The Institution of Engineers of Kenya
Founded 1972

Engineering in KENYA

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Trade in Services

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In this Issue

ENGINEERING PARTNERSHIPS CONVENTION | 2024

10
The 5th Engineering Partnerships Convention 2024

13
2022 - 2024 Council Achievements

45
Harnessing Digital Platforms for Global Reach

48
IEK's Engineering Marvel - South Rift Branch Unveiled in Nakuru City

50
Investigation of the Root Causes of High Transformer Failures on the 33 kV Feeder

57
IEK Launches the Infrastructure Report Card (IRC)

65
The African Manufacturing Sector in the Battlefield

Engineering in KENYA

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Call for Papers

Engineering in Kenya Magazine - Issue 017

The Institution of Engineers of Kenya (IEK) publishes Engineering in Kenya magazine, whose target audience includes engineering professionals, practitioners, policymakers, researchers, educators and other stakeholders in engineering and related fields. The publication is distributed to its target readers free of charge through hard and soft copies.

IEK invites you to contribute articles for our next and future editions. Articles should reach the Editor not later than 20th May, 2024 for our next issue, whose theme shall be "Building Services Engineering" and related sub-themes, across all engineering disciplines. An article can range from engineering projects to processes, machinery, management, innovation, news and academic research.

The articles must be well researched and written to appeal to our high-end readers in Kenya and beyond. The IEK Editorial Board reserves the right to edit and publish all articles submitted, in line with standing editorial policy. All articles should be in Word document format, 500-700 words, font type Times New Roman and font size 12.

Send your article today, and get a chance to feature in the magazine!

Send your article to:
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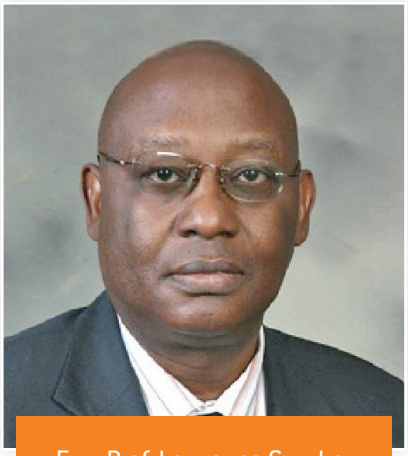
Message from the Editor



Eng. Prof. Lawrence Gumbe

Trade in Services refers to the sale and delivery of an intangible product, called a service, between a producer and consumer. Trade in services that takes place between a producer and consumer that are, in legal terms, based in different countries is called International Trade in Services.

The theme of this issue of ***Engineering in Kenya*** is ***Trade in Services***.

International trade in services is defined by the ***Four Modes of Supply*** of the **General Agreement on Trade in Services (GATS)** of the **World Trade Organisation (WTO)**. The trade is effected in the following modes.

- **(Mode 1) Cross-Border Trade** - which is defined as delivery of a service from the territory of one country into the territory of other country, e.g. remotely providing accounting services in one country for a company based in another country, or an airline flying between two international destinations
- **(Mode 2) Consumption Abroad** - this mode covers supply of a service of one country to the service consumer of any other country, e.g. tourism, telemedicine, or study abroad
- **(Mode 3) Commercial Presence** - which covers services provided by a service supplier of one country in the territory of any other country, e.g. a bank opening a physical branch or internet service provider offering internet services in another country
- **(Mode 4) Presence of Natural Persons** - which covers services provided by a service supplier of one country through the presence of natural persons in the territory of any other country, e.g. a business transferring an employee from one country to another for work duties (doctors or architects traveling and working abroad

Engineering services means any service or creative work, the adequate performance of which requires engineering education, training and experience in the application of special knowledge of the mathematical, physical and engineering sciences to such services or creative work as consultation, investigation, evaluation, planning and design of engineering works and systems, engineering studies and the review of construction for the purpose of assuring substantial compliance with drawings and specifications; any of which embrace such services or work, either public or private, in connection with any utilities, structures, buildings, machines, equipment, processes, work systems, projects and industrial or consumer products or equipment of a mechanical, electrical, hydraulic, chemical, pneumatic or thermal nature, insofar as they involve safeguarding life, health or property, and including such other professional services as may be necessary to the planning, progress and completion of any engineering services.

Such practice includes the performance of architectural work incidental to the practice of engineering. Engineering services does not include responsibility for the superintendence of construction, site conditions, operations, equipment, personnel or the maintenance of safety in the work place.

Trade in engineering services has the potential of contributing greatly to the Kenyan economy as well as contributing to the development of the profession.

According to the United Nations Conference on Trade and Development, UNCTAD, After the pandemic-driven decline of 17.2 per cent in 2020, world services exports value continued its recovery path in 2021 and 2022. In 2022, it increased by 14.8 per cent. An annual growth of 7.0 per cent is nowcast for 2023.

In 2022, global services exports were valued at $7.1 trillion, representing 7.1 per cent of world GDP and 23 per cent of total world trade in both goods and services. Compared to the pre-pandemic period, all main service categories surpassed their value of 2019, except travel and construction. Global engineering services market industry revenue has grown at a compound annual growth rate of 3.9% over the past five years, to reach an estimated $1.7tr in 2023.

The African Continental Free Trade Area (AfCFTA) has opened up new horizons for Trade in Services across the African continent, presenting a transformative opportunity for economic growth, development, and innovation. Kenya is one of the first African member states to ratify the AfCFTA Agreement and has actively participated as a key player in the AfCFTA implementation processes.

Kenya's Schedule of Specific Commitments in Trade in Services under the AfCFTA was developed in 2022 as part of the EAC offer and has been adopted by the AfCFTA.

The Engineers Board of Kenya, EBK, and the Association of Consulting Engineer, ACEK, of Kenya organised a very successful training on trade in engineering services in January 2024.

The primary objective of the workshop was to explore the vast opportunities for engineering services within the context of the AfCFTA. The specific objectives were to: Provide a comprehensive overview of the AfCFTA and its implications for trade-in services, with a specific focus on engineering services; identify potential state parties to trade with and the potential business opportunities in them; and develop a strategic work plan for the successful export of services.

The above efforts by EBK and ACEK are very important for sensitising engineers and other stakeholders on the importance of trade in services. The future of engineering in Kenya is bright with a well harnessed trade in engineering strategy.

The elections for a new IEK Council was held on 21 March 2024. We wish the new team all the best during its 2 year tenure. We are confident that under its leadership IEK will attain greater heights!

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- Sharing fake lease agreements to members of the public claiming that Kenya Power plans to construct substations or install transformers on their land. Customers are then asked to pay some money to facilitate the payments.
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Provisional Results of IEK Council Elections held on 21st March 2024 for the 2024 - 2026 Council -

As released by Scrutineeers on 21st March 2024.

President:
Eng. Shammah Kiteme

Honorary Secretary:
Eng. Jackton Mwembe

Honorary Treasurer:
Eng. Jeniffer Korir

1st Vice President:
Eng. Harrison Keter

2nd Vice President :
Eng. Christine Ogut

Ordinary Council Members:
Eng. Prof. Maina Mureithi
Eng. Jeniffer Gache
Eng. Cedric Obonyo
Eng. Annette Ingaiza
Eng. Lilian Kilatya
Eng. Flora Kamanja

World Engineering Day 2024

Media briefing session World Engineering Day - Day Star University

Chief Guest _PS. Eng. Joseph Mbugua, FIEK, EBS, IEK Council Members, EBK CEO, In Attendance, WED

Media briefing session World Engineering Day - Day Star University

Ps. State Department for Roads_ Eng. Joseph Mbugua addresses congregation on sustainable development.

PS. Eng. Joseph Mbugua, FIEK, EBS, Flags off Procession during WED celebrations.

Message from the President

Eng. Erick Ohaga, CE, FIEK, MKIM, AMCIARB (UK)

Engineers are a key backbone of development happening in Kenya, the East Africa region and across the globe today. This edition of Engineering in Kenya magazine touches on a key current concern on how our limitless human capital talent potential can be exported.

Originally signed in 1989, the Washington Accord, is a multi-lateral agreement between bodies responsible for accreditation or recognition of tertiary-level engineering qualifications within their jurisdictions who have chosen to work collectively to assist the mobility of professional engineers. Regulator Engineers Board of Kenya made a formal application to join the global community in acceding to the Washington Accord. Kenya is being mentored by Board of Engineers Malaysia and Pakistan Engineering Council. Acceding to the Washington Accord will make Kenya's Engineering Programs globally recognized, attract foreign students, and increase mobility of our engineers.

Currently in Africa, its only South Africa that has acceded to WA while Nigeria has a provisional signatory. Kenya will be hoping to be the 3rd country from Africa to accede.

As with the other accords the signatories are committed to development and recognition of good practice in engineering education. The activities of the Accord signatories (for example in developing exemplars of the graduates' profiles from certain types of qualification) are intended to assist growing globalization of mutual recognition of engineering qualifications.

The Washington Accord is specifically focused on academic programmes which deal with the practice of engineering at the professional level. The Accord acknowledges that accreditation of engineering academic programmes is a key foundation for the practice of engineering at the professional level in each of the countries or territories covered by the Accord. The Board will align its accreditation functions to the requirements of the Washington Accord in order to ensure that Kenyan engineers go through engineering education that is globally recognized, thus, enhancing their international mobility. There are a number of reasons why it is important for Kenya to accede to the Washington Accord as currently being championed by Engineers Board of Kenya.

