Study

The main purpose of the present study is to conduct a bibliometric analysis of published researches on Internet of Thing research and specifically to meet the following objectives (a) Investigate the growth pattern and distribution of Internet of Thing research literature from 2009 to 2018 (b) Identify the features of core authors and journals that contain substantial proportion of Internet of Thing research and (c) Identify the key research domain including country, area of application, funding agencies, affiliation, language and keywords of Internet of Thing research domain10 years (2009-2018), the subject areas of applications, authors productivity, journal productivity as well as citations with the Citescore and impact factor, keywords occurrences was also investigated with affiliation and funding. The detail study framework is presented in Figure 1.

Figure 1: Research framework of the current study
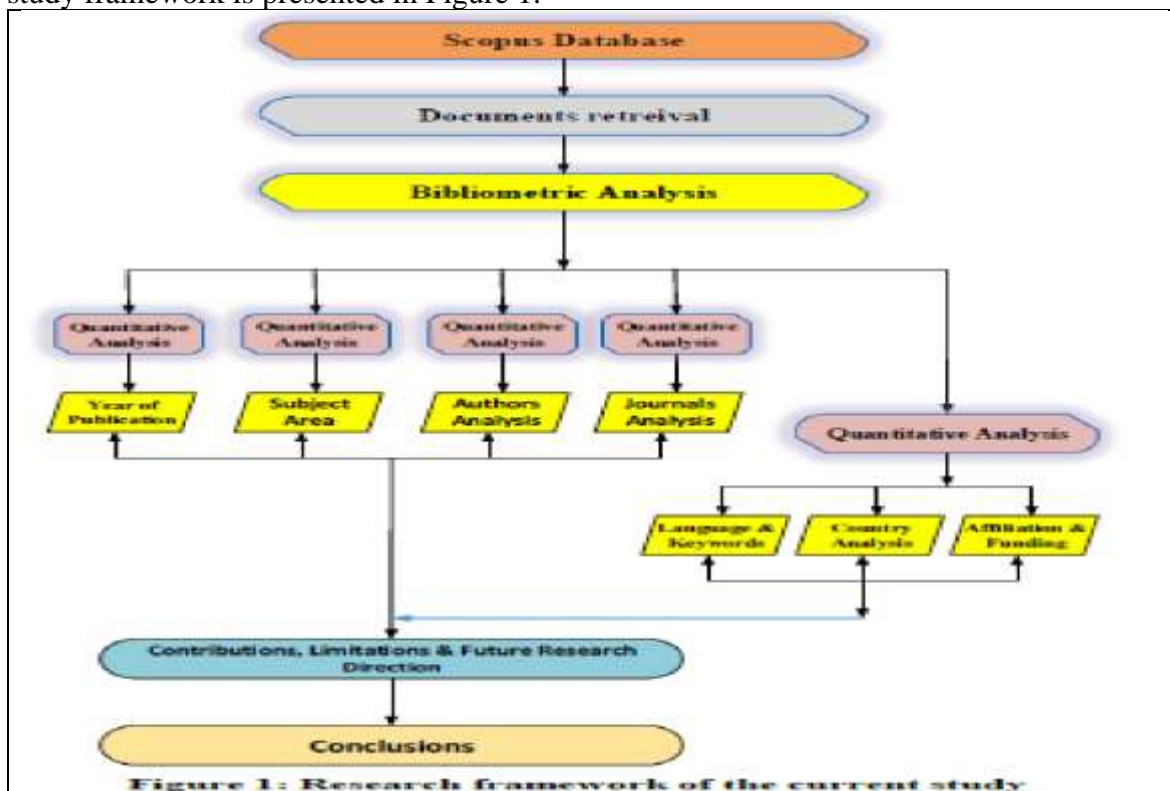
The detail study framework is presented in Figure 1.

3. Methodology and Models for Data source and search strategy

The data search and retrieval was conducted using Scopus database. The Scopus is a prestigious and influential scientific database; because it covers published researches with citations in the entire field. Thus it is the one of the valuable tool for bibliometric studies [15]. The Scopus was used because it provides more than 20% of the coverage of all scientific publications more than any other database including web of science [16]. Based on the above narrations, this study utilizes the Scopus database to retrieve all the literature used in this study. Data retrieval was done from August 30th to 5th September 2019 from the Scopus database. The researchers conducted searches with central theme or code to retrieve the articles relevant to the research objectives. The term used was any articles containing "cyber physical system* in the article's abstract, title or key. Based on the objective of this study, the oldest publications are considered to be published in 2009 and the more recent is 2018. The first query string used was (TITLE-ABS-KEY ("Internet of Thing *") and this produced 42,059 document results. After inspecting these articles, it was discovered that, some articles were published in 2019 and some for 2020, in order to limit the articles to the 2009 to 2018 this query was used to limit the articles to the years under investigation thus; (TITLE-ABS-KEY ("Internet of Thing *") AND (EXCLUDE (PUBYEAR, 2020) OR EXCLUDE (PUBYEAR, 2019)). This second query resulted in retrieval of 10,045 documents.

4. RESULTS

The data analysis was conducted as stated in the preceding section of data analysis. The results obtained from the analysis of the retrieved documents on Internet of Thing researches published from 2009 to 2018 are presented in line with objectives of the study. The findings have been presented and described under nine (9) headings as spelt out in the study purposes and frameworks thus: publications growth by year, subject area analysis, author productivity analysis, journal productivity analysis, language of writing analysis, keywords, country, affiliation, funding agencies analyses respectively.

A. Publications Growth by Year of Publications

The applied technique yielded 9,367 publications from 2009 to 2018. The first article in this category was published in 2009 with two17 publications; the annual publications were stable from 2009 up to 2010. A dramatic increase was noticed from 2012 to 2018. The number of articles during these years (2012-2018) shows exponential growth in the trend. The annual documents and accumulated documents are shown in figure 2. The highest annual publications were seen in 2018 totaling 9,367. This representation provides a clear picture of the publication trend in IoT from 2009 to 2018.
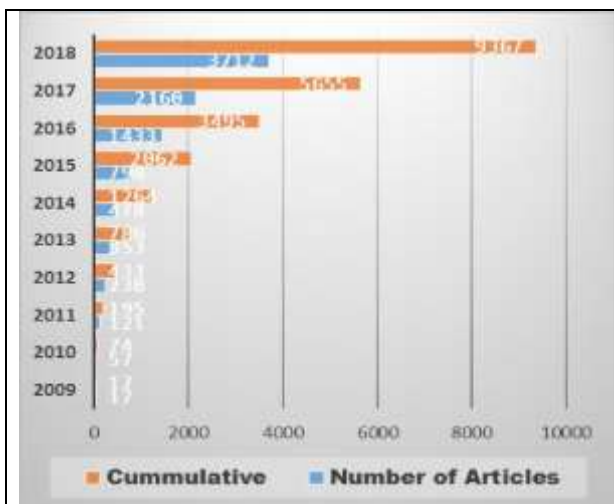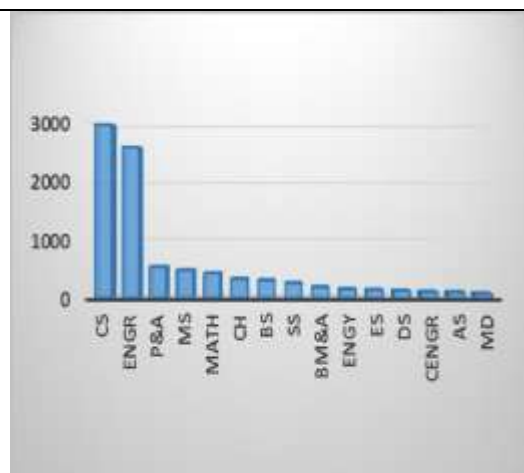
| Figure 2: Publication growth by year | Figure 3: Distribution of document subject area |

B. Subject Area Analysis

The bibliometric analysis of subject area where the research in IoT was presented on figure 3. Top 15 must productive fields of application were analysed. In line with the set standards for this review the total retrieved documents was 9,367 and among the retrieved articles 8810 (94.05%) were published in 15 top subject areas selected in this study. The results presented on figure 3 shows that, out of the 8810 articles produced, computer Science has the highest number of publications with 2,987 (33.9 %), followed by Engineering field with a total of 2,597 (29.5 %). The third most popular filed was Physics and Astronomy with a total publication of 539 (6.1%), material sciences were the fourth populous filed with total publications of 482 (5.5). Furthermore, looking into the pattern of publications in IoT as presented in figure 3 showed that business, management and accounting field is the ninth with 188 (2.1%) and the last area with the application of IoT in the research with only 75 (0.9%) publications produced from 2009 to 2018 was Medicine.

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Drift Detection and Handling-based Ensemble Classifier for Online Sentiment Classification

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ABSTRACT

Textual data streams have been widely applied in real-world applications where online users' expressed their opinions for online products. Mining this stream of data is a challenging task for researchers as a result of changes in data distribution, a phenomenon widely known as concept drift. Most of the existing classification methods incorporated drift detection methods that depend on the classification errors. However, these methods are prone to higher false-positive or missed detections rates. Thus, there is a need for more sensitive detection methods that can detect the maximum number of drifts in the data stream to improve classification accuracy. In this paper, we present a drift detection-based adaptive windowing for ensemble classifier, an adaptive unsupervised learning algorithm for sentiment classification, and opinion mining. The proposed algorithm employs four different dissimilarity measures to quantify the magnitude of concept drift in data streams, to improve the classification performance. Series of the experiments were conducted on the real-world datasets and the results demonstrated the efficiency of our proposed model.

Key words: data streams; sentiment analysis, concept drift; ensemble classification; adaptive ensemble

INTRODUCTION

Data streams are well-ordered sequence of samples that were generated continuously in real-time (Aggarwal, 2007). Example of data streams include recommender systems, computer network traffic streams, financial time series, and various sensor data among others. Besides, the sentiment classification in stream data mining applications, each of which is made up of an instance and a class label is most widely explored using the stream classification models (Gaber, et al., 2007). Unlike the traditional stationary settings, stream data are very different due to the problems such as the increase in data volume, read-only once, different types of concept drift, and imbalanced situations (Widmer & Kubat, 1996).

In text stream analysis, especially review-based sentiment classification, these issues become more challenging as review contents are unpredictable and mostly a user's

perception changes often times (Du, et al., 2015). Sometimes, users express their opinions for a given item based on their characteristics which may change over time. For example, in a phone product, a user may have a positive sentiment about the phone, and at a specific time if some features change (i.e., some add or remove), then suddenly some terms associated with the new features may be appeared or disappeared in the user's review for the phone, revealing a different sentiment. In such a dynamic environment, the classifier performance degrades as a result of these shifts in the underlying distribution of data (Babcock, et al., 2002; Pinage, et al., 2016)

Concept drifts are generally categorized as abrupt and gradual concept drifts dependent on the speed (Tsymbal, 2004). A number of approaches have been presented to address concept drifts, which basically comprised of three groups, such as window-based, weight-based, and ensemble-based methods (Gama, et al., 2014a). Ensemble method combines various base methods leveraging the advantages of their joint performances, to increase the predictive power that any of the individual methods can achieve (Polikar, 2006; Rokach, 2010; Xiao, et al., 2010). In recent times, several efforts have proposed the ensemble approach and much success has been recorded (Zhou, et al., 2010). Following their success, the selective ensemble paradigms have been extended to be used for mining data streams (de Almeida, et al., 2020; Minku & Yao, 2012; Roy, 2015; Van Camp, 2018). However, most of these methods only integrate base classifiers to improve the predictive performance of data streams, they do not explicitly consider concept drift detection (Katakis, et al., 2010; Krawczyk & Cano, 2019; Verdecia-Cabrera, et al., 2018).