Firstly, is the need to expand opportunities for engineers. The economy in Kenya has expanded rapidly but has not been able to translate into sufficient job opportunities for young people leaving our Universities as graduate engineers. As such; an empowered work force capable of being exported to markets of high engineering related potential job markets is essential to help mitigate run-away joblessness currently ails our Engineers

Secondly and most vital, exported talent is a key contributor to Kenya 's diaspora remittances. Empowered Kenyan engineers working abroad will be a key dollar revenue earner for the exchequer, bolstering the local economy.

Finally, Kenya's accession to the Washington accord will strengthen the quality of Engineering programs offered in our universities as there will exist strict program quality guidelines for each engineering programs offered by our universities attracting foreign students to Kenya in turn and ensure Engineers in Kenya can offer services all around the world.

World Engineering Day 2024

Police Band Lead WED Procession

South Rift Branch Engineers celebrated World Engineering Day 2024 at Nyayo Gardens, Nakuru City. The Celebration Led by Chairman of South Rift Branch, Eng. Harrison Keter.

Procession Along Valley Road _ WED celebrations.

South Rift Branch Engineers celebrated World Engineering Day 2024 at Nyayo Gardens, Nakuru City. The celebrations, led by Eng. Harrison_Keter, Chairman of South Rift Branch

Message from the Honorary Secretary

Eng. Shammah Kiteme, CE, MIEK

This issue of Engineering in Kenya magazine has focused on Trade in Services. A key area of our practice as Engineers because we offer services especially when it comes to consulting engineering services. With a number of protocols already signed including East Africa Community, Africa Continental Free Trade Area (AfCTA), a door has been made available to offer our professional services in the region.

It is expected that with signing of Mutual Recognition Agreements, it will be much easier to offer consulting services in other countries regionally and at continental level. Presently, Kenya has signed MRAs with Tanzania, Uganda and Rwanda. There are efforts to broaden these to other countries in East Africa and indeed it should be possible for the entire Africa. Having MRAs helps Engineers practice in other countries with the registration credentials recognized there as in their own countries.

This reduces red-tape for Engineers and makes it possible to offer their services within the region with less obstacles.

IEK will continue to engage other Professional Engineering Institutions in Africa to support the initiatives to enter into MRAs for opening the practicing space for Engineers. Under the East Africa Federation of Engineering Organisations (EAFEO), IEK will play her role in bringing together countries not yet active in the regional Engineering issues.

Under the Federation of Africa Engineering Organisations (FAEO), IEK will play a critical role in enhancing mutual understanding between Engineers in Africa, breaking barriers in terms of standardisation and accreditation. IEK will support initiatives towards forging closer collaboration with Engineers in terms of exchanging ideas, sharing challenges, training and project financing.

All these initiatives are aimed at making sure that our members can practice freely across the region. Having practiced in Djibouti, Burundi and Ethiopia I have experienced first-hand the need to forge more closer collaborations with Engineers across Africa. Some of the challenges we face include cultural barriers, language barriers and different standards of practice. It is our engagement at the EAFEO, FAEO, WFEO, EAC and AU level where these can be addressed both from the professional point of view but also under the political point of view.

The efforts to engage engineers across the border have already started bearing fruits with three students already sponsored for a full scholarship to do a project management course in Ethiopia. The course which takes six months is going to be very helpful in preparing the young bright engineers with the required skills to work in leading project management of infrastructure projects.

IEK is keen on pursuing further partnerships to offer opportunities for internships for engineering students regionally. Graduate Engineers should also benefit from attachment opportunities across Africa. This will ensure that Engineers can learn from the best projects being undertaken in Africa so that we retain the knowledge and experience to indigenous Africans.

The need for continuously upgrading and updating our skills to match the changing practicing environment is also important. This will enhance our competitiveness. IEK will therefore invest in capacity building initiatives to equip our members with skills set to remain and the edge when it comes to the changing technology and emerging ideas that are going to impact our practice.

This issue is timely and I invite members to read through the quality content that will inform, entertain and educate

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Company logo included on EPC 2024 Banner	√	√	√
Brand recognition and acknowledgement on the EPC 2024 website. *(Company logo, 100-word company bio and link to company website)*	√	√	√
Brand recognition on relevant EPC 2024 promotional collateral	√	√	√
Brand recognition on official sponsor board	√	√	√
Logo recognition on large format audio visual screens at EPC 2024	√	√	√
Recognition as EPC 2024 Premier Partner via live social media posts over the three-day Convention	√	-	-
Two EPC 2024 exhibition passes	√	√	-
Opportunity for your organisation to provide an industry relevant article that will feature on the news section of the EBK website	√	-	-
Logo recognition included in relevant EPC 2024 marketing communications pre and post - Convention	√	√	√
Sponsor one keynote address at the discretion of EBK	√	-	-

Exhibition Tent	Kshs 200,000 for a 3x3 Booth

2022-2024 COUNCIL ACHIEVEMENTS

The period spanning year 2022 to 2024 has been a time of significant accomplishments and notable challenges for the Institution of Engineers of Kenya (IEK). Under the leadership of the Council, several initiatives were undertaken to advance the interests of engineers while addressing pressing issues within the engineering fraternity.

Throughout this period, the Council convened regularly, demonstrating a commitment to uphold the institution's values and adhere to its constitutional provisions. The Council comprised of 21 members constituted as follows: 10 elected members; one appointed member (Hon. Treasurer); 8 elected Chairs of eight branches; two Co-opted members; and the Immediate Past President.

The Council Members comprised of:

Eng. Erick Ohaga, CE, FIEK, MKIM, AMCIARB (UK)
Co-Chairperson

Eng. Grace Kagondu, PE, FIEK, FAAK
Ist Vice President

Eng. Christine Ogut, PE, FIEK
2nd Vice President IEK

Eng. Shammah Kiteme, CE, FIEK, PMP
Honorary Secretary

Eng. Justus Otwani, CE, FIEK
Honorary Treasurer

Eng. Nathaniel Matalanga, CE, FIEK, OGW
Immediate Past President

Eng. Prof. Lawrence Gumbe, CE, FIEK
Chair, Technical Papers

Eng. Jennifer Korir, PE, MIEK
Member

Eng. Dr. Elisha Aketch, PE, MIEK
Member

Eng. Flora Kamanja, PE, MIEK
Member

Eng. Paul Ochola, CE, FIEK
Member

Eng. Jennifer Gache, PE, FIEK
Chair Member Branch

Eng. Wachira Kahoro, PE, FIEK
Member

Eng. Lilian Kilatya, PE, MIEK
Member

Eng. Harrison Keter, PE, MIEK
Chair South Rift

Eng. Eric Ngage, PE, MIEK
Chair Western Branch

Eng. Dr. Mwaka Mungatana, CE, FIEK
Chair, Coast Branch

Eng. Abdulrazaq Adan Ali PE, FIEK
Chair, North Eastern Branch

Eng. Dr. Damaris Oyaro PE, FIEK
Chair, Capital Branch

Eng. Hannah Njeri PE, FIEK
Chair, Central Branch

Eng. Patrick Otuoma, CE, FIEK
Chair, North Rift Branch

Engineering is essential to a country's growth and prosperity, and it contributes significantly to economic growth and quality of life. This is why engineering should be given the attention it deserves, as it contributes significantly to the socioeconomic development of Kenya and the African continent.

The council began implementing a number of programs for the benefit of members as soon as they took office. Members are the heart and soul of this Institution.

The Council established a committee structure; the chairs and vice chairs of which are elected Council members, and the remainder of the membership being made up of Corporate Members, Graduate Members, and Technologists with relevant competency for specific committee functions. The constitution of the committees was through an engagement process which involved sending out of Expressions of Interests to our entire membership and subsequently evaluation of responses in a duly structured manner.

There was a total of 14 Committees constituted through which the Council would deliver on its agenda. These are namely: Events and Conference; Membership and Mentorship; Policy Research and Advocacy; Capacity building and Leadership Development; Legislation and Regulation; Governance, Audit and Risk; Future Leaders; Women Engineers Committee; Strategic Plan; Welfare; Resource Mobilization; Editorial Board and Outreach.

Immediately upon assuming office, the Council Members were taken through an induction process as a matter of good corporate governance. Council Members were also taken through a two-day training/ workshop on Corporate Governance. These two events served to impart insight to the Council Members into how they would work together in driving the business of the institution. The objective foregoing has been fruitful as Council meeting sessions have progressively improved for the greater good of delivery of service to our members.

The 2019-2023 Strategic Plan continued to be the core guide in driving the affairs of the institution. In certain cases, by virtue of emerging changing dynamics in local and international environment, the council also incorporated such other aspects that were deemed relevant to the engineering community.

Let's delve into the key achievements and challenges of the IEK during this period:

a. Starting with Membership growth:

Membership growth stands as a cornerstone of IEK's strategic blueprint. By March 2024, the institution witnessed a commendable surge in membership, soaring to 12,244 from 9,588 in April 2022, marking a notable 27.7% increase. Notably, transitions within membership categories were observed, with 707 members progressing from Graduate to Corporate status and 22 members advancing to Fellow status. Such transitions reflect growth rates of 23% and 14.4% for Corporates and Fellows respectively.

Furthermore, concerted efforts in membership drives yielded substantial increments across various categories, with a notable 34.7% surge in Graduate Engineers, 450% in Graduate Engineering Technologists, 464.3% in Graduate Engineering Technicians, and 104.4% in Student members.

Mentorship: A Cornerstone of Development

Mentorship emerges as a pivotal instrument in nurturing engineering talent and fostering professional development. Recognizing its significance, IEK established a Mentorship Board comprising seasoned engineers across diverse disciplines. This board is tasked with addressing challenges hindering the seamless transition of engineering graduates across membership categories.

In tandem with mentorship initiatives, Professional Interview Preparation courses (PIPs) were conducted, equipping graduate members with the requisite skills for their professional journey. The number of PIPs conducted during the review period were 6 reaching 712 Graduate engineers up from 464 in the year 2022. Additionally, the institution recruited 92 mentors and 37 panelists to bolster mentorship endeavors.

Outreach and Engagement

In line with its mandate, the Capacity Building and Leadership Development Committee conducted the first ever Training Needs Analysis that gave us very pertinent insights on what members need in terms of capacity building. Our training programs are now geared to meet the specific competency needs of all our members at different stages of their professional careers. Over the past two years the Institution has successfully ran training programs that are well aligned to the needs of the Engineers. Such programs include Contract Management, Project Management Professional certification, Solar PV T1, T2 and T3 training, Civil 3D, AutoCAD among others.

Courtesy call to the Atlas Copco's Regional General Manager

Meeting with Engineers Board of Kenya

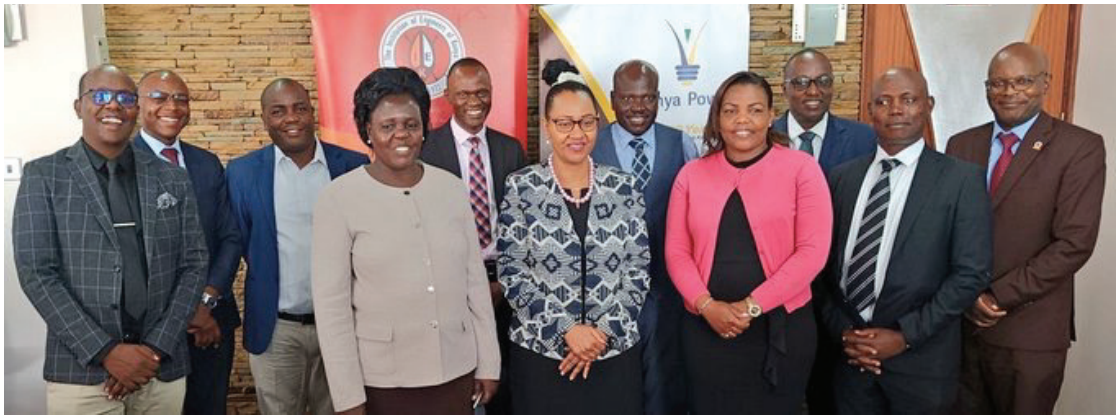
Courtesy Visit to the Ministry of Water, Sanitation and Irrigation

KAA Meeting

GDC Courtesy Call

RERCC Courtesy Call

KCAA Courtesy Call



KPLC Courtesy Call

KURA Courtesy Call

KETRACO Courtesy Call

KENGEN Courtesy Call

Empowering the Next Generation

Efforts to nurture budding engineering professionals extend to university and high school levels. Mentorship programs and career fairs were conducted to guide aspiring engineers, with IEK members playing a pivotal role in their academic and professional journey. Furthermore, initiatives such as the Women Engineers Summit and the "She for She" program aim to empower female engineers, fostering inclusivity and gender diversity within the engineering sphere.

The IEK Women Engineers Committee Chair Eng. Florah Kamanja with one of her She for She mentees.

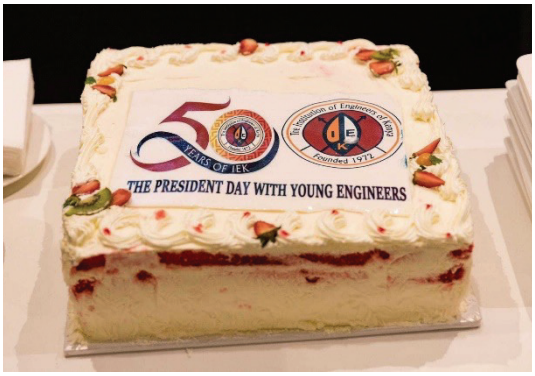
Mentorship exercise at St. Monica Girls High School Chakol in collaboration with the IEK western branch

Mentorship exercise at Limuru Girls in collaboration with Engineers Board of Kenya

Mentorship at St. Monica Girls High School, Chakol

IEK 1st VP, Eng. Grace Kagondu on behalf of the Council presented award letters to the three beneficiaries of the Future Project Managers Roadmap Scholarship, a collaboration between IEK and the Ethiopian Construction Corporation.

Presentation of an award to the winner of the senior category in the 3rd edition of the Steam Virtual Art Competition



President's Evening with Young Engineers

Moi University Career Week-Future Leaders

Celebrating Engineering Excellence

The 29th and 30th IEK Annual International Convention held in November 2022 and 2023 incorporated 1st and 2nd Young Engineers Summits, 1st Men Engineers Summit, and 5th and 6th Women Engineers Summits that addressed multi-generational issues, alongside informal bonding sessions and networking cocktails witnessed record attendance, with over 3000 delegates converging to exchange knowledge and showcase engineering innovations. Esteemed speakers challenged conventional wisdom and inspired excellence in engineering practice and education. Furthermore, IEK played a pivotal role in commemorating the 4th and 5th World Engineering Days celebrated annually on 4th of March, themed "Engineering for Sustainable Development," and "Engineering solutions for a sustainable world" underscoring the profession's commitment to societal well-being.

The effort motivated more engineers to join the institution. The Summits also attracted a good number of participants who, in addition to enhancing their knowledge, were equipped to be ambassadors for IEK and facilitated recruitment of more engineers.

World Engineering Day 2024

IEK Annual International Convention Celebration

Women Engineers Summit

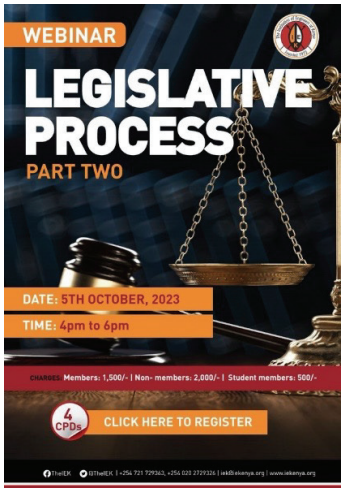
Women Engineers Summit

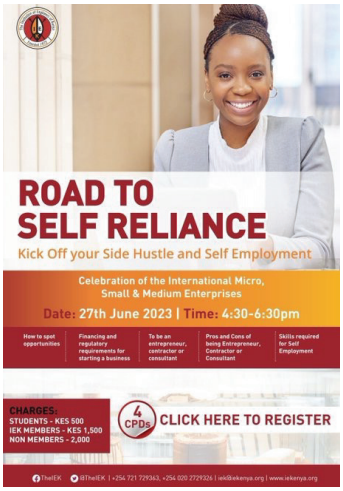
b. On Developing Expertise:

Engineering and technology play pivotal roles in addressing society's most pressing challenges. The Institution of Engineers of Kenya (IEK) is steadfast in its mission to promote and develop the engineering profession for the long-term benefit of humanity. Through a series of impactful initiatives and collaborations, IEK continues to make significant strides in enhancing engineering expertise and knowledge sharing.

Inspiring Webinars and Events

In 2022-2023, IEK organized a myriad of webinars and events aimed at inspiring, informing, and influencing engineering practitioners and the wider society. These platforms served as catalysts for positive change, allowing participants to glean insights and contribute towards societal advancement through engineering solutions.

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Pros and Cons of being Entrepreneur, Contractor or Consultant
Skills required for Self Employment
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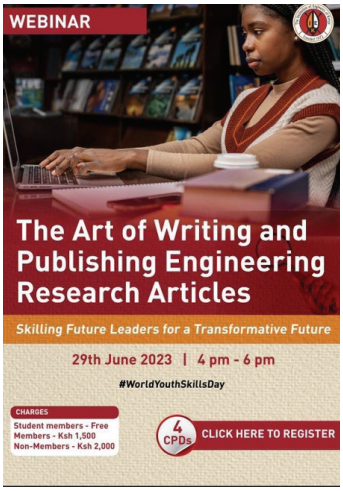
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4 CPDs
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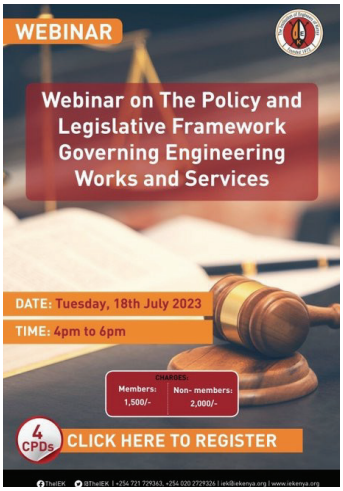
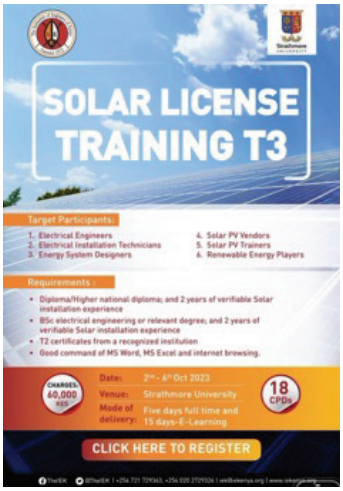