In this paper, we propose a novel drift detection and handling method for ensemble classifier in online user sentiment classification that incorporates drift detectors intending to simultaneously identify different types of concept drifts, rather than using a static ensemble of the classifier. To this end, the contribution of this paper is summarized in three folds:

- a novel adaptive ensemble classification framework is presented, which considers concept drift to improve the predictive performance of the ensemble classifier.
- to quantify the drift magnitude, different dissimilarity measures are explored based on their performances to measure the changes between two consecutive windows, that is, the reference window and the current window, respectively.
- a series of experiments were performed on two real-world datasets and the results demonstrate that the proposed method performs better than the existing state-of-the-art models in terms of accuracy.

The rest of this paper is as follows: Section 2 presents the proposed method, while the experimental settings and results are presented in section 3 to assess the performance of the proposed model. Finally, the paper is concluded in Section 4.

PROPOSED DDAW MODEL FOR CONCEPT DRIFT DETECTION

This section presents the proposed DDAW approach for concept drift detection, which is an unsupervised concept drift detection algorithm that uses a trigger as a concept drift indicator. DDAW is specifically designed to deal with the concept drift in online user opinion based on the text reviews. It aims at enhancing the ability of the ensemble model to deal with

concept drift and maximizing the accuracy of the model. The proposed method is comprises of two main components, namely training phase and drift detection phase.

A. Training Phase

The main goal is to learn the classifiers to predict the sentiment of each review in the stream. In this phase, the data stream was first created using the extracted document term matrices by segmenting the data into a window with a fixed number of instances taken from equal time intervals. The first window is used as the training window, since it is used in the training process of the classifiers, and formulated in the learning process. Following this approach, a several of basic classifiers are built from different chunks of data stream, where each classifier signifies one of the existing concepts and the class of incoming instances is predicted based on the weighted voting weighted schemes.

B. Drift Detection-based on adaptive window model

In this paper, we adopt the approach of comparing the data distribution between two consecutive windows for drift detection using the two-window scheme, which has been proved to be most efficiently used method for drift detection (Sun, et al., 2018). To this end, four distance measures are considered to be used to compare the current window and the reference window based on their efficiency for drift detection (Goldenberg & Webb, 2019), such as Hellinger distance (HD), Kullback–Leibler divergence: (KD), Total variation distance (TVD), and the Kolmogorov–Smirnov statistic (KS distance).

Supoose W_1 and W_2 represent the reference window and the current window and the size of both the windows is n, respectively. Generally, the problem of concept drift detection in data streams is to decide the null hypothesis H_0 against the alternative hypothesis H_1 as follows:

$$\begin{cases} H_0 & d(W_1, W_2) \leq \varepsilon \\ H_1 & d(W_1, W_2) > \varepsilon \end{cases}$$

where $d(W_1, W_2)$ denotes a distance function that measures the dissimilarity two time windows and the parameter ε resents a distance-based threshold used to determine whether a change occurs. A change is said to occur if the dissimilarity measure between two windows exceeds a given threshold.

EXPERIMENTAL RESULTS AND DISCUSSIONS

In this section, we presented the results and discussed the performance of our proposed DDAW algorithm using four different distance measures with other baseline methods on two real-world datasets, Amazon shopping (McAuley & Leskovec, 2013) and 20-Newsgroup (Zhang, et al., 2017). Table 3.1 summarizes the results of the experiment on three baseline methods and our proposed method using four different similarity measures, in terms of false alarm (FA) and missing rate (MR), making a total of seven (7) different approaches. It can be observed from Table 3.1 that the DDAW-HD model is superior to the other DDAW versions and the three based lines on both the datasets.

Table 3.1: Analysis of drift detection performance based on false alarm and miss rate

Metric	DDM		EDDM		PageHinkley		DDAW -HD	DDAW -KL	DDAW -TVD	DDAW -KSD
	NB	SVM	NB	SVM	NB	SVM				
Amazon Shopping										
False-alarm	4	5	5	4	6	5	1	3	3	2
Missing-rate	4	4	3	3	4	4	1	2	1	1
20-Newsgroups										
False-alarm	9	10	8	9	8	7	3	4	5	4
Missing-rate	11	12	11	11	10	13	3	6	7	6

CONCLUSION

The availability of concept drift detection techniques offers many different potentials for extracting the possible changes between concepts depending on whether the change is mine through model performance or by comparing data distribution over two windows, using different similarity measures. In this paper, we proposed the DDAW algorithm for concept drift detection based on the distance measures (Hellinger distance, Kullback–Leibler divergence, Total variation distance, and Kolmogorov–Smirnov statistic distance) to quantify concept drift. Therefore, we found that our DDAW algorithm that is based on the Hellinger distance (DDAW-HD) algorithm for detecting the concept drift in user-generated reviews is better predictive than the rest of the drift detection methods. We believe this is due to the different ways it produces the desired distance. As future research, we believe that incorporating drift detection and handling methods in deep learning techniques has great potentials to increase the performance of sentiment classification models.

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EVALUATION OF MECHANICAL, MICROSTRUCTURE AND WEAR BEHAVIOUR OF ALUMINIUN ALLOY REINFORCED WITH AQUACULTURAL WASTE POWDER

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ABSTRACT

Evaluation of mechanical, microstructure and wear behaviours of Al-Mg-Si reinforced with aquacultural (mussel shell powder (MSP) for developing a new material was carried out. MSP particle of size 100µm was prepared at different weight percentages of 3, 6, 9, 12, & 15 wt. % to develop metal matrix composites for the studies. The MSP was characterized by X-ray fluorescent (XRF). The morphology of the alloy and composites were studied using scanning electron microscope for the distribution of MSP particles. The XRF revealed oxides of calcium being the highest followed by potassium oxide, alumina and other trace elements. The results of mechanical properties indicate that the tensile strength increased from 49.78MPa in the alloy to 88.5MPa in the composites at 9wt% MSP and increased to 89MPa at 15wt% MSP. The hardness strength decreased from 49.78RHB for the alloy to 40.7RHB at 9wt% MSP and increased to 50.52RHB at 15wt% MSP. The impact energy increased from 8.6J for the alloy to 38.20J at 9wt% MSP and increased to 89J at 15wt% MSP. The percentage elongation of the alloy was 43 at 9wt% and decreased to 20 at 15wt% MSP respectively. The morphologies revealed uniformly distribution of MSP within the composites and resulted to appreciable increase in mechanical properties which were

attributed to the chemical compositions of the mussel shell powder. The wear resistance of Aluminiun alloy/MSP fabricated samples had least wear resistance at 6 Wt. % of MSP which complement the results of hardness values. The composites can be used in aerospace and automobile industries where some of these properties can be explored.

Key words: Aluminium alloy, Composites, Mussel shell powder, Mechanical properties, Microstructures, Wear behaviour.

INTRODUCTION

The growth of world's population and increase of living standard due to technological development have increased the quantity of waste materials generated through industrial, mining and agricultural activities substantially. The waste materials are becoming major concern to both environments and human beings globally as observed by [1]. Utilization of waste materials could reduce contamination and free up spaces for disposal. Therefore, recycling of waste materials by converting it into useful material for applications in aerospace and automobile/construction industries could save the world from natural disasters according to the findings of [2].

The development of low-cost metal matrix composites reinforced with agricultural wastes materials has been the major innovations in the field of materials for sometimes as these developments have positive effects on both environments and human beings [3,4].
Aluminium-based Metal Matrix Composites (MMCs) have received increased attention in recent decades as engineering materials. The introduction of a ceramic material into a metal matrix produces composite material that results in an attractive combination of physical, chemical and mechanical properties which cannot be obtained with the aluminium alloys alone according to [5]. These materials have shown to possess great potential of applications in the aerospace, automobile, mining etc as pointed out by [6].

Various reinforcements such as silicon carbide, graphite, boron, titanium carbide, zirconium, Al_2O_3, tungsten etc. have been used to develop aluminium matrix composites (AMCs). However, these reinforcements had improved the mechanical properties and wear resistance such as strength, hardness, toughness, ductility resistance, corrosion and high temperature resistance among others of the composites by [7]. Synthetic reinforcements such as silicon carbide (SiC) and alumina (Al_2O_3) despite their apparent wide spread use, are not produced in developing countries. The reliance on importation from overseas and the high foreign currency exchange involved implies that the synthetic reinforcements purchased locally are at relatively high cost and time constraint by [8].
Alternative to the high cost of synthetic reinforcements to developing countries currently is to explore some ashes, powder obtained from the controlled burning of agriculture or aquaculture wastes such as bamboo leaf, rice husk, baggase, melon shell, coconut shell, ground nut shell, periwinkle shell, oyster shell etc for the development of AMCs had been investigated by [9-16]. These ashes or powders are not just cost effective but its availability and environmentally friendly in nature. The results had also shown that agriculture and aquaculture waste ashes and powder contain high percentage of refractory materials such as Al_2O_3, silica (SiO_2), hematite (Fe_2O_3), carbonate ($CaCO_3$) and calcium (Ca) were distributed on these wastes.

Mussel shell is an aquaculture wastes after removing the edible part are abundantly available across Nigeria in West Africa. The mussel shell is a great environmental threat that can cause damage to the land and the surrounding area in which it is dumped. The effective way of utilizing the mussel shell was to subject it to treatments and convert it to powder under controlled conditions. Many studies have investigated the use of oyster-shell waste as construction materials by [17].

Therefore, this research focused on the utilization of aquaculture mussel shell powder (MSP) particle size of $100\mu m$ by dispersing it into Al/1%Mg/0.6%Si/ alloy to produce matrix composites through stir casting route (liquid metallurgy). The weight fractions of mussel shell powder particles were v a r i e d from 0-15 wt. % at 3 wt. % interval. The MSP was characterized by XRF to ascertain its chemical compositions. Experiments were therefore carried out to assess the mechanical, microstructure and wear behaviour on the alloy and composites.

MATERIALS AND METHODS

Preparation of Mussel Shell Powder (MSP)

The mussel shell powder was prepared by cleaning, washing, drying, grinding and sieving to obtain uniform size. The sieving was done at the department of Agriculture and Bio-resources Engineering, University of Nigeria, Nsukka with electric powered sieving machine. A sieve of 100µm was used to sieve the mussel powder to uniform sizes. Figure 1 showed the mussel shells and powder respectively. The elemental analysis of the carbonized mussel shell powder was analyzed by Energy Dispersive X-ray Spectrometer (Mini pal 4 ED-XRF machine, made by Panalytical of Netherlands was used). The sample was weighed and ground in mortar and pressed in hydraulic press to produce pellet. The pellets were loaded in the sample chamber of the spectrometer and a voltage of 30kv and current of 1 mA was applied to the X-rays to excite the sample for 10mins. The spectrum from the sample was then analyzed to determine the concentration of the elements in the sample. The chemical compositions of the MSP is presented in Table 1.

Fig 1: Mussel shells and powder (100µm)

Production of Al- Mg-Si/Mussel shell powder particulate composites

The production of the composites was performed using double stir casting process performed in line with [19]. The chosen casting method has advantages like effective production cost, and easy control of materials [20]. The composition of aluminiun alloy used

for this work was presented in Table 2. The amounts of mussel shell powder (MSP) reinforcement required to produce composites was determined using charge calculations presented in table 3. Aluminium alloy was charged into electric furnace and superheated to a temperature of 800°C.The stir casting technique was used to fabricate the specimens. The stainless-steel stirrer was used to stir the molten alloy/composites manually. The reinforcement particles, MSP was preheated to 200°C for 30 minutes.