WEBINAR
Webinar on The Policy and Legislative Framework Governing Engineering Works and Services
DATE: Tuesday, 18th July 2023
TIME: 4pm to 6pm
CHARGES:
Members: 1,500/-
Non- members: 2,000/-
4 CPDs
CLICK HERE TO REGISTER

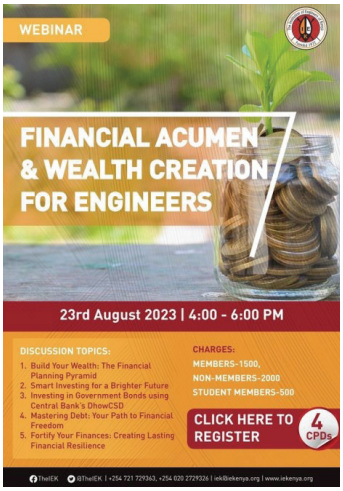

SOMER'S ENGINEERING
BEAM AND BLOCK
INDUSTRIAL VISIT
24th June, 2023 | 9am
Participants will be taken to Dagoretti to view one of the ongoing construction sites with beam and blocks, then to the Sarit Centre Parking Silo to view post tensioning
CHARGES: 1,000/=
CLICK HERE TO REGISTER
4 CPDs


SOLAR LICENSE TRAINING T3
Target Participants:
1. Electrical Engineers
2. Electrical Installation Technicians
3. Energy System Designers
4. Solar PV Vendors
5. Solar PV Trainers
6. Renewable Energy Players
Requirements :
Diploma/Higher national diploma; and 2 years of verifiable Solar installation experience
BSc electrical engineering or relevant degree; and 2 years of verifiable Solar installation experience
T2 certificates from a recognized institution
Good command of MS Word, MS Excel and internet browsing.
CHARGES: 40,000 KSh
Date: 2nd - 6th Oct 2023
Venue: Strathmore University
Mode of delivery: Five days full time and 15 days-E-Learning
18 CPDs
CLICK HERE TO REGISTER


CONSTRUCTION PLANNING & PROJECT CONTROLS
1ST - 3RD NOVEMBER 2023
ROYAL TULIP HOTEL, NAIROBI
TARGET:
Project Directors
Project Managers
Contract Managers
Engineers
Project Planners
Quantity Surveyors
CPDs to be awarded per ESG policy
CHARGES:
Ksh 60,000 for members |
Ksh 65,000 for non-members
CLICK HERE FOR COURSE OUTLINE AND CONTENT
CLICK HERE TO REGISTER


PROJECT MANAGEMENT PROFESSIONAL (PMP®) TRAINING
Acquiring International Project Management Certification- Upskilling and Reskilling Engineers for Career Progression
18 PDUs
9TH - 13TH OCTOBER 2023
8.00AM - 5.00PM
CHARGES: MEMBERS - KSH 32,000
NON-MEMBERS - KSH 35,000
CLICK HERE TO REGISTER


CORRUPTION AWARENESS TRAINING:
EMPOWERING ENGINEERS TO RESIST THE VICE
ATE: 10TH AUGUST, 2023
ME: 4.00 - 6.30 p.m.
CHARGES:
STUDENTS - KES 500
IEK MEMBERS - KES 1500
NON MEMBERS - KES 200
CLICK HERE TO REGISTER
4 CPDs


WEBINAR
FINANCIAL ACUMEN & WEALTH CREATION FOR ENGINEERS
23rd August 2023 | 4:00 - 6:00 PM
DISCUSSION TOPICS:
1. Build Your Wealth: The Financial Planning Pyramid
2. Smart Investing for a Brighter Future
3. Investing in Government Bonds using Central Bank's DhowCSD
4. Mastering Debt: Your Path to Financial Freedom
5. Fortify Your Finances: Creating Lasting Financial Resilience
CHARGES:
MEMBERS-1500,
NON-MEMBERS-2000
STUDENT MEMBERS-500
CLICK HERE TO REGISTER
4 CPDs

Webinars

The 29th and 30th Annual International Conventions of the Institution of Engineers of Kenya (IEK), held in November 2022 and 2023 respectively, were distinguished by esteemed guests and a record-breaking attendance. The 29th Convention was graced by the esteemed presence of Hon. Alice Wahome, the Cabinet Secretary for Water, Sanitation, and Irrigation, who officially inaugurated the event. Following this, the 30th IEK Convention had the privilege of being opened by His Excellency, Vice President Hon. Rigathi Gachagua, EGH. Drawing over 3000 delegates, the conventions marked a significant milestone, setting a new benchmark for participation and engagement. The gatherings featured a lineup of distinguished speakers whose presentations either challenged prevailing paradigms or introduced cutting-edge advancements, fueling a collective pursuit of excellence in engineering practice and education.

Moreover, the conventions provided a vital platform for engineers to showcase their innovative products and services, fostering networking opportunities and facilitating knowledge exchange. Participants were thus equipped with the latest insights and technologies, ensuring they remained at the forefront of the ever-evolving landscape of engineering.

The 4th and 5th editions of World Engineering Day were celebrated with great enthusiasm on March 4, 2023, and March 4, 2024, respectively, at prestigious venues: the University of Nairobi Towers and Daystar University. In a testament to the esteem in which the celebrations were held, the institution had the distinct honor of welcoming Eng. Joseph Mungai Mbugua, CBS, the Principal Secretary of the State Department for Roads, as the Chief Guest on both occasions. Eng. Mbugua, a distinguished figure within the national government and a respected member of the engineering community, lent his expertise and leadership to the proceedings, further enhancing the significance of the events.

Launch of African Journal of Engineering Research and Innovation (AJERI)

In collaboration with the Engineers Board of Kenya (EBK), IEK achieved a significant milestone with the launch of the African Journal of Engineering Research and Innovation (AJERI). This esteemed journal, published quarterly, embodies a collective effort to elevate engineering discourse and foster academic excellence. Postgraduate engineering students are encouraged to embrace AJERI as a premier platform for disseminating their research findings.

Strategic Publications

Building on its commitment to knowledge dissemination, IEK introduced the "Engineering in Kenya" magazine in 2020. The magazine has garnered widespread acceptance, with its twelfth issue focusing on the theme of "Manufacturing and Mechanical Engineering." Additionally, IEK launched a weekly newsletter to keep members abreast of institutional activities and pertinent engineering news from around the globe.

Global Engagement and Advocacy

IEK remains at the forefront of advocating for the simplification of the accreditation process and recognition of university engineering degree courses. Collaborating closely with EBK, IEK facilitated the latter's admission as an Affiliate member of the World Federation of Engineering Organizations (WFEO), thereby strengthening ties with the global engineering community.

Nurturing Future Engineers

The 3rd and 4th Sessions Engineering Students Career Week, held in conjunction with World Engineering Day celebrations, provided a platform for approximately 582 students from 13 universities across Kenya to explore diverse engineering specializations. This initiative, now a staple in the IEK calendar of events, fosters mentorship and knowledge transfer between seasoned engineers and aspiring professionals, ensuring a robust pipeline of talent in the engineering fraternity.

c. On Enhancing Relevance:

In a groundbreaking move, the Institution of Engineers of Kenya (IEK) embarked on a journey into the political landscape of the nation for the first time in its history. The pivotal year of 2022 saw IEK making deliberate decisions to support candidates with engineering backgrounds vying for various elective positions at both the National and County Government levels. This strategic maneuver aimed to assert the engineering profession's influence in policy-making spheres, recognizing the critical role of engineers in shaping the nation's development trajectory.

Handing over of Campaign Items

Venturing into Politics:

Recognizing the imperative of having a seat at the decision-making table, IEK threw its support behind candidates with engineering qualifications, echoing the successful strategies employed by other professions such as law, medicine, and accounting. The institution endorsed candidates for positions ranging from Members of National Assembly to Governors and Women Representatives, marking a significant step towards positioning engineers as key stakeholders in national development.

Building Bridges with Decision Makers:

IEK's engagement with political stakeholders extended beyond electoral support. In February 2023, the institution hosted a dinner with Members of Parliament boasting engineering backgrounds, fostering dialogue on strategic collaborations and avenues for greater engagement with parliamentary committees. This ongoing dialogue underscores IEK's commitment to ensuring engineers' voices are heard in legislative processes.

Dinner with Members of Parliament

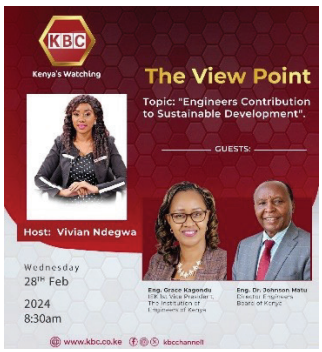
Representation by the chair, IEK Energy Subcommittee in the Departmental Committee on Energy meeting in the National Assembly, Eng. David Mwaniki,

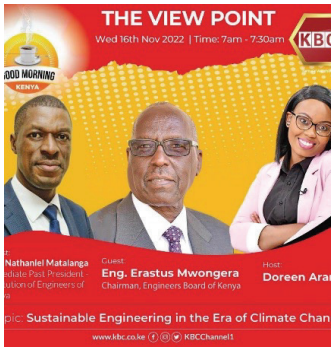
Advocating for Engineers' Interests:

Beyond political engagement, IEK tirelessly advocated for engineers' welfare and representation in key strategic positions. From lobbying for enhanced entry levels and allowances within the Engineers Scheme of Service to championing the appointment of engineers in state corporations, IEK actively pursued avenues to safeguard engineers' interests and promote their professional advancement.

Meeting with the Public Service Commission Officials

The institution had successful years of media coverage and numerous media appearances including on Print media (the Standard, Business Daily, the Star, Daily Nation), Broadcast Media (NTV, Citizen TV, KTN, KBC, K24, TV47, Kameme TV, Nakuru TV) and position papers thus increasing visibility and interaction with the members and public. IEK has featured in several mainstream media to respond to matters of public interest and provided opinion and insight on engineering related topics such as Building Standards. Jointly with the Engineers Board of Kenya, IEK participated on broadcast media talk show and on the print media, and articulated matters and issues engineering to a higher height of societal relevance. As a result of these engagements, IEK received feedback that Engineers now are felt more by the public than previously which means something changed and our impact is being felt.





Media coverage and media appearances

The strategic plan targeted creation of additional branches. This objective was successfully realized with the establishment of the North Rift and Nyanza Branches, bringing the total number of branches to eight and achieving 100% of the set goal. This expansion has significantly bolstered IEK's presence throughout the country, enabling enhanced advocacy for the institution at the grassroots level.

Nyanza Branch Launch

North Rift Branch Launch

South rift Branch Office Launch

The Legislative and Policy Research and Advocacy committees participated in reviewing of legislation with a view to safeguarding the interests of Engineering Fraternity. These include:

i. The Kenya Roads Board (Amendment) Bill, 2022
ii. NEMA act
iii. Roads Design Manual
iv. Draft energy (net metering) regulations, 2022
v. Draft solar water heating regulations 2022.
vi. Review of water act 2016
vii. Review of the land physical & urban development documents
viii. Urban Areas and Cities (General Regulations) 2022
ix. The Kenya Information and communication (Amendment) Bill, 2019
x. National Addressing Code.
xi. The Public Procurement and Asset Disposal (Amendment) bill 2021
xii. The Lands Control (National Assembly Bill No. 07 of 2022)
xiii. Sustainable Waste Management Bill, 2021
xiv. The Natural Resources (Benefit Sharing) Bill, 2020 (Senate Bills No. 25 of 2020)
xv. The Irrigation (Amendment) Bill
xvi. The Cotton Industry Development Bill
xvii. Draft Land Surveying and Mapping Bill 2021
xviii. Housing Bill 2021
xix. Public Service Internship Bill

The institution created the first Kenya's Infrastructure Scorecard, which was launched in 2020, and would be launching the "2023 Kenya's second Infrastructure Report Card (IRC)" which highlight the country's infrastructure status, including at the county level, and identify gaps. Engineering firms have access to a wealth of knowledge and expertise. As a result, they are uniquely positioned to produce infrastructure report cards because they can act as an authoritative intermediary between civil society and government.

Empowering Through Knowledge and Training:

Recognizing the importance of continuous professional development, IEK launched comprehensive training programs aimed at enhancing members' skills and competencies. Through webinars, capacity-building sessions, and industrial visits, members had opportunities to expand their technical expertise and hone their leadership abilities, with initiatives such as the Project Management Professional certification training garnering significant participation.

Industrial Visits

Strengthening International Partnerships:

IEK's influence transcended national borders, as the institution forged alliances with global engineering organizations, facilitating knowledge exchange and collaboration on shared challenges and opportunities. These international partnerships not only enhance IEK's visibility but also provide avenues for members to access cutting-edge resources and expertise. One noteworthy example is the recent engagement between the Ambassador of Jordan to Kenya and representatives from the Jordanian Association of Engineers, which led to a pivotal meeting with IEK. This productive dialogue resulted in the formalization of a Memorandum of Understanding (MoU) between IEK and JAE, encompassing various areas of shared interest and mutual benefit.

Furthermore, IEK has also solidified its collaboration with the IEEE – Education division, culminating in the development of another MoU. This agreement underscores IEK's commitment to fostering educational excellence and innovation through strategic partnerships with esteemed global entities.

MOU signing between IEK and African Organization for Standardization. A Strategic Partnership MoU on Collaboration in Standardization & Conformity Assessment in the Engineering Sector on 4th August 2023.

Promoting Social Welfare and Responsibility:

In line with its commitment to social welfare, IEK embarked on various initiatives aimed at supporting vulnerable communities and fostering environmental sustainability. From tree-planting activities to corporate social responsibility endeavors, IEK demonstrated its dedication to making a meaningful impact beyond the confines of the engineering profession.

A total of 8000 seedlings will be planted across the country courtesy of IEK in partnership with The Engineers Board of Kenya, Lafarge group,Bamburi cement and Kenya Wildlife Service on National Tree Planting Day.

IEK Women Engineers Committee (WEC) at KAWANGWARE INITIATIVE RESCUE CENTRE

The IEK Coast branch visited "Pahali pa Usalama Mombasa Rescue Centre" in Tudor. The center houses over 30 rescued children of all ages. This was an initiative by the coast Women Engineers Chapter.

North Eastern Branch CSR activity dubbed "Wahandisi Dhidi ya Njaa" in Magadi region, Kajiado county

On matters Social Welfare of engineers;

i. IEK held an engagement with KRA on taxation issues affecting Engineers;

ii. The institution took charge and commissioned the Mhandisi Sacco where members are encouraged to save; The Sacco currently have 140 members who have subscribed.

iii. Establishment of a Benevolent fund for all members to join by ABSA. 107 members have joined the fund so far.

iv. Founded Mhandisi Medicare for members covering range of products by AAR, 52 members have joined the scheme so far.

v. On the sponsorship front, IEK sponsored students, Graduate Engineers, Professional Engineers, Fellow Engineers to attend Conventions, Summits & International Conferences in Zimbabwe; Ethiopia; Tanzania; Uganda; Nigeria; Ghana; Sierre Leone; Rwanda; Zambia; Spain; and Portugal.

With the goal of promoting inclusivity and diversity, IEK organized a webinar to commemorate International Women's Day on March 8, 2023 and International Women in Engineering Day on 23rd June, 2023; through the Women Engineers Committee (WEC). These activities aimed to recognize the incredible work that women do every day to support lives and livelihoods in Kenya and around the world.

International Women in Engineering Day Celebrations

d. On Revenue growth

In a testament to its strategic initiatives and financial acumen, the Institute of Engineers of Kenya (IEK) has witnessed a significant improvement in revenue collection, bolstering its financial stability and sustainability. Through a multifaceted approach encompassing flagship events and innovative ventures, IEK has not only achieved surplus but also expanded its revenue sources.

Positive Revenue Trend:

IEK's financial trajectory has been on an upward trajectory, showcasing resilience and adaptability in the face of economic challenges. With revenue projections surpassing expectations, the institution experienced a notable increase from KES. 125 million in 2021 to Kshs. 172 million in 2022, reflecting a commendable growth trajectory despite prevailing economic constraints.

Diversification of Sponsorship:

A key factor contributing to IEK's financial success lies in its ability to attract a diverse pool of sponsors. Moving beyond conventional sectors such as Civil and Electrical engineering, IEK has forged partnerships with entities spanning manufacturing, telecommunications, water, and other industries. This diversification not only enriches IEK's network but also ensures sustained support and collaboration from varied sectors of the economy.

Strengthening Financial Position:

The surplus generated through enhanced revenue collection has fortified IEK's financial position, enabling the institution to pursue its mandate with renewed vigor. The financial stability attained serves as a foundation for continued growth and innovation, empowering IEK to expand its impact and influence within the engineering fraternity and beyond.

Innovative Revenue Generation:

In addition to traditional revenue streams, IEK has embraced innovative approaches to augment its financial resources. The institution has ventured into selling merchandise, tapping into market opportunities to generate additional income. This entrepreneurial endeavor not only diversifies revenue sources but also enhances brand visibility and engagement with stakeholders.

Gratitude to Sponsors:

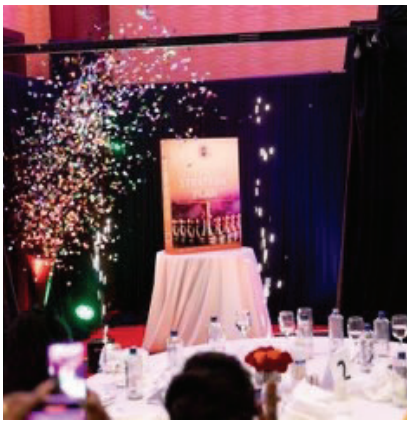
IEK extends its heartfelt gratitude to its sponsors whose unwavering support has been instrumental in driving the institution's growth and success. The collaboration and goodwill of sponsors, spanning various sectors, underscore their commitment to advancing the engineering profession and contributing to IEK's endeavors. Their partnership remains invaluable in realizing IEK's vision and objectives.

e. Governance and Institutional strengthening

In its unwavering commitment to optimizing operations and enhancing member welfare, the Institution of Engineers of Kenya (IEK) has implemented a series of strategic initiatives aimed at promoting good corporate governance, bolstering human resource capacity, and streamlining organizational processes. These efforts underscore IEK's dedication to fostering excellence and efficiency across its governance structures.