After preheating, MSP particles were consolidated into the melt to exclude moisture. To reduce the porosity, the addition of the degassing tablet has been done once after the alloy/composites were completely melted. The wettability was enriched by the composition of magnesium in the melt. This magnesium improves the wettability between the matrix alloy, reinforcement and thus 3 wt.%, 6 wt.%, 9 wt.%, 12 wt.%, and 15 wt.% by equal weight proportions of MSP were thus used. Figure 2 showed the preparation, equipment, and cast products (alloy/composite).

Fig 2: Showing the casting to the finished products

The Morphologies of the Alloy/Composites

The chemical composition analysis of mussel shell powder (MSP) described in the experimental procedure is presented in Table 1.

Microstructure plays an important role in the overall performance of any alloys or composites. The properties of the alloys/composites however, depend on the microstructure, reinforcement particle size, shape and distribution. Prepared samples examined using a Scanning Electron Microscope (SEM) of magnification (x2000) to study the distribution pattern of the mussel shell powder as reinforcer in the aluminiun alloy matrix. The micrograph presented in figure 4 depicts the microstructure of as-cast Al-Mg-Si alloy. Figure 4 (a—e) revealed the volumes of the reinforcer from 3-15 wt.% of MSP at 3 wt. % interval. From the figures, the structures were completely uniform with the solubility of calcium oxide in the Al matrix thereby reveals fairly uniform distributions of MSP in the matrix in all wt. % addition of the reinforcements. The uniform distribution of MSP in the alloy matrix, can be attributed to a number of factors such as, effective stirring of the slurry, degassing tablet used and good wettability that resulted in improved interfacial bonding between the matrix and the mussel shell powder particles according to the findings of [28]. The volume of MSP shows the metallic phase seems to be white while the light black portion of calcium oxide (CaO, 95.70 wt. %) which is more in the table and small silica (SiO_2, 0.83 wt. %). The figures revealed the same trend with more volumes of light black portion of CaO. It was also found that there was good retention, interfacial and bonding between Al matrix and the filler (MSP) particles and no gap was observed between the particle and

matrix at different weight percentage of reinforcers [29,30]. There was an increase in the particulates dispersed for the composites containing wt. % of the MSP as shown in the figures and also in agreement with the previous works [26].
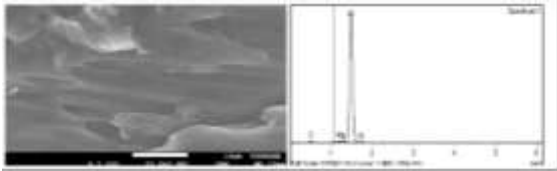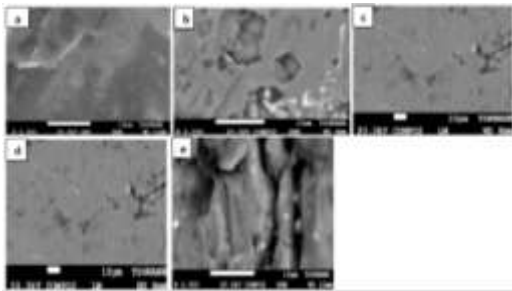

Fig 3: SEM/EDS of AA6061 alloy

Fig 4: SEM morphologies of aluminiun alloy/composites (a) 3 wt. % (b) 6 wt. % (c) 9 wt. % (d) 12 wt. % and (e) 15 wt. % reinforced with MSP particles size of (100µm)
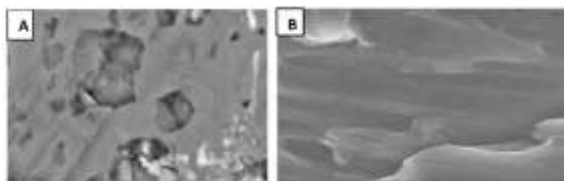

Fig. 5: SEM morphologies of Aluminiun alloy/ 6 wt. % MSP before and after wear
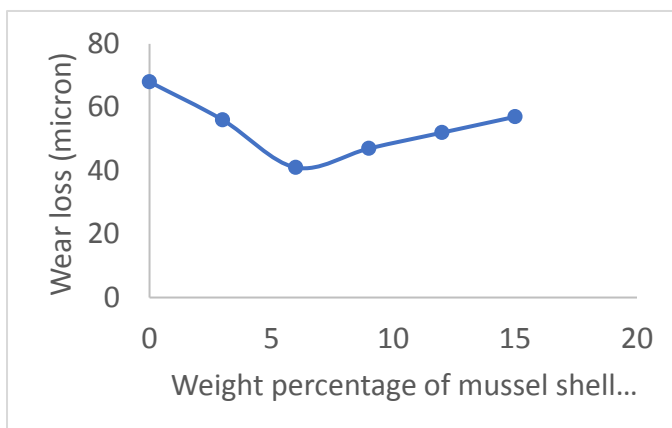

Fig. 6: Variation of wear rate with the reinforcement

Table 1: The XRF analysis of mussel shell powder

Oxides	Mussel shell powder (%)
CaO	95.70
K_2O	0.35
SiO_2	0.83
SrO	0.26
Fe_2O_3	0.67
SO_3	0.46
MgO	0.48
Al_2O_3	0.46

Table 2: Composition of Al-Mg-Si alloy used

Elements	Mg	Si	Fe	Mn	Cr	Cu	Zn	Ti	Al
Weight percent (wt. %)	1.00	0.60	0.01	0.02	0.01	0.03	0.02	0.03	Bal.

Table 3: Summary of charge calculations in gramme (gm)

S/No.	0 wt.% MSP	3 wt.% MSP	6 wt.% MSP	9 wt.% MSP	12 wt.% MSP	15 wt % MSP
Mussel shell powder (MSP)	0	25.45	50.90	76.34	101.79	127.24
Silicon (Si)	5.090	5.090	5.090	5.090	5.090	5.090
Magnesium	8.48	8.48	8.48	8.48	8.48	8.48
Aluminium	834.68	809.24	783.79	758.34	732.89	707.45
Total	848.30	848.30	848.30	848.30	848.30	848.30

CONCLUSIONS

From the investigations carried out on aluminiun alloy reinforced with mussel shell powder (3-15wt %), the following conclusions can be drawn:

1. The mussel shell powder is a potential reinforcer that improve the alloy in different properties.

2. The hardness value initially decreases with increase in wt. % mussel shell powder and later increase as the wt. % of MSP was increased. The tensile strength, impact toughness, and elongation also show different variations.
3. The microstructure SEM slides clearly revealed that the composites materials produced by stir casting method showed without voids and discontinuities of MSP particulates in the aluminium metal matrix.
4. The wear resistance of Aluminiun alloy/MSP fabricated samples had the best wear resistance at 6 Wt. % of mussel shell powder.

ACKNOWLEDGMENTS

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TEACHER QUALIFICATION AND STUDENTS PERFORMANCE IN PHYSICS: A STUDY OF SCHOOLS IN SULEJA LOCAL GOVERNMENT AREA OF NIGER STATE

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ABSTRACT
The study examined the effect of teachers' qualification on the academic performance of Senior Secondary School Students in physics. The area for the study is Suleja Local Government Area of Niger State. The study applied ex-post-facto survey research design. Random sampling was used to select six (6) schools in Suleja Local Government Area of Niger State .The SS II student's 2020/ 2021 academic session result formed the data which was analyzed using simple percentage and t - test statistic. Three research questions were answered and the findings of the research showed that academic achievement of Senior Secondary School students in Physics subject was dependent on the teachers' qualification, and teachers' experience.. Recommendation is made for organization of more regular training for teachers and in-service and refresher training of Physics teachers to enable them embraces and conform to the emerging technologies in pedagogy and more so, unqualified teachers should be given room to pursue postgraduate diploma in Education to get them qualifiefy. Also students should be enlightened on the relevance of Physics and be adequately motivated to have a positive attitude towards the subject.

Key words: Teacher, Qualification, Performance

INTRODUCTION

Academic qualification is one of the principal bases for working in any organization, but the situation is not so in the teaching Profession, as both qualified and unqualified teachers are found in the teaching field, thereby making the teaching job a dumping ground for all manner of graduates due to unemployment in their field. The educators, government, parents and society in general have constantly been interested in the academic performance of students (Lydiah and Nasongo, 2009; Adeogun, 2010). This is so because of the great importance that education has on the national development of the country (Unanma et. al., 2013). Adodo (2007) argued that one key overriding factor for the success of students' academic achievement is the teacher. In the same vein, Ibrahim (2000) believed that teachers' qualifications and exposure can go a long way to bring about pupils' high academic achievement. Considering the assertions of Ibrahim (2000), Adodo (2007), and Ibukun (2009), it implies that teachers' role in the preparation of students to succeed in examinations cannot be undermined. Education at secondary school level is the bedrock and the foundation towards higher knowledge in tertiary institutions. It is an investment as well as an instrument that can be used to achieve a more rapid economic, social, political,

technological, scientific and cultural development in the country (National Policy on Education,2004). The role of secondary education is to lay the foundation for further education and if a good foundation is laid at this level, there are likely to be no problem at subsequent levels. The researcher seek to find the role of qualification and years of experience on students academic achievement in physics in suleja area council of Niger state Nigeria

The following objectives guides the research work

1. To examine the difference in performance between students taught by qualified Teachers and those taught by unqualified teachers.
2. To examine the difference in performance between students taught by long – time experience Teachers and those taught by short-time experienced teachers.

The following hypotheses have been generated to guide this study:

HO1: There is no significance difference in students' performance between those taught by qualified teachers and those taught by unqualified teachers.

HO2: There is no significant difference in students' performance between those taught by long - time experienced teachers and short – time experienced teachers.

The study employed ex-post-facto survey research design to determine the degree of relationship between the independent variable (teacher qualification) and the dependent variable (students' academic performance) in Physics subject at Senior Secondary School (SS II) level. The advantage of using ex-post-facto research design was that it provided the precise way of stating the extent to which teacher qualification was related to the students' academic performanc

The data were analysed using frequency counts and mean while t-test statistics were used to draw the inferences. The qualification of teachers from the various sampled schools was shown according to their type of certificate/degree while student's academic achievements will be grades into pass or fail and expressed in simple percentage. Student's academic achievement is shown with percentages and mean. The various research questions and hypothesis will be validated or nullified as the case may be.

Main Result

Table 1.0 T – test analysis of academic performance between two samples of biology students.

Source of Variation	N	Mean score	Df	t- calculated	t-critical
Qualified Teachers	9	71.5			
			282	1.51	0.87
Unqualified teachers	7	46.7			

From table above the null hypothesis is rejected because the t – calculated is greater than the t – critical. Thus there is significance difference in students' performance between students taught by qualified teachers and students taught by unqualified teachers.

Table 2.0 T – tests analysis of academic performance between two samples of Physics students.

Source of Variation	N	Mean score	Df	t- calculated	t-critical
Long-term experienced Teachers	9	69.9			
			282	1.82	0.99
Short-experienced teachers	17	45.7			

*Significant at 0.05 (2 – tailed)

The null hypothesis is rejected because the t – calculated is greater than the t – critical. Thus there is significance difference in students' performance between students taught by long - experienced teachers and students taught by short – experienced Physics teachers.

CONCLUSION

In conclusion the learning of Physics depends on the qualification of the teacher and his years of experience, the findings of the study revealed that teachers qualification and experience helps to boost academic achievement in Physics in Suleja local Government Are

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EXTENT OF BASIC INNOVATIVE SKILLS AQUSITION AND APPLICATION BY TEACHERS OF SCIENCE AND TECHNICAL EDUCATION IN KWARA STATE

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ABSTRACT

The role of science and technical education in the society cannot be over emphasized as human development depends so much on them. As a result of this the teachers of these two courses are important as the two courses, especially their innovative skills acquisition and application which is highly required in the new normal. It is against this background that this study was carried out to investigate extent of basic innovative skills acquisition and application by teachers of science and technical education in Kwara State. The study purposely involved 124 science and technical education teachers from Kwara State College of Education Technical Lafiagi. The instrument used to collect data for the study was questionnaire titled Extent of Basic Innovative Skills Acquisition and Application Questionnaire tagged EBISAA Questionnaire. The instrument is a 5 point likert scale. The face and content validity of the instrument was carried out by given it to two experts in the field of science and technical education which their observations were later effected. The reliability of the instrument was determined by administering it to 20 teachers who did not take part in the study and 0.953 was arrived at as reliability coefficient after analyzing it with Cronbach alpha. Data analysis was carried out using mean and standard deviation and the null hypotheses were tested using t-test and ANOVA statistics. Findings from the study revealed that the teachers have average basic innovative skills and application. Also both gender and qualification did not influence the basic innovative skills acquisition and application of the teachers but years of teaching experience had influence which was in

favour of the inexperienced teachers. It can be concluded from the study that the teachers have no adequate basic innovative skills acquisition and application

Key words: Extent; Innovative Skills, Science, Technical; Teachers

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INTRODUCTION

Recently, the entire world witnessed a strange phenomenon due to the outbreak of COVID-19 that resulted into standstill in the economic and social activities of all nations. According to the World Health Organization WHO (2020) who reported that the Chinese authorities declared the outbreak of the novel corona virus in January 2020. In a little while, it was found that there is need for a new dimension in our way of living due to the lockdown of the entire system globally as life comes to a halt and its control time is unpredictable (Akat & Karataş, 2020). The occurred changes also affect the educational institution as schools were locked down too. Most governments around the world have temporarily closed educational institutions which include the primary, post-primary and even tertiary institutions to contain the spread of the COVID-19 pandemic (Akat & Karataş, 2020). Therefore, for teaching and learning to continue in a new normal that the world found itself, provision of educational resources is significant. These resources are materials and non-materials that can withstand the test of time for the attainment of goals in any institution of learning (Usman, 2016).Thus, the study examined an extent of basic innovative skills aqusition and application by teachers of science and technical education in kwara state.

The instrument used for the study is questionnaire. The instrument was administered to 124 science and technical teachers in Kwara State College of Education Technical Lafiagi. The data was analysed using mean and standard deviation, while the hypotheses one and three were tested using t-test statistics and hypotheses two was tested using Analysis of Variance ANOVA. Findings from the study revealed that the teachers have no adequate innovative skills acquisition and application. It was also gathered from the study that gender and qualification had no influence in the innovative skills acquisition and application of the science and technical teachers. But it was discovered that years of teaching experience of the teachers influenced the basic innovative skills acquisition and application of the teachers which is in favour of the inexperience teachers. This may be because they are still fresh in the job and also conversant with the use of technology.

MAIN RESULTS

Table 1. Extent of Science and Technical Education Teachers' Basic Innovation Skills Acquisition and Application

S/N	ITEMS	Mean	Std. Deviation
1	Using computer for word processing	3.20	1.337
2	To type and edit research materials and other works	3.50	1.179
3	ICT literacy skills	3.60	1.066
4	Presentation of software	3.00	1.223
5	Rendering of online educational services	3.31	1.085
6	Spreadsheets	2.90	1.151
7	Usage of internet to down load materials	3.65	1.197
8	Digital video and photo coverage for teaching	2.94	1.232
9	Packaging of online innovative ideas for teaching	2.77	1.237
10	Modeling and presentation software	2.32	1.159

continue

CONCLUSION

It can be concluded from the study that the teachers acquisition of basic innovative skills and application was not adequate to meet the teaching and learning in the new normal and this called for serious attention. As a result of this, another study can be carried out to investigate the students' basic innovative skills for learning of science and technical education.

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IMPACT OF POPULATION CHANGES IN POST PANDEMIC PERIOD: ISSUES AND CHALLENGES IN NIGERIA

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ABSTRACT

The total lock down and restriction of people's movement at covid-19 pandemic period led to multiple stresses and challenges that can impact their mental wellbeing, including the loss of cultural norms, religious customs, and social support systems, adjustment to a new culture, changes in identity and concept of self-reliance. The aim of the study is to assess the population change at post covid-19 pandemic period, issues and challenges in Nigeria. The study relied primary and secondary data; documentary report of National Bureau of Statistics (NBS); a time series data ranging from 1991 to 2006, and projected to 2021. The study examines covid-19 report data generated by National Centre for Disease Control (NCDC) between Februarys 2020 to April, 2021. The also adopt Malthusian exponential and geometric models of population growth projection to determine the rate of growth. Simple regression analysis and Chi square goodness of fit were employed to provide evidence of relationship between population change at post pandemic period and as well determine the coefficient of correlations between socio-cultural norms and economic changes. The study focuses on the following variables such as growth rate, sex ratio, density and responding covid-19 reported cases. The study revealed that, there is no statistically significant relationship between population change and growth rate, sex ratio, and population density but slight change in socio-cultural and economic characteristic. The researchers recommended that government and other agency responsible for the distribution of covid-19 palliatives gets to intended beneficials, effective movement control and management of resource for sustainable development.

Keywords: Population Change, Growth rate, Sex ratio, Density, Socio-cultural, economic Changes.

INTRODUCTION

Covid crisis forced governments to close borders in order to contain the spread of the virus. Countries and regional policies became popular at the beginning of pandemic to protect national economies and stop immigration. Social protective measures ahead of health protective measures, such as social distancing, house indoor and lockdown, border closure, human activities were restricted to control the spread of Covid-19. Covid-19 and declared a pandemic triggering a public health agency worldwide, its impact on people, their health, business, stock markets, and other pillars of global economy needs on emphasis (Bundi and Kitaria 2021). Speculation about the possible impact of the Covid-19 pandemic on cities have become a home-office leisure pursuit of planners and journalists who have been forced by anti-virus policies to stay at home, look after their children and entertain their husbands or wives, learn how to do online shopping despite earlier pledges to never use Amazon's services (Kunzman 2020). Labour supply declined because of quarantine measures and a fall in economic activity and loss of labour income (International Labour Organisation 2020). Economic outlook saw global growth halved to 1.5% between June, 2020 and almost 13% decline in global Gross Domestic Product (Organisation of Economic Cooperation and Development 2020). Organisation of Economic Cooperation and Development (2020) identifies four significant areas to boost confidence in traded and global market; constant supply of chain flow especially, essential health supplies and food; avoid unnecessary export restrictions and other trade barriers; government should provide palliative for the interest of the public not vested interest and avoid market distortions. Population ageing could be source by birth and death rate records and its impact on the present pandemic on demographic movement is a basis to our understanding of future ageing societies (Harper 2021). The current problem of the pandemic is to lower the problem of labour work force (Sengupta 2020). Principally due to lockdowns to stop odd delay, prevent the spreads the pandemic. Covid-19 has possibly impacted the life almost every person in the world.

The study aims at assessing population changes characteristics on the basis of cultural norms, religious customs, social support system, changes on individual or community identity and self-sufficiency. The study first examines the concepts and the status of Covid-19npandemic; second, assess population growth trends and changes between 1991 to 2006 and 2021; application of models and instrument for the measurement of changes under real life situation. These changes directly or indirectly impact the life of average Nigerian's, disengagements from physical activities, social gathering, regional and inter-state movement, families and communities' ties, dislodged people from places of worship, marriage and other social events, closure of school and games activities, closure of industries and factories as against their workers, mobility and other means of movement; growth and scarcity of consumable goods, instability of private and public firms to predict forces of demand and supply, unsustainability and failure to support the less income group. It is a fact on this based that adequate measure should be taken to overwhelms future occurrence to curtain these challenges.

LITERATURE REVIEW

United Nation Fund and Population Activities (2021) postulated that the impact of Covid-19 to eased family planning services and projected 12 million women could not benefit family planning services as a result the pandemic.   result of pandemic. The study opined that about 2.7 million unadopted pregnancies may take place before women were able to note the use of family planning. Organisation of Economic Cooperation and Development

(2020) assessed the impact of population change in post Covid-19 pandemic era as well as measures taken by Federal Government of Nigeria been a responsibility to curtailed the spread and risk of infection from home to activities areas. Kunzman (2020) focuses on the impact of covid-19 pandemic on smart city development and policies and application of digital technologies in urban development. Further narratives that range from "Return to Normal after Summer" to "New Power for the Public Sector" and "Tourism at Home". Kang (2020) examines urban and regional issues related to covid-19 including social distancing, housing affordability, lockdown and border closure as well as smart city recovery. International Labour Organisation (2020) examine uncertainty brought on by Covid-19 requires organisations to recognise leadership and employee sentiments and explore new ways of working for business continuity. Fernandes, A. (2021) examines challenges of communication at Covid-19 pandemic to assess issues of uncertainty under risk. Fernandes, A. (2021) employed quantitative discursive analysis revealed that uncertainty can be fought by increasing uncertainty; a multiplication of facts or reason may not be the most prominent strategy in practices of correction; and the use of hyperlinks with additional information can increase uncertainty and risk. Alghamdi, A. A. (2021) The study investigated both positive and negative impact of social and educational aspect of student's lives in an online survey under 30 variable impacts. The study adopted social impact theory to demonstrate rates of engagement regarding student's perception on those impacts. World Bank (2020) projected a worldwide economic conceptualisation of contraction of 7% in Low- and Middle-Income Countries (LMICs) mostly faced such problem. Sengupta, S. (2020) try to construct an extraordinary basic form of ideas to intervene on long term losses from the pandemic shock are mostly to exceed the short-term one. Alghamdi, A. A. (2021) The study investigated both positive and negative impact of social and educational aspect of student's lives in an online survey under 30 variable impacts.

METHODOLOGY

The first examines population from 1991, last conducted census 2006 as a basis for the study and projected to 2021. Relevant theories, concept and model of population growth and changes were also reviewed. Th study employed quantitative. The study-maintained nations six Geo-political Zone to managed data handling than 37 states including the Federal Capital Territory Abuja. method and adopted proportional technique. Documentary report of National Bureau of Statistics (NBS); a time series data ranging from 1991 to 2006, Covid-19 report generated by National Centre for Disease Control (NCDC) between Februarys 2020 to April, 2021 were the basis for the study. The study further administered an online internet response through WhatsApp groups within the six zones for its stronghold to generate response within shortest time. Sixty (60) responses in each zone making a total of three hundred (300) respondent within the country. Malthusian exponential and geometric models of population growth projection was used to determine the rate of growth. Simple regression analysis and Chi square goodness of fit. The researchers expanded this study to social impact theory to demonstrate rates of engagement. The researcher targeted 300 respondents and the result showed moderate evidence on positive and negative impact on individual, group and community's lives. The study revealed a strong evidence existence

between social changes and economic aspect of lives. The study founded weak correlations between Covid-19 pandemic in relation to population changes.

RESULTS AND DISCUSSIONS

The study discussed each and every table, population changes been an indicator whilst the socio-cultural, economic and demographic variable as parameters for data analysis. The data were disused in each table below.