Promoting Good Governance:

Under the stewardship of the Council, IEK has prioritized the promotion of good corporate governance principles to ensure transparent and accountable decision-making processes. The development of 2024-2029 Strategic Plan, Service Charter, board plan, and ratified policies, coupled with the establishment of Standard Operating Procedures, serves as a framework for enhancing operational efficiency and organizational effectiveness.



IEK President's Dinner and Launch of 2024-2029 Strategic Plan

Expanding Office Space and Infrastructure:

Recognizing the need for expanded infrastructure to accommodate the institution's growing needs, IEK made a strategic decision to purchase additional office space at Top Plaza. With a payment of Kshs. 23 million in cash, IEK has successfully acquired the new office space, facilitated the accommodation of its burgeoning affairs and addressed the space constraints faced by the Secretariat.

Transition to Digital Operations:

In a transformative move towards automation, IEK has implemented a comprehensive Membership Management System to streamline membership processes and operations. The system, which has transitioned into the live production stage, enables members to access various services digitally, including membership applications, invoicing, Continuing Professional Development (CPD), and more. This digital transformation not only enhances member experience but also facilitates greater flexibility and accessibility, enabling members to conduct business beyond traditional working hours.

Data Privacy and Security:

In alignment with the Data Protection Act, IEK has prioritized data privacy and security, ensuring the confidentiality and integrity of member information. Through rigorous adherence to data protection protocols and robust partnerships with service providers, IEK underscores its commitment to safeguarding sensitive data and maintaining the trust of its members.

Harnessing Technology for Events:

Embracing technology as a catalyst for innovation, IEK hosted its 29th and 30th Annual International Conventions as hybrid events, leveraging virtual platforms to reach a wider audience and enhance engagement. This strategic integration of technology reflects IEK's forward-thinking approach to event management and operational efficiency.

Federation of African Engineering Organisations - FAEO's Contribution to Trade in Engineering Services.

Eng. Kazawadi Papias Dedeki - FAEO President

Bio Data

Eng. Kazawadi Papias Dedeki is the current President of the Federation of African Engineering Organizations (FAEO) and has over twenty-five years of expertise.

Eng. Kazawadi is the Immediate Past chair of World Federation of Engineering Organizations (WFEO) Committee on Anti-Corruption (CAC), the Immediate Past President of the Institution of Engineers Rwanda (IER) and the founder of STAR CONSTRUCTION AND CONSULTANCY Ltd among others. His other professional qualifications include:Mastery in Circular Economy, Construction Project Management, Arbitration and Mediation. IAPM, AETDEW, and AAET Fellow.

Eng. Kazawadi is an activist, visionary engineer, advocate, and inspirational figure driving Africa's transformation through engineering.

Eng. Kazawadi is also an entrepreneur and the driving force behind TASKS AFRICA CBC, which is a dynamic social enterprise committed to transforming the landscape of the built environment in Africa. Committed to nurturing future leaders' talents for problem-solving mindsets and advancing African Continental Free Trade Area (AfCFTA) for the "Africa we want" in 2063.

Through his desire to champion for proper shaping of Africa's destiny in engineering landscape, Eng. Kazawadi has been the catalyst for reliable solutions aimed at sustainable progress and prosperity and in an interview response to the Institution of Engineers of Kenya (IEK), he provided FAEO Contribution to Trade in Engineering Services.

Interview Questions

1 ***Kindly provide an overview of the role of FAEO in promoting engineering across the African continent?***

The Federation of Africa Engineering Organizations (FAEO) serves as a unifying force for the engineering profession in Africa, promoting excellence, innovation, and sustainability in engineering practices across the continent.

The FAEO consists of five regions CAFEO, EAFEO, NAFEO, SAFEO, WAFEO and national engineering institutions from various African countries, each representing the engineering profession within its respective country. These institutions work together under the FAEO to advance the engineering industry in Africa and address common challenges faced by engineers on the continent.

Through its member institutions, the FAEO provides a platform for engineers to access training, professional development opportunities, and resources to enhance their skills and expertise. The FAEO also in collaboration with its members and international partners organizes conferences, seminars, and workshops to facilitate knowledge sharing and collaboration among engineers in Africa.

2 *How do you perceive the significance of trade in services within the engineering sector, particularly in the African context?*

I view trade in services within the engineering sector as a key driver of economic growth, technology transfer, and capacity building in the African context. The exchange of engineering services across borders plays a crucial role in supporting infrastructure development, promoting innovation, and fostering collaboration among engineers, technologists, technicians and artisans in Africa.

As FAEO President, I am committed to fostering partnerships, promoting collaboration, and facilitating knowledge sharing among engineering organizations in Africa to create a conducive environment for trade in engineering services. I believe by working together and harnessing the collective expertise of our member institutions, we can unlock the full potential of the engineering sector in Africa and drive sustainable development across the continent through trade in services.

3 *Could you share some insights into the current trends and challenges in the service engineering sector in Africa?*

While there are promising trends shaping the delivery of engineering services in Africa, such as digital transformation, sustainability, and collaboration, there are also significant challenges that need to be addressed. Skills development, infrastructure deficits, regulatory compliance, and promoting ethical practices are among the key areas requiring attention to drive positive change and advance the engineering profession in Africa. Through continuous innovation, capacity building, and strategic partnerships, engineers in Africa can overcome these challenges and contribute to sustainable development across the continent.

4 *What potential opportunities do you see for African countries, including Kenya, in enhancing their* participation in global trade in engineering *services?*

African countries, including Kenya, have significant opportunities to enhance their participation in the global trade of engineering services by leveraging their specialized expertise, enforcing quality standards, investing in capacity building, embracing technology, fostering partnerships, diversifying markets, reforming policies, and supporting SMEs. By seizing these opportunities and implementing strategic initiatives, African engineering firms and contractors can position themselves as key players in the global market, drive sustainable development, and contribute to the prosperity of the continent.

5 *How can collaboration between FAEO and IEK contribute to the advancement of engineering education, innovation, and professional development in Kenya and Africa as a whole?*

Collaboration between FAEO and the Institution of Engineers of Kenya can have a transformative impact on engineering education, innovation, and professional development in Kenya and Africa as a whole. By leveraging their collective expertise, resources, and networks, FAEO and IEK can drive positive change, foster collaboration, and elevate the engineering profession to new heights of excellence and impact in the region

6 *In what ways do you believe trade in engineering services can contribute to sustainable development goals, particularly in the Kenyan context?*

I believe that trade in engineering services has the potential to significantly contribute to sustainable development goals in Kenya by fostering innovation, capacity building, economic growth, environmental sustainability, and regional collaboration. By embracing trade partnerships, promoting knowledge exchange, and fostering a culture of continuous learning and improvement, Kenya can harness the transformative power of engineering services to build a more prosperous, resilient, and sustainable future for its citizens and communities.

7 *Can you elaborate on any successful initiatives or projects undertaken by FAEO that have positively impacted the service engineering sector in Africa?*

The FAEO's recent participation for the first time in the African Union Ministerial Retreat on Agenda 2063 and the Retreat of the Permanent Representative Committee (PRC) on the African Union Institutional Reform, collaborative engagements with Association for Development of Education in Africa (ADEA) and the AU's African Scientific and Innovation Council (ASRIC) plus the signing of the Memorandum of Understanding (MoUs) with AfCFTA and ARSO are among the successful and impactful initiatives that have positioned FAEO as a leading advocate for the engineering sector in Africa. Therefore, through capacity building, global engagement, advocacy for excellence, innovation, and participation in key continental platforms, we are advancing the interests of engineers, promoting sustainable development, and contributing to the realization of Africa's transformative Agenda 2063. I am therefore, humbled by the lifetime opportunity to lead an organization that is making a tangible difference in shaping the future of engineering in Africa and driving positive change for the benefit of our continent and its people.

8 *How can FAEO support the efforts of IEK in promoting engineering excellence and knowledge-sharing within Kenya?*

By leveraging on existing partnerships, the support and resources contained in the signed MoUs with AU ASRIC, AfCFTA, ARSO and the Africa Asia Pacific (AAP) Accord provided by FAEO, IEK can strengthen its position as a leading engineering organization in Kenya and further its mission of promoting engineering excellence and knowledge sharing within the country. Collaboration between the two organizations can lead to mutual benefits and contribute to the overall development of the engineering sector in Kenya.

9 *From your perspective, what are the key factors driving the growth of the service engineering sector in Africa, and how can organizations like FAEO and IEK capitalize on these opportunities?*

My perspective is that growth of engineering services in Africa is being driven by several key factors such as infrastructure development, technology adoption, skills development, regulatory reforms, agenda 2063 and SDGs implementations which together present opportunities for both FAEO and IEK.

By proactively capitalizing on the opportunities presented by the growth of engineering services in Africa, FAEO and IEK can contribute to the sustainable development of the engineering sector, drive economic growth, and address societal challenges through innovative engineering solutions.

10 *What role do you envision African engineering organizations playing in shaping international standards and regulations related to trade in engineering services?*

I envision FAEO through its MoU with ARSO can empower its members by actively contributing to the shaping of international standards development and dissemination and regulations related to the trade of engineering services. This proactive engagement can not only improve the competitiveness of African engineers in the global marketplace but also promote the adoption of high-quality engineering practices that benefit societies and economies within the continent.

11 *How do you see the future of trade in engineering services evolving in Africa, and what steps should be taken to ensure its sustainable growth and competitiveness?*

The future of trade in engineering services in Africa holds great potential for growth and advancement. To ensure its sustainable growth and competitiveness, there is need for implementing the following steps, namely enhancing skills and capacity, promoting regulatory harmonisation, facilitating market access, encouraging collaboration and partnerships, investing in infrastructure, embracing technology and innovation plus advocating for policy support.