Table 1. Census Population Distribution by Zones, Total Land Area and Densities (1991, 2006, 2021)

Zones	Census 91 Total Population	Census 2006 Total	2021 Population	Land Size Km2	Population Density1 991	Population Density 2006	Population Density 2021
North-west	22,913,412	35,915,467	60,169,182	223,150.39	811.53	1274.9	269.64
North-east	19,900,913	18984299	31,804,396	289,421.7	282.78	494.5	109.89
North-central	12,554,912	20,369,956	34,125,787	231,677.02	407.76	737.7	147.30
South-west	17,455,042	27,722,432	46,443,390	78,505.17	2554.04	4053.5	591.60
South-east	13,184,291	20,297,606	34,004,579	35,754.76	2350.26	3547.5	951.05
South-south	13,184,291	20,297,606	34,004,579	35,754.76	2350.26	3547.5	951.05
Total	88,992,218	140,431,790	235,265,378	937,052.16	8756.63	13655.6	3020.53

Source: Author's, 2021

The 1, above is reflection of population growth and density as projected from the last 2006 National population Census figure and grouped in to six Geo-political Zones. The shows the population changed by 40%.

Table 2. Population Distribution by Zones and Rate Growth (1991, 2006, 2021)

Zones	Census 91 Total Population	Census population 2006	2021 projected Population	Inter-census Growth rate	Growth rate	Growth rate Error
North-west	22,913,412	35,915,467	60,169,182	3.20	3.50	0.30
North-east	19,900,913	18984299	31,804,396	3.53	3.50	-0.03
North-central	12,554,912	20,369,956	34,125,787	3.54	3.50	-0.04
South-west	17,455,042	27,722,432	46,443,390	2.94	3.50	+0.56

South-east	13,184,291	20,297,606	34,004,579	3.35	3.50	+0.15
South-south	13,184,291	20,297,606	34,004,579	3.36	3.50	+0.14
Total	88,992,218	140,431,790	235,265,378	3.183	3.50	+0.327

Source: Author's, 2021

Table 3. Population Distribution by Zones, Densities and Sex ratio (1991, 2006, 2021)

Zones	Population Density 1991	Population Density 2006	Population Density 2021	1991 Sex Ratio	2006 Sex Ratio	2021 Sex Ratio	Ratio Error 2006
North-west	811.53	1274.9	269.64	102.5	103.9	101.6	-2.0
North-east	282.78	494.5	109.89	101.8	107.8	103.7	-0.1
North-central	407.76	737.7	147.30	123.4	111.4	108.9	-2.5
South-west	2554.04	4053.5	591.60	93.6	103.4	103.1	-0.3
South-east	2350.26	3547.5	951.05	88.4	106.8	101.3	-5.5
South-south	2350.26	3547.5	951.05	96.5	102.5	101.3	-1.2
Total	8756.63	13655.6	3020.53	606.2	635.8	619.9	-15.3

Source: Author's, 2021.

Table 4. Socio-cultural changes

S/N	Assessments Variables changes	Strongly agreed	Agreed	Neutral	Strongly agreed	Strongly disagreed	Total
1	Change cultural norms	32	16	-	8	4	60
2	Religious custom	28	20	-	5	7	60
3	Social support	15	12	-	23	10	60
4	Change in identity	23	27	-	6	4	60
5	Self-reliance	30	17	-	10	3	60
	Sub-total	128	92	-	52	28	300
	Total	220 (73%)			80 (27%)		

Source: Author's, 2021.

Table 5. Economic changes

S/N	Assessments Variables changes	Strongly agreed	Agreed	Neutral	Strongly agreed	Strongly disagreed	Total
1	Participation	26	16	-	11	7	60

2	Commercial engagement	22	20	-	12	6	60
3	Growth in consumers goods	25	13	-	14	8	60
4	Stability	20	17	-	18	5	60
5	Sustainability	14	19	-	15	12	60
		107	85	-	70	38	300
		192 (64%)			108 (38%)		

Source: Author's, 2021.

Table 5. Assessment of population density and sex ratio

S/N	Population Density O	2021 Sex Ratio E	(O – E)	$(O – E)^2$	$\dfrac{(O – E)^2}{E}$
1	101.6	269.64	-160.04	28237.4	104.7
2	103.7	109.89	-6.19	38.3	0.3487
3	108.9	147.30	-38.4	1474.6	10.0
4	103.1	591.60	488.5	238632.3	403.4
5	101.3	951.05	-849.8	722160.0.	759.3
6	101.3	951.05	-849.8	722160.0.	759.3
Total	∑O619.9	∑E3020.53		1712722.6	2037.0

	Land Area Km2 O	2021 Population E	(O – E)	$(O – E)^2$	$\dfrac{(O – E)^2}{E}$
1	223,150.39	60,169,182	-5996031.6	35935267.2	0.5972
2	289,421.7	31,804,396	-31514974.3	9931936.1	0.3123
3	231,677.02	34,125,787	33894111.0	11488106.2	0.3366
4	78,505.17	46,443,390	-46364884.	821497025.2	17.6881
5	35,754.76	34,004,579	-339668824.2	11537491,2	0.3393
6	35,754.76	34,004,579	-339668824.2	11537491,2	0.3393
Total	∑937,052.16	∑235,265,378		∑90192731.0	∑19.6128

Source: Author's, 2021

Table 7. Relationships between Scio-cultural and Economic changes

S/N	Scio-cultural changes O	Economic changes E	(O – E)	$(O – E)^2$	$\dfrac{(O – E)^2}{E}$
1	26	32	-6	36	1.125
2	22	28	-6	36	1.2857
3	25	15	10	100	6.6667
4	20	23	-3	9	0.3913
5	14	30	-18	258	8.5333
6	107	128	-21	441	3.4453
Total	∑192	∑220		∑880	∑21.4473

Source: Author's, 2021

$$X^2 = \sum \frac{(O - E)^2}{E}$$

$$\frac{880}{220} = 4.0$$

$X^2 = 4.0$

$\alpha = 0.05$

$\alpha = 0.1$

$df = 6 - 1 = 5$

$\quad 5 - 1 = 4$

$df = 5 * 4 = 20$

Decision: Since > 0.05

$X^2 = 4.0 >$ critical value 31.41943

Computed value 4.0 is less than the critical value 31.41043 H_0 rejected and H_1 accepted. There is relationship between socio-cultural values and economic values.

Table 8. Relationships between Covid-19 cases and deaths troll's reported

S/N	Zones	Covid-19 Cases O	Death toll E	(O – E)	(O – E)²	$\frac{(O – E)^2}{E}$
1	North-west	321	16950	-16629	276523641	16314.08
2	North-east	162	7189	-7029	49378729	6868.65
3	North-central	330	36254	-35924	1290533776	35597.00
4	South-west	911	76020	-75109	5641361881	74208.92
5	South-east	152	11282	-11130	1238769900	10980.05
6	South-south	400	15670	-15270	233172900	14880.21
	Total	2276	163365		11218441000	158848.91

Source: Author's, 2021

$$X^2 = \sum \frac{(O - E)^2}{E}$$

$$\frac{11218441000}{163365} = 6867.1018$$

$X^2 = 6867.1018$

$\alpha = 0.05$

$\alpha = 0.1$

$df = 6 - 1 = 5$

$\quad 5 - 1 = 4$

$df = 5 * 4 = 20$

Decision: Since > 0.05

$X^2 = 6867.1018 <$ critical value 31.41943
 Computed
ue 6867.1018 is greater than the critical value 31.41043, H_1 rejected and H_0 accepted. There is no relationship between population change and covid-19.

Table 9. Correlation of coefficient between Covid-19 cases and deaths troll's reported

S/N	Zones	Covid-19 Cases X	Death toll Y	XY	X^2	Y^2
1	North-west	321	16950	5440950	103041	287302500
2	North-east	162	7189	1164618	26244	51681721
3	North-central	330	36254	11963820	108900	1314352516
4	South-west	911	76020	69254220	829921	5779040400
5	South-east	152	11282	1714864	23104	127283524
6	South-south	400	15670	6268000	160000	245548900
	Total	$\sum x$ 2276	$\sum x$ 163365	$\sum xy$ 95806472	$\sum x^2$ 1251210	$\sum y^2$ 7805209561

Source: Author's, 2021

$$r = \frac{nexin - \sum x \sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

$$r = \frac{6*(95806472) - 2276 * (163365)}{\sqrt{[6* 1251210 - (2276)^2][6*1251210 - (163365)^2]}}$$

$$r = \frac{574838832 - 371818740}{\sqrt{[7507260 - 5180176][7507260 - 2668812310]}}$$

$$r = -\frac{203020092}{\sqrt{2327084 * -2661305050}} = -\frac{293020092}{\sqrt{19979108160}} =$$

$$r = \frac{203020092}{4469799566} = 0.045420401$$

r = 0.045420401
df = 6 - 1 = 5
      5 - 1 = 4
      5 * 4 = 20

r = computed value = $0.045420401 < 0.05$ therefore, H_0 accepted, H_1, rejected. Therefore is, no significant relationship between population changes and covid-9.

DISCUSSIONS OF RESULTS

For the purpose of this research, participation and denial of people to engage in their private and public activities, poor and socially less privileged group were not given opportunity to take advantage of commercial trading within regional, state and local boundaries. Growth in economic was not sufficient to meetup the scarcity of consumable goods which push the market price. Stability of individual, group, communities, business and government failed to predict the degree of confidence to predict forces of demand and supply mechanism leading other commodity price such as fuel and domestic gas cooking. Sustainability of economic and social wealth also failed to support low-income groups in the areas of manufacturing, financial, human and social capital. Table 1 discusses the trend of population changes for three decades ranging from 1991, 2006 and 2021 and total land area of each zone. Table 2 discusses population distribution and the rate of growth. As the population increases, density also increases. Table 3, discuses density and sex ratio approximately 105 females per 1000 males. Table 4 and 5 discuses sociocultural and economic changes using Likert scale. Strongly agreed and agreed were summed together, represent 73% while strongly not strongly not agreed and agreed represent 27% implies strong imposition and denial of socio-cultural activities as well as economic setbacks at covid19 in table 7 indicated strong relationship. Inactive performance of socio-cultural activities affects other people's business and sources of earning. The 8 and 9 discusses population change and covid-9 pandemic. The study revealed no relationship as well as coefficient of correlation between population and covid-9 death toll or records. The covid-19 reported cases represent sample population growth while, deaths record represents changes that occurred. The study revealed no evidence of associations.

CONCLUSIONS

Declined deaths rate translates in to fewer people ageing population within 70 years above serious lockdown later affects socio-cultural norms and economic aspects individual, group, communities' large newer parents at that period change their life patterns. The pandemic as thoughts responsible households many lessons which indicates that fertility rates will be reduced due to Covid-19 on the basis of unemployed rates that may also result to change in decline in birth rates where many marriages will be disengage due economic and health related challenges. Most of Covid-19 deaths toll recorded by National Centre for Disease Control (NCDC) in Nigeria were among older adults between 70 years and above. Globally, large number of people for quite decades live in a country other than their place of origin were returned home at start of Covid-19 to avoid border closure and many migrant lost jobs and faced higher risk been affected due limited accommodation space as well as overcrowded living conditions. There is no doubt that, age, sex ratio, density, economic and educational trends will play out for population change under unforeseen circumstances. Population changes influences available workforce and the nation's economy sector where demand and supply would likely change, declined in parenting expenses and educational investment and declined in birth rates may result to higher differential and lesser family group may carter for aging adults.

RECOMMENDATION

The decision-making organs should incorporate the long term-cost and benefits and not merely short-term gains that requires human use of considerable asset base. It is recommendable to awareness for proper family planning, marriages and divorces experienced at Covid-19 period do economic hardships, stigma reduction and build strong self-awareness and acceptance and over dependents and the government checkmate's unemployment rate to combat future reoccurrence.

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THE VALUE RELEVANCE OF RESEARCH AND DEVELOPMENT USING MARKET BASE APPROACH OF LISTED MANUFACTURING COMPANIES IN NIGERIA

By

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ABSTRACT

The main concern has been the accounting practice that is yet to meet up with the fast growing economic and technological developments which virtually affect the value relevance of accounting information. This paper examines the value relevance of research and development of listed manufacturing companies in Nigeria. This study employed a correlational and Ex-post facto research design of which Olhson (1995) model was adopted. The data was obtained from secondary sources on Earnings per share (EPS), Book value per share (BVPS), research and development per share (RDPS) and price per Share (PPS). It was also sourced from the published annual reports of 45 listed manufacturing companies over the period (2012 to 2019). The General least square (GLS) regression model documented that value relevant and research and development are value relevance. The study therefore, recommends that regulatory authority and standard setter should ensure that manufacturing companies should adhere to standard set for preparing financial report that reflect the true picture of the companies so the investors should know the true picture of their companies performance. Firms should spend more on research and development so as to be more innovative and produce goods that would meet the yearning of the Nigerian populace.

Keyword: Book value per share, earnings per share, research and development and price per share.

INTRODUCTION

In the area of manufacturing companies one of the sources of external accounting information is their financial statement. This information can be obtained from earnings per share, book values per share which may contribute in increasing the market price of shares (Umoren, Akpan & Ekeria, 2018). Also, manufacturing companies heavily relying on knowledge and innovation in order to win in a competitive environment and this innovation has provided opportunities for organization and companies to differentiate themselves from rivals companies (Nankman, 2020). Also, as a result of the change in macro and micro economic environment such as fluctuations in foreign exchange rates and other developments in equity and credit markets, globalization has caused a paradigm shift in intangible assets like research and development, this paradigm shift has made research and development to be one of the major drivers of market value Lahtinen (2020). Furthermore, despite the widespread use of financial statement for information purpose and the confidence which was reposed on them by the external auditors. The main concern has been the accounting practice in Nigeria are yet to meet up with the fast growing economic and technological developments which virtually affect the value relevance of accounting information. Thus, theoretically book value per share, earnings per share, research and development per share has been linked with signalling theory.

The main objective of the study is to evaluate the value relevance of intangible assets of listed manufacturing firms in Nigeria. The specific objectives are to:

i. Examine the effect of research and development on value relevance of accounting information in the Nigeria manufacturing sector?
ii. Evaluate the effect of book value per share on value relevance of accounting information in the Nigeria manufacturing sector?
iii. Assess the effect of earnings per share on value relevance of accounting information in the Nigeria manufacturing sector?

This paper adopts correlational research design because it determining the relationship between value relevance of research and development and share price. The population of the study comprised of seventy six (76) manufacturing firms listed on the Nigerian Stock Exchange over the period (2012 to 2019). Purposive sampling technique was adopted and the sample size arrived at was 45 listed companies.The study used invariant Ohlson's (1995) price valuation model which formed the basis for model specification and measurement for this study.

$$PPS_{it} = \beta_0 + \beta_1 BVPS_{it} + \beta_2 EPS_{it} + \beta_4 RDPS_{it} + \varepsilon_{it} - \quad (1)$$

Where:

β_0 = Constant or intercept

PPS_{it} = Share price . The price of shares of listed anufacturing firms three months after the fiscal year (Akpaka *et al*, 2014)

EPS_{it} = Earnings per share of firm i at time t. Earnings per Share (EPS) profit after tax divided by the number of outstanding share Issued (Akpaka *et al*, 2014)

BVPSit = Book value per share of firm i at time t. The Book value per share (BVPS) is defined as total asset less total liabilities divided by the number of outstanding share (Akpaka et al, 2014).

RDNPSit = Research and Development of firm i at time t. $Y = AL^{\alpha 1}K^{\alpha 2}$ Where: Y is value added, L= labour (total employment) divided by number of outstanding share issued ;

K= stock of tangible capital and A= scalar representing knowledge divided by number of outstanding share issued (Dwivedi, 2013)

B_{1-3} = Coefficient of explanatory variables

εit = Error terms

Table 1. Summary of the Panel Corrected Standard Errors

Variable	Beta Coeff	T-value	Prob	VIF	1/VIF
Constant	**11.992**	**8.94**	**0.000**		
BVPS	**-4.272**	**-7.78**	**0.000**	**1.180**	**0.851**
EPS	**.124**	**2.40**	**0.016**	**1.010**	**0.998**
RDPS	**10.717**	**8.08**	**0.000**	**1.170**	**0.852**
R²	**0.37**				
Prob.	**0.000**				

The results in table 1 revealed d that PPS significantly affect the value relevance of manufacturing companies and the significant level indicate that PPS has increase the value relevance of companies. The beta coefficient for book value is -4.272 and its t-value is -7.78 with a significant value of 0.000 (1% level of significance). The findings is in line with the work of (Nankman, 2020) Earnings per share have a coefficient of N0.124 and t-value of N2.61 and have a significant value of N2.40, this shows that Earnings per share have a significant positive relationship with share price of listed manufacturing firms in Nigeria. the result of this finding is in line to the prior expectation of the researcher as it validates the market efficiency and affirmed the signaling theory. The positive coefficient finding on earnings is in line with the findings of the study of (Bankole & Ukolobi, 2020 and Indiael, 2019).The results in table 4.4 also provide us with enough evidence that RDPS has positive and significant impact on the PPS of listed manufacturing firms in Nigeria. This can be confirmed from its beta coefficient of N10.71K and t-value of N 8.08 with a P-value of 0.000. (Petros, et al., 2020)

In conclusion, the result of the study depicted that book value per share, earnings per share and research and development are more value relevance. Although, further research needs to be done overtime and in other sectors in order to corroborate the results of this study using more and more representative data. The study recommends that, regulatory authority and standard setter should ensure that manufacturing companies submit their annual reports timely so that investors would be more informative. Firms should spend more on research

and development so as to be more innovative and produce goods that would meet the yearning of the Nigerian populace.

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VALUE RELEVANCE OF BRAND NAME OF LISTED CONSUMERS GOODS FIRMS IN NIGERIA

By

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ABSTRACT
This paper examines value relevance of brand name of thelisted consumer goods companies in Nigeria. This study employed a correlational research design of which the Olhson (1995) model was adopted. Data on Book value per share, Earnings per share, brand name per share and price per share were sourced from the published annual reports of 24 listed consumer goods companies in Nigeria over the period (2012 to 2019). The General least square (GLS) regression model documented that value relevance of brand name are value relevant. The study therefore, recommends a need for book value per share, earnings per share to be reported promptly so that users of financial information should used it in assessing the performance of the companies. Also, brand name which was associated with advertisement would strengthen the listed consumer goods companies and would continue to enhance the performance of the consumer goods companies in Nigeria.

Keyword: Book Value Per Share, Earnings Per Share, Brand Name Per Share and Price Per Share

INTRODUCTION

The usefulness of accounting number in the financial statement has been expressed as "value relevance". Therefore, the term value relevance has been used as the measures of the utility of accounting figures in respect to equity valuation. This means the concept of value relevance is used to reflect the main function of accounting numbers that enable all users of accounting information in the valuation of securities to make rational decisions. Also, International Accounting Standards Committee (IASC, 2008) has amended IAS,38 Paragraph 68-69 which explained that expenditure on internally developed intangible item

shall be recognised as an expense when it is incurred (Tokar, 2014). Therefore, IAS,38 paragraph 68,69 as amended indicate that advertising and promotional activities create brands name. This has made consumer goods companies more unique through the use of advertisement, marketing, distribution and promotional activities as value generating assets Samer, et al. (2020). Thus, gap may exist between book value per share and earnings per share when there is a decrease in market value of the companies. In addition despite the contribution of brand name, there is no clear reporting of cost associated with brand name in the financial statement. Therefore, this show that investors may not have clear understanding concerning the contribution of brand name and would mislead the investors in making informed decisions.

Thus, the objectives of this study is to:
  d. Examine the effect of book value per share of value relevance of accounting information in the listed consumer goods companies in Nigeria;
  e. Determine the effect of earnings per share of value relevance of accounting information in the listed consumer goods companies in Nigeria;
  f. Examine the effect of brand name per share of value relevance of accounting information in the listed consumer goods companies in Nigeria;

This paper adopts correlational research design and the population of the study comprised of twenty seven (27) consumer goods companies listed on the Nigerian Stock Exchange between (2012 to 2019) with 24 as a sample drive through the use of purposve sampling techque. This study used invariant Ohlson's (1995) price valuation model which specify and measured the model of the study as follows:

$$PPS_{it} = \beta_0 + \beta_1 BVPS_{it} + \beta_2 EPS_{it} + \beta_4 BNPS_{it} + \varepsilon_{it} - \quad (1)$$

Where:

$\beta_0 =$ Constant or intercept

$PPS_{it} -$ Stock price 3 months after the end of fiscal year.

Where:

$PPS_{it} =$ Share price. The price of shares of listed consumer goods companies three months after the fiscal year (Akpaka *et al*, 2014)

$EPS_{it} =$ Earnings per share of firm *i* at time *t*. Earnings per Share (EPS) profit after tax divided by the number of outstanding share Issued Akpaka *et al* (2014).

$BVPS_{it} =$ Book value per share of firm *i* at time *t*. The Book value per share (BVPS) is defined as total asset less total liabilities divided by the number of outstanding share.. Akpaka *et al* (2014).

$BNPS_{it} =$ Brand Name of firm *i* at time *t*. Cost of advertisement and promotional activities divided by number of outstanding share issued Grazia et al(2018).

$B_{1-3} =$ Coefficient of explanatory variables

$\varepsilon it =$ Error terms

Table 1. Summary of the Panel Corrected Standard Errors

Variable	Beta Coeff	T-value	Prob	VIF	1/VIF
Constant	10.580	10.00	0.000		
BVPS	-3.507	-8.28	0.000	1.02	0.984
EPS	0.151	2.92	0.003	1.00	0.999
BNPS	0.061	3.86	0.000	1.02	0.984
R^2	0.323				
Prob.	0.000				

Book value per share is significant in determining the share price of Nigerian listed consumer goods companies. This means for every N1 increase in book value per share, the share price is expected to reduce by approximately N3.50k. this is not in line with prior expectation of the researcher. Thus finding is in line with the studies of (Ogbodo, Osisioma and Benjamin, 2020). The results of the study indicate that Earnings per share has a coefficient of 0.151 which is followed by a T-statistics of 2.92 with a significant value of 0.003. It signifies that Earnings per share have a significant positive relationship with price per share of Nigerian listed consumer goods companies. The result of the study is in agreement with the prior expectation of the researcher as it validates the signaling theory (Hasan, 2020) .

.The result of the study indicate that brand name per share has a coefficient of 0.061 which is accompanied by a t-v of 3.86 with a significant value of 0.000. This show that brand name per share have a significant positive relationship with price per share of Nigerian listed consumer goods companies. The result of this finding is in agreement with the findings of (Samer, et al. (2020). The result of the study shows that, the cumulative effect of value relevance of brand name on price per shares above put together show that for every unit increase in the coefficient of determination (R2) value of 0.323 shows that the cumulative influence of regressors are able to provide explanation for the variation in the regressand up to about 32%. However, the above result clearly reveals that 32 per cent of variations in share price are dependent on vale relevance of brand name holding other variables constant. The finding is not surprising as it is in line with the prior expectation of the researcher. It is expected to enhance more investor's confidence.

In conclusion, the result of the study revealed that book value per share, earnings per share and brand name per share are more value relevance. Therefore, there is a need to conduct a study from non-financial sector in order to see the results. The study recommends that, accounting quality in respect to BVPS and EPS should be promptly reported as it will increase the information content of the companies. The study further suggests that FRCN should advise IASB, IFRS as regulatory bodies on the need and relevance of capitalized and disclosed brand name per share instead of classifying them as internally generated intangible asset in the financial position of the listed consumer goods companies.