By implementing these steps, I believe Africa can foster sustainable growth and competitiveness in the trade of engineering services, positioning engineers to make significant contributions to the continent's development and prosperity. Collaborative efforts among stakeholders, investments in skills development, regulatory harmonization, infrastructure development, and embracing innovation are key strategies to unlock the full potential of the engineering sector in Africa.

12 ***Finally, what message would you like to convey to young engineers and aspiring professionals in Africa regarding the importance of trade in services and the opportunities it presents for their careers and the continent's development?***

I would convey to young engineers and aspiring professionals in Africa that trade in engineering services is not only a pathway to personal and professional growth but also a catalyst for driving sustainable development and progress on the continent. By embracing opportunities, cultivating a global mindset, advocating for professional development, collaborating with others, championing sustainability and innovation, and seizing the moment, they can position themselves as impactful agents of change in the engineering sector and contribute meaningfully to Africa's development journey.

KENYA URBAN ROADS AUTHORITY

Transforming Urban Mobility

Our MANDATE

Development & Management of the National Urban Road Network

Our VISION

'A leading Provider of Sustainable Urban Mobility'

Our MISSION

Provide & Manage, Quality, Safe, Adequate & Responsive Urban Mobility.

Our CORE VALUES

- *Equity*
- *Teamwork*
- *Integrity*
- *Professionalism*
- *Innovation*

Kenya Urban Roads Authority

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Kenya Urban Roads Authority

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The Role of Government Policies in Promoting Trade in Engineering Services

By EiK Correspondent


Picture: Courtesy

Services constitute over two-thirds of the total global gross domestic product (GDP), representing a significant economic contribution. Moreover, they consistently employ the majority of the workforce across the vast majority of nations and serve as the primary engine for job creation, driving the growth of employment opportunities worldwide. The role that services play in world trade goes beyond the national economies, as previously assumed.

Kenya has been gradually recognizing the immense potential of exporting professional services, including IT, healthcare, legal and engineering services, among others. With an ever-growing pool of skilled professionals, Kenya is well-positioned to explore global markets for professional services. Engineering services have garnered significant popularity, with a diverse range of specialties tailored to meet the demands of the global market.

How Are Engineering Services Transported?

The export of engineering services takes different forms. These are the most common ones:

Contracting: Kenyan engineering firms have successfully bid and won projects in other countries. The projects vary, from building infrastructure to providing specialized engineering solutions for industries. Apart from just the expertise, the projects sometimes involve exporting physical goods like equipment and material.

Consultancy Firms: Consultancy firms are a key driver of exporting engineering services. Firms may be hired by clients abroad to provide expert advice, design solutions, project management, feasibility studies, and other engineering-related services.

Outsourcing: Outsourcing is a trend that cuts across industries, including engineering. The allure of outsourcing mainly lies in its capacity to save costs while accessing specialised skills. Companies outsource engineering tasks to firms or individuals in other countries. These tasks include software development, CAD drafting, simulation and analysis.

Technology Transfer: Technology transfer agreements involve licensing or selling engineering technologies, patents, or know-how to companies or governments in other countries. This allows the importing entity to use the technology to develop products or infrastructure locally.

Remote Collaboration: Advances in communication technology has allowed for the export of engineering services through remote collaboration. It is no longer strange to have different engineers working on the same projects using video conferencing, project management software, and collaborative design platforms.

Training and Education: Engineering institutions or individual experts may provide training workshops, seminars, or courses to students or professionals in other countries.

Joint Ventures and Partnerships: Engineering firms may enter into joint ventures or partnerships with companies in other countries to provide engineering services locally. This could involve setting up subsidiaries or partnering with local firms to establish a presence in foreign markets.

Overall, exporting engineering services rests on the successful combination of expertise, networking, and understanding of the target market's needs and regulations.

The Role of Government Policy in Promoting Engineering Services.

While these services may be readily available for exportation, the success of that or lack thereof is heavily dependent on the policy environment of the country. A well-structured policy environment would certainly make it easier to facilitate the export of these services, while a weak one would hamper any such progress.

So far, Kenya has made commendable strides in developing and implementing policies formulated to promote the trade of engineering services. One such recent notable policy is the Kenya's National AFCFTA Implementation Strategy (2022-2027) which was launched in 2022 to diversify, consolidate and expand exports to African markets. Among the priority exports in this strategy were services such as healthcare, ICT and engineering services.

Following the launch of this strategy, Kenya's exports to other African countries increased by about 15% from the previous year, a clear indication of its success. Kenya has since maintained strong trade relationships with other African countries, which has seen growth trends in the value of its domestic exports.

Additionally, in 2018, the Kenyan government, through the Ministry of Industry, Trade and Cooperatives, launched the Integrated National Export Development and Promotion Strategy (NEDPS) which came complete with an implementation plan. NEDPS was formulated to strengthen the link Kenya needs to fully exploit her trade opportunities both at the regional and global levels. Such trade opportunities would involve the export of professional services like engineering.

NEDPS boasts a string of successes, including better access to a wider market base, provision of targeted support to the service sector of the economy and the diversification of Kenya's exports base. With this strategy, professional service providers who desire to export their services have had the opportunity to enjoy capacity building programs and access to funding.

Policy Landscape Setbacks

Be that as it may, the policy landscape suffers a few setbacks which make it difficult to realize the full potential of this industry.

Foremost, the tax environment is becoming increasingly harsh on the exporters of professional services. The Finance Act of 2022 reclassified exported services from VAT-exempt goods to standard-rate goods for which a 16% VAT is payable. The import of this amendment is that services exported by professionals, including engineers, are no longer zero-rated and as such, no tax refunds can be claimed on them. This ultimately discourages the exportation of engineering services as it eats into the profits of the exporters.

Secondly, these policies do not expressly provide for the ways in which the Kenyan government could link engineering service exporters with opportunities in overseas governments. Access to such opportunities could be made a lot easier if the Kenyan government lobbies on its citizens' behalf, as compared to if the professionals seek out the opportunities at an individual capacity.

To optimize the growth of this industry, the policy framework could use a few improvements.

A friendlier regulatory environment would be a good place to start. If the government simplifies regulatory procedures and does away with unwarranted bureaucratic barriers to conducting business in this sector, it would be much easier for engineers to export their services. This includes friendly tax laws that incentivize professional service providers and allows them to derive the full financial benefit of exporting their services.

It would also help for these policies to facilitate access to international markets by establishing intergovernmental partnerships and negotiating service export agreements. These partnerships and agreements would formally recognize the professional qualifications of Kenyan engineers, and give them the greenlight to provide their services in different jurisdictions.

A functional policy framework is essential for facilitating trade in engineering services and harnessing the huge growth potential of this sector. The government policies and initiatives currently put in place to promote the exportation of engineering services have done a laudable job so far, but there are still glaring gaps in the framework. By addressing these gaps and implementing specially targeted interventions, policymakers would create an environment that allows engineers to thrive in their trade, which would then promote sustainable economic development in the industry.

Picture: Courtesy

Engineering in Kenya Magazine Issue 15 44

Harnessing Digital Platforms for Global Reach

By EiK Correspondent

A 2019 Global Retail Study revealed that more than 50% of shoppers researched their product online before making a decision. Most purchase decisions for both services and products begin online. This means that just by not having a digital presence in this day and age, you could be missing out on a big chunk of prospective clients.

It is no longer enough to have excellent products and services, it is just as important for engineering offerings to be visible to the right clientele. When trading in engineering services, digitization not only helps Kenyan engineering firms build trust and share their robust capabilities with the local market, but it also positions them better for the global markets.

Opportunities Associated with Digitalization in the Engineering Services Sector

International Accessibility

The Internet long turned the world into a global village. What this means to engineering firms is that with digitization of their services and online marketing, a firm in Kenya can work on a joint project with a firm in Poland. Digitization improves access to the global market because it is not dependent on physical proximity.

Cost Efficiency

Unless they really have to, traders in engineering services no longer have to set aside huge budgets for international travel. Improved connectivity means client interactions do not have to happen strictly physically.

Access to Talent Pool

Kenyan engineering firms export engineering services, just as they import them. In either case, digitization promises access to specialized skills.

Optimised Productivity

Digital communication and project management platforms have led to better automation and collaboration, thus increasing the output of engineering firms.

Challenges Associated with Digitalization in the Engineering Services Sector

Digitization of engineering services, despite its good rep, comes with its own set of challenges as engineering firms seek access to clients worldwide. Some of those challenges are as follows:

Digital Infrastructure

Digitization of engineering services sometimes means heavy reliance on the digital framework of both the local and international firms. Inconsistency in connectivity of any sort can greatly hinder the progress and collaboration of projects.

Data Privacy and Compliance

Working with clients in other countries will mean data being exchanged across borders, some of it sensitive. Keeping up with the data laws and regulations of different regions and harmonizing them with the local data laws can prove a challenge to engineering firms.

Cybersecurity

Few threats are as immediate in the digital realm as cyber-attacks, especially when it comes to digitized engineering firms which handle sensitive data and whose successful execution of projects depends on connectivity. Engineering firms have to invest heavily in cybersecurity to prevent cyber-attacks that may lead to loss of data and intellectual property.