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MODIFICATION OF A CONVENTIONAL MOTORCYCLE TO A SOLAR HYBRID MOTORCYCLE

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ABSTRACT
The modification of a conventional motorcycle to solar hybrid motorcycle, is a motorcycle which relies not only on internal combustion engine but on batteries which drives the wheels and it is carried out to give a recommendation for the government to consider it as a perfect machine which can improve transportation in our country. The traditional internal combustion engine made economic sense when oil was cheap and in abundance and the effects of burning fossil fuels and pollution were not understood. The environmental damage from internal combustion engine is compounded by the problem of air pollution as well as carbon dioxide emissions. The objective is to modify a solar hybrid motorcycle powered by both gasoline and battery charged by harnessing the energy from the sun through the solar panel. The combination of both the power makes the motorcycle dynamic in nature. It provides its owner with advantages in fuel economy and environmental impact over conventional motorcycle. Solar hybrid motorcycle combines an electric wheel hub motor, battery, solar panel and control system with an internal combustion engine to achieve better fuel economy and reduce toxic emissions. In the solar hybrid motorcycle, the battery alone provides power for low-speed driving conditions where internal combustion engines are least efficient. For high-speed driving conditions in long highways, the internal combustion engine is used. This allows a smaller, more efficient engine to be used. Thus, the solar hybrid motorcycle is best suited for the growing urban areas with high traffic.

Key words: Solar hybrid motorcycle, Electric wheel hub motor, Battery, Solar panel and Control system.

INTRODUCTION

The 20th century has encountered the liquidation of all flammable matter of which the liquid and solid fuel like petrol, diesel and coal are not exception. As we know fuel will deplete in 21st century and also in a few years the fuel prices will shoot up sky high (Dandapani *et.al*, 2016). Growing concerns over the limited supply of fossil-based fuels are motivating intense activity in the search for alternative road transportation propulsion systems. In addition, regulatory pressures to reduce urban pollution, CO2 emissions and city noise have made plug-in electric motorcycles a very attractive choice as the alternative to the internal combustion engine. (Emanuele Crisostomi *et.al*, 2018).

Hybrid motorcycle is a hybrid when it combines two or more sources of power. For example, a moped (a motorized pedal bike) is a type of hybrid because it combines the power of a gasoline engine with the pedal power of its rider. Most of the engines we see pulling trains are diesel-electric hybrids. Cities like Seattle have diesel-electric buses, these can draw electric power from overhead wires or run-on diesel when they are away from the wires. Submarines are also hybrid motorcycles -- some are nuclear-electric and some are diesel-electric. Any motorcycle that combines two or more sources of power that can directly or indirectly provide propulsion power is a hybrid. (G. Adinarayana *et.al*, 2014). The primary aim of this project is to modify a solar hybrid motorcycle powered by solar, battery and fuel which should be light weight and easy to control.
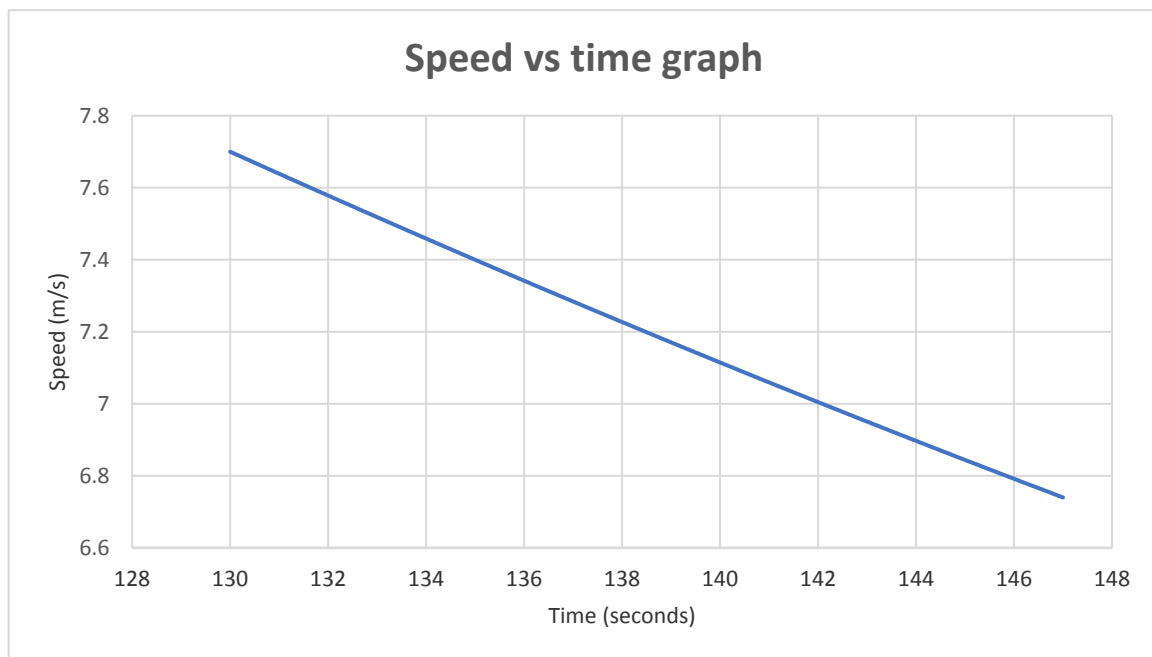
MAIN RESULTS

Fig.1: Speed time graph.

Table 1: Result obtained from the testing of Solar Hybrid Motorcycle (Time (s), Speed (m/s))

ROUTE	DISTANCE (km)	TIME TAKEN (s)	SPEED (m/s)
Trip A (Uphill)	1	147	6.8
Trip B (level ground)	1	135	7.4
Trip C (downhill)	1	130	7.7

CONCLUSION

With the increase in the price and consumption of gasoline fuel like petrol, diesel etc. and its effect on the environment as a result of emission, it is necessary to shift our way towards alternate resources like the solar hybrid motorcycle and others because it is necessary to identify new way of transport. This solar hybrid motorcycle is a modification of the existing conventional motorcycle and can be powered by dual source of energy such as gasoline and electricity which will be a new innovation in automotive era, it is eco-friendlier because it causes less pollution, noiseless, efficient and is a better solution for hiking fuel cost day to day. It can be used for shorter distances by people of any age.

The modification of a conventional motorcycle to a solar hybrid motorcycle was done to provide means of converting solar energy into electrical energy which is then used to charge the batteries powering the electric DC hub motor which cannot be found in a normal conventional motorcycle. One disadvantage is that driving on electric power is not a good option for a long-distance travel (above 30km/hr) and may not be possible if not charging due to limited energy storage in the battery system and may not perform well in cloudy or rainy days. Though this combined gasoline-electric system will become much useful in more stop and go traffic situations. Therefore, it will be most efficient in urban areas mainly in high traffic where gasoline engines are least efficient as the energy from gasoline is being wasted away and creates pollution.

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AN OVERVIEW OF BUILDING MAINTENANCE PROBLEMS IN MALAYSIA

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ABSTRACT

Building maintenance is essential to preserve the entire building component. This is why it takes about 50 to 70% of the entire building lifecycle cost. In Malaysia, building maintenance is of great concern because of the prevalence of poor practices in both public and private sectors. Facility managers practice maintenance improperly and this negatively impacts the building. A literature review was carried out to identify the causes of poor building maintenance practices and suggest improvements. From the findings, reactive maintenance, unprofessionalism, poor response to end-users, poor planning and implementation, and maintenance budget were identified as the major maintenance problems in Malaysia. The improvements suggested were cost-effective maintenance, maintenance analytics, and data-driven decision making.

Keywords: Building maintenance, Maintenance problems, Malaysia

INTRODUCTION

Building maintenance is comprised of practices that sustain building performance to meet the required standards and decrease the frequency of failure [1]. It is important because it increases the longevity of a building which is crucial to the life cycle that spans over decades [2]. Maintenance is a crucial aspect of the building operation because it is made up of several activities that range from repair works, refurbishment, and improvement [3]. It also deals with building uncertainties that affect organizational performance [4]. Buildings must be properly managed and maintained to ensure that they function at an immaculate level [5].

In Malaysia, building maintenance is of great concern because of the prevalence of poor practices in both the public and private sectors [4]. The poor maintenance practice impacts both the building and the level of service provided, it also results in going over budget and remedial works [3]. This lack of a proper maintenance culture has plagued Malaysia to a level that maintenance is only implemented during an emergency, and no priority is given to maintenance issues [1]. There is a need to study why building maintenance in Malaysia is practised this way.

LITERATURE REVIEW

From the reviewed literature, there is a consensus that building maintenance in Malaysia is performed poorly. This is due to the ineffective and inefficient maintenance procedures that are often carried out [2]. Five factors were identified to be the main causes of the poor maintenance practice. They are reactive maintenance, unprofessionalism among facility managers, poor response to end-user complaints, and poor planning and implementation. These factors were noted to be prevalent in both private and public (government-owned) buildings [1, 6]. There is a need to study the underlying causes of these factors to understand how the issues relating to them can be managed.

Reactive Maintenance: It has been noted that the current building maintenance practice in Malaysia is reactive [7]. Reactive maintenance is also called failure-based maintenance because facility managers perform repairs or replacements after the failure occurs [8]. Although the implementation cost for reactive maintenance is low, the risks are high and there are unexpected downtimes and secondary damage [9]. At this stage the building condition is poor, and components are no longer functioning which might end up being very expensive to repair [7]. Since the maintenance strategy is reactive, it will be difficult for buildings to be maintained effectively. The reasons reactive maintenance is still carried out despite its many disadvantages is because:
  i.   The rising cost of maintenance.
  ii.   Maintenance is not made a priority.
  iii.   Lack of maintenance strategy.

Unprofessionalism: The lack of knowledgeable, skilled, and competent staff has been noted to be negatively impact building performance [4]. The unprofessionalism of the facility managers can cause the building decision-makers to view maintenance as a negligible aspect of the building operation. Unprofessionalism can also be identified as the reason for poor response to maintenance requests [10]. Even when the facility managers have years of experience, being unqualified or untrained might make their experience worthless because knowledge is needed to support experience [11]. In conclusion, unprofessionalism lowers maintenance quality and reduces the competitive advantage of the organization. Reasons for the unprofessionalism among facility managers are:
  i.   Building maintenance is usually outsourced or carried out on an ad hoc basis.
  ii.   The lowest amount is set aside for maintenance.
  iii.   Lack of proper communication between facility managers and decision-makers.

Poor response to end-users: Building maintenance is regularly assessed from users' perspectives because it is important to compare end-user expectations with end-user experience [12]. The performance of a building affects the daily activity of its end-users [13]. Response to end-users complaints or feedback has been noted to impact user satisfaction levels [14]. In a country like Malaysia where maintenance is usually outsourced [15], adequate attention must be given to building end-users due to the contrast between the end-users and facility managers' motivation. Unfortunately, it has been noticed that end-users have not been given serious priority in Malaysia as there is a poor response to their complaints. There is a backlog of maintenance requests because of the poor response to end-user complaints [16]. This is dangerous because if end-user complaints are not swiftly

responded to, the maintenance issues may get worse and could harm the building occupants. Lateef [16] stated that the response to end-users complaints shows the commitment level to maintenance and user safety. Therefore, great effort must be put into ensuring adequate response to end-user complaints. Some of the factors hindering this are listed below:

    i.   Poor communication between building end-users and facility managers.
    ii.   Lack of information technology.

Poor planning and implementation: The successful execution of a maintenance strategy is impossible without proper planning and implementation especially in aspects of time and cost Irigaray, Gilabert [17]. It has been noted that one of the reasons Malaysia is losing a lot of financial resources is because of its poor planning and implantation of an effective maintenance strategy [5]. Poor planning and implementation negatively impact maintenance quality because of issues like lack of maintenance knowledge, failure to transfer knowledge to the building design stage, and inadequate performance standards [15]. As a result, Malaysian buildings fall below the standard requirements and functions [6]. Additionally, the lack of proper planning and implementation affects the level of both building performance and maintenance works [18]. It will also stop the maintenance operation from meeting and delivering the optimum service required to carry out the organisational functions [19]. In conclusion, adequate planning and implementation of a maintenance strategy result in high responsiveness and less unplanned overtime and work. Thus, minimising the overall cost of maintenance. The factors which have been identified as barriers are listed below:

    i.   No policy enforcing maintenance at the building planning stage.
    ii.   Conventional management methods are still used for decision-making and defect diagnosis.
    iii.   Ineffective decision-making

Maintenance Budget: Building maintenance is still considered new in the Malaysian building industry and this has influenced how funds are allocated for the maintenance process. The allocation and control of the maintenance budget play a crucial role in the planning and execution of maintenance [19]. Khalid, Abdullah [7] reported that the oversight in maintaining Malaysian government assets is because no evaluation is done to ascertain the maintenance needs and requirements. As a result, funds are allocated from a reactive standpoint. Since the maintenance practice is mostly short-termed, it is difficult to make long term budget allocation because of the lack of proactiveness. Mohd-Noor, Hamid [20] stated that determining maintenance cost in government-owned buildings has always been a thing of distress and conflict between the maintenance contractors and clients. This is because of the lack of a systematic and efficient budget allocation method [4]. Thus making it a challenging task to estimate the exact cost of maintenance works like repairs and replacements, as the predicated costs are usually a lot slower than the actual cost [3]. In addition, this lack of a guideline on fund allocation leads to the depletion of the allocated budget before the end of the allotted period [4]. The reasons for the actual cost of maintenance not tallying with the maintenance budget have been identified below:

    i.   Overspending because of the unsystematic maintenance practice.
    ii.   Lack of spare parts in the event of a breakdown.
    iii.   Maintenance works are not prioritised.

CONCLUSION

The purpose of this study was to identify the building maintenance problems in Malaysia to suggest improvements for the practice. This was done by reviewing existing literature to

find identify the causes of poor maintenance practice. The factors identified were reactive maintenance, unprofessionalism, poor response to end-users, poor planning and implementation, and maintenance budget. To improve the building maintenance culture in Malaysia, the process has to be systematic. This requires transforming it from a conventional practice to a data-driven one. Tools like Computerized Maintenance Management System (CMMS), Building Information Modeling for Facility Management (BIM-FM), Building Automated System (BAS), and Internet of Things (IoT) are needed to capture maintenance data. This will aid in fault detection and diagnostics, as well as monitor the overall building performance. There is also a need for a comprehensive database to ensure decision-making and prioritisation of maintenance work orders are based on existing building data and not subjective assessment. With maintenance cost being the primary driver of maintenance, there is a need to ascertain cost-effective ways to carry out maintenance.

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SUSTAINABLE FILLING OF UNDERGROUND MINING VOIDS USING A MIXTURE OF PASTE AND AGGREGATE WASTE

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ABSTRACT

Many underground mining operations produce enormous quantities of waste rock and tailings on site. The material handling of waste rock in an underground mining area is time-consuming and reduces ore capacity production. On the other hand, after the recovery of ore content in the processing plant on the surface, a massive amount of slurry is produced and stored on the surface disposal dams as tailings. Which often are acidic and contain high concentrations of arsenic, mercury and other toxic substances. Tailing dams are a potent danger to the ecosystem and communities living near the mining sites. In this study, the environmentally friendly method for producing paste aggregate filling has been proposed, enabling the in-situ disposal of crushed aggregate waste using the tailings slurry as the career media. The strength study of produced PAF revealed a high strength to withstand any future exposure of the cured material.

Key words: Paste, Aggregate, Waste, Tailings, Cement, UCS strength, Stope, Exposure

INTRODUCTION

Many mining operations store enormous quantities of waste, known as tailings, onsite. After miners excavate rock, a processing plant crushes it to recover valuable minerals such as gold or copper. The leftover pulverised rock and liquid slurry become tailings, which often are acidic and contain high concentrations of arsenic, mercury and other toxic substances. Tailing dams are a potent danger to the ecosystem and communities living near the mining sites. The failure of the tailings dam can cause the sudden burial of nearby life beings, such as plants, animals, towns, or aboriginal communities. Tailings dams and their toxic reservoirs require maintenance forever. Even if there is no catastrophic failure, these dams and their surrounding infrastructure can cause ecological harm in multiple ways. They need artificial water diversions and releases, which upset natural flow patterns in surrounding streams and modify water temperature and concentrations of metals.

Cemented paste backfill is an advanced technology that can address the tailing disposal challenges by converting the tailing to a cementitious material that can be transferred to the

excavation area and fill the voids created by the mining activity. This technology is equally beneficial for both mining activity and environmental concerns. Firstly, the backfilling of excavated voids provide strength for mining areas; furthermore, the tailings are disposed to their original ore procurement location. While there are many advantages associated with cemented paste backfill, the supplement of the required energy for converting the tailing to paste and the procurement of cement for the production of paste is expensive. It can cost up to 20% of mining production expenses. Hence a deep understanding of renewable energy sources and cement chemistry is crucial for lowering cemented paste production costs.

Various waste management strategies are currently being used in the mining industry for waste disposal underground. Some of the development waste rock is presently being used as rockfill, with the balance being hauled to the surface. After completing the paste sill pillar in the voids, some stops are concurrently filled with paste fill, and waste rock is delivered through a waste pass. In some conventional methods, waste is tipped to the stope by the stope edge, and paste is poured on top of waste once the tipping activity is completed. In the current study, the feasibility of paste aggregate fills by adding crushed development waste rock to the existing paste fill stream before it is delivered to the stope voids is studied. The PAF filling method has several potential advantages because it will enable the mine to avoid trucking the waste rock to the surface. This can allow increased ore haulage capacity and reduce mining costs through reduced backfill operating costs.

The envisaged waste plan involves crushing the waste to a suitable size and then integrating the waste into the paste mixture. This creates a refined paste aggregate fill (PAF) mix, which can then be delivered through the paste reticulation into the open voids. Hence this study aims to understand the physical and mechanical behaviour of PAF mix with different levels of aggregate loadings. For this purpose, different PAF mixtures were prepared with different proportions and classes of crushed waste rocks.

Materials Requisition

The tailings used in this study were sampled from the Gwalia tailings damn. This mine is St Barbara's mine, and it is located in Leonora in Western Australia. Gwalia mine is dippest truck haulage mining operations in Australia. The ore after milling is submitted to flotation and cyanidation for gold recovery. After that, the tailings are sent to tailings damn for a de-watering period; then, the dry tail gets collected and transferred to the paste plant for paste production.

The waste rocks were also sampled from the Gwalia mine waste rocks crusher plant with particles less than 20 mm. The samples were separated using 12mm sieves, and aggregate size samples less than 12mm were used. The samples were dried in the oven for 24 hours. Mining water was used for the PAF mixtures preparation. The water sample was chemically analysed using ICP-AES analyser. Gwalia mine also has supplied the required binder for preparing the samples. The binder is a mixture of general Portland and furnace slag.

PAF samples were prepared using fine size aggregate with a different binder and aggregate ratio. The solid content was adjusted based on the following formula to obtain the right mix design. For all prepared samples, the solid content of 78% was used to calculate the ratio of aggregate binder and the tailings.

$$Solid\ Content\%$$
$$= \frac{Binder\ Weight + Tailings\ Weight + Aggregate\ Weight}{Binder\ Weight + Tailings\ Weight + Aggregate\ Weight + Water\ Weight} \quad Binder\%$$
$$= \frac{Binder\ Weight}{Binder\ Weight + Tailings\ Weight + Aggregate\ Weight}$$

$$Aggregate\ Ratio\% = \frac{Aggregate\ Weight}{Tailings\ Weight + Aggregate\ Weight}$$

RESULTS AND DISCUSSION

Hydration Test Results

The permeability measurements during the hydration tests are presented in Figure 1, plotted against hydration time. This figure shows the results of testing with Mixes 50/50 aggregate to tailings ration and 25/75 aggregate to tailings ratio and 100% tailings batched with 4% binder. Superimposed over the data are the models used to represent the reduction in permeability with hydration time. These results show the permeability reducing at an increased rate as the binder content increases. This is the expected outcome due to further pore infilling.

Unconfined Compression Test

A series of unconfined compressive strength (UCS) tests were carried out on Gwalia aggregate paste mixes to assess the evolution of strength with time. The Gwalia paste mixes considered in this analysis are summarised in Table 1. Based on the UCS test results of both mix designs, the strength gain of ~100Kpa after three days of curing was observed for all samples. 100KPa strength is a requirement of backfill material to mitigate the risk of liquefaction. Furthermore, it was observed that the samples' strength with a higher aggregate ratio was similar to the samples with a lower aggregate ratio but higher binder content. The higher aggregate ratio samples with lower cement content resulting in higher strength are economically beneficial for mine life. The envisaged PAF plant can dispose of the underground waste rocks and reduce the binder consumption rate for producing cemented backfill material.

Current mining practice in Gwalia mine requires the backfill material to have 350KPa for development to the boundary of the backfill stope. The strength of 420KPa is necessary for vertical exposures, and 570KPa is required for undercutting the stopes. Based on the results obtained from the UCS study after filling the stope with PAF, the stope can expose vertically after seven days and horizontally after 14 days if appropriate content of the binder is used to produce PAF mix.
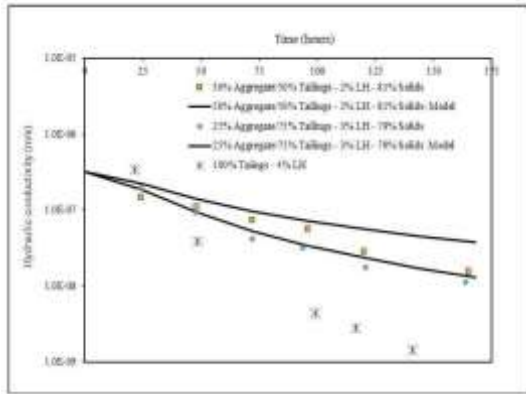
Figure 1. Permeability against time for Gwalia aggregate-paste mixes A and B and 100% tailings paste fill

Table 1: The UCS strength of different PAF mix designs

Mix #	Aggregate/Tailings Ratio	LH Cement content (%)	Mix Solids content (%)	UCS (kPa)		
				3 day	7 day	14 day
1	50:50	1.50	81	97	164	198
2	50:50	2.00	81	180	342	433
3	50:50	2.50	81	304	519	619
4	25:75	2.25	77	119	208	254
5	25:75	3.00	77	205	384	440
6	25:75	3.75	77	302	598	715

CONCLUSION

This study studied the compressive strength of cemented paste aggregate with the aggregate size less than 12mm. The replacement rate of aggregates was varied from 25 to 50% w/w of the total weight of tailings and aggregates. The unconfined compressive strength of these PAF mixtures was investigated at three, 7 and 14 days of curing times. This study shows that the permeability of the mix reduces at an increased rate of the binder content. Also, the UCS test results confirmed that the strength achieved over a short period would prompt exposure for future stopes near the void area. This will particularly enable the in-situ disposal of produced waste in an underground area and mitigate the disposal of the produced waste in the environment near the mining area. Also, the freed fleet capacity can be used to increase the production of mine.

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