ISM Containers

A new trend that is slowly taking over Kenya's property market is the container homes. Not just container homes, but offices, restaurants, malls, luxury BnbS all built in shipping containers. In the middle of this quite unconventional yet highly effective building trend is ISM Containers, which designs, builds and delivers complete container structures – a fete that would never be achieved without their robust team of engineers. While there are many such companies that ship and transform shipping containers into complete structures, one thing that sets ISM Containers apart is there online presence and digital marketing efforts.

The digital strategy of ISM Containers is a multi-tier approach that combined optimized website and a presence is all the main social media platforms. The message for every platform has been synergized to match the target audience. Matters construction and engineering aren't exactly the stuff that you would expect to draw a huge following on social media with the technical lingo. That is why ISM Containers has instead focused on the visual elements of marketing, drawing attention to the transformation of containers to dream dwelling places.

The list of clients, both local and international, that ISM Containers has worked with is long and enviable. Their deliberate online presence and their ability to showcase their work in simple but effective manner is partly to blame for this success, and it is definitely one of the firms that trade in engineering services that have displayed the true power behind harnessing digital platforms for global reach.

Davis & Shirtliff

Davis & Shirtliff sits at the core of trading in engineering services that range from solar, to water treatment, chemicals to pumps, and smart digital technology and has been at it for the past 75 years. It is also one of the top engineering firms in Kenya that has warmly embraced digital platforms used it to expand their global reach. Their approach to digital marketing is that of using story-telling to share the impact that their products and services have heard on people. From a website that tells their range of equipment at first glance to fully embracing digital adverts, Davis & Shirtliff has built a perception of a prime engineering brand in Kenya, Africa and globally.

Conclusion

Engineering is a profession that wears a very professional, serious tag while at the mention of digital platforms, what comes to mind is the playfulness and probably a TikTok dance challenge. Marrying these two to find a perfect balance has been a challenge to many traders in engineering services who prefer to let their services speak for themselves. Those who have taken a leap and found what works for them are gaining in terms of market share. It is important that engineering service providers wake up to the latent power of digital platforms and the resulting global exposure.

Picture: Courtesy

Muthokinju Paints & Cement

The Journey of a Construction Materials Company

By EiK Correspondent

Since its establishment in 1995, Muthokinju Paints and Cement has emerged as a beacon of quality and integrity in Kenya's construction industry. Over the years, the company has grown to become a leading distributor of paints, paint accessories, cement and waterproofing products, earning the trust and admiration of customers across the nation. As a Certified ISO 9001 Company, Muthokinju is devoted to upholding exceptionally high standards to ensure the provision of the best products for the protection and aesthetics of all surfaces.

At the core of Muthokinju's operations are its core values: Integrity, Humility, Efficiency, Agility and Reliability. These values serve as the guiding principles that shape the company's culture and inform its actions. Integrity is paramount, guiding every decision and interaction to ensure honesty, transparency and ethical responsibility. Humility fosters a culture of openness, learning and continuous improvement, while Efficiency drives optimization of processes and operations to deliver value in a timely and cost-effective manner.

Agility enables Muthokinju to adapt swiftly to market dynamics, seizing opportunities and staying ahead of the curve, while reliability cements the company's reputation as a dependable partner customers can count on. These values are not mere words but are deeply ingrained in Muthokinju's DNA, guiding every aspect of its operations.

In addition to paints, paint accessories, cement and waterproofing products, Muthokinju offers a comprehensive selection of building and construction materials, including tiles, steel, iron sheets, door locks, power tools and gypsum boards. This extensive product range ensures that Muthokinju is a one-stop destination for all building and construction needs, providing convenience and efficiency for its customers.

Whether it's a large-scale construction project or a DIY home improvement endeavour, you can trust Muthokinju to deliver top-quality products and exceptional service. With a team of knowledgeable professionals dedicated to understanding customers' unique needs and offering personalized guidance and support, Muthokinju is committed to building long-lasting relationships and empowering customers to bring their construction projects to life with confidence and ease.

In summary, Muthokinju Paints and Cement stands as a testament to excellence, integrity and reliability in Kenya's construction industry. With its unwavering commitment to quality and customer satisfaction, Muthokinju continues to set the standard for excellence, driving the industry forward and empowering customers to achieve their construction goals.

Picture: Courtesy

IEK'S ENGINEERING MARVEL

SOUTH RIFT BRANCH UNVEILED IN NAKURU CITY!

By EiK Correspondent

In a historic moment, The Institution of Engineers of Kenya (IEK) joyously celebrated the grand inauguration of the first branch office; the IEK South Rift Branch office in the vibrant city of Nakuru on the 16th of February ,2024.

Eng. Harrison Keter - Chairman, IEK South Rift Branch took the the privilege to welcome the presence of notable dignitaries, including H. E David Kones - the Deputy Governor of Nakuru, Eng. Erick Ohaga, the President of the Institution of Engineers of Kenya, Eng. Peter Njenga – the Managing Director, and CEO of Kenya Electricity Generating Company PLC (KenGen), Eng. Margaret Ogai the Registrar/CEO of the Engineers Board of Kenya, as well as Council Members of the Institution of Engineers of Kenya.

The establishment of the South Rift Branch office in Nakuru City stands as a testament to IEK's dedication to fostering growth and development in the engineering domain and would serve as standing pillar in service provision to members from the regions of Nakuru, Bomet, Baringo, Kericho, Narok, Nyandarua and Samburu. This significant milestone underscores IEK's unwavering commitment to its core mission of the IEK Council that ensures for the continued improvement of the performance in service delivery to members and engineering service to the nation. The accomplishment displays IEK as a model institution for other professional institutions in the country and beyond.

The IEK Council extends sincere gratitude to Kenya Electricity Generating Company PLC (KenGen) for their invaluable support in making the launch of the Nakuru City Branch a resounding success. Your commitment and generosity turned our vision into reality and the management of the IEK council is proud to have partners like you standing with us as we expand our reach and impact.

Your support goes beyond mere sponsorship; it reflects a shared commitment to the advancement of engineering excellence and the growth of our professional community. As we express our gratitude, we also acknowledge the role your organizations play in driving progress and fostering a culture of excellence within the engineering community.

The launch of the Nakuru City Branch marks the beginning of a new chapter for IEK, and we look forward to achieving even greater heights with your continued support as we challenge ourselves on opportunities that lie ahead and the positive impact we can collectively make in the field of engineering.

The institutional' vision for growth and development in the engineering sector reflects a harmonious collaboration amongst all sectors of interested parties, creating a unifying factor that will undoubtedly have a lasting impact. This cooperative effort serves as a beacon for future initiatives, showcasing the positive outcomes that can be achieved when industry leaders come together to support a common cause.

Navigating Trade Barriers

Challenges Faced by Kenyan Engineering Service Exporters

By EiK Correspondent

Kenya is an increasingly evolving economy that has been slowly embracing the export of business and professional services, such as engineering, as a vital component of its economic growth plan. As of 2024, Kenya is one of the leading exporters of services both in Sub-Saharan Africa and the East African Community. With a broad array of highly-developed service industries, the country stands out as a key player in the service export space, and has great potential to grow its economy by promoting this sector.

However, professional service exporters often encounter certain hurdles that threaten their access to global markets.

In the engineering industry particularly, service exporters face challenges that limit their ability to compete favourably on the international stage. Such barriers in effect hinder the expansion of Kenya's engineering sector into global frontiers, which then hampers the country's capacity to exploit the potential of the sector.

The harsh regulatory environment in international markets is a huge drawback for engineering service exporters in Kenya. The strict and complex licensing requirements and certification processes make it difficult for Kenyan engineers to navigate. Moreover, the absence of a harmonized regulatory framework further complicates market entry since it requires engineering exporters to re-structure their services to meet the requirements of every individual foreign market.

Inefficiencies occasioned by bureaucratic red tape also contribute to the myriad of challenges faced by Kenyan engineering service exporters. Overly intricate customs processes and administrative delays not only lengthen the period required to meet regulatory requirements, but also inflate operational costs and water down the competitiveness of Kenyan engineering service exporters on the global stage.

Aside from regulatory limits and red tape, this sector faces several non-tariff barriers such as labour standards, subsidies and quality standards. Thanks in no small part to these barriers, domestic firms have a competitive edge over foreign players, which creates an uneven playing field for Kenyan engineers who are looking to export their services. With these barriers in the way, it becomes extremely difficult to thrive in global markets.

To address these barriers, all stakeholders in this industry, including policymakers, must join hands to develop functional strategies that would improve access of international target markets.

Negotiating trade agreements with governments in target countries is a good place to start. The existence of bilateral and multilateral agreements would make foreign technical standards and market entry requirements more favourable to engineering service exporters and facilitate easier market access.

Making deliberate efforts to get rid of bureaucratic barriers to the export of engineering services would stimulate trade in this sector. This can be done by implementing measures that would streamline administrative processes and allow exporters to make maximum profit with minimal operational costs.

Equally important would be to invest heavily in capacity-building initiatives that refine the technical capabilities of engineering service providers and improve their ability to compete globally. With up-to-date technical engineering skills, Kenyan exporters would have no problem competing with their international counterparts in foreign markets.

There is need for the Kenyan government to inject resources into research to help both firms and individual exporters track and evaluate new competitive developments globally. Such information will greatly help exporters sustain and improve their positions in international markets. Moreover, it will guide them in developing effective marketing strategies that appeal to international target markets. This way, exporters would be able to keep abreast with all changes in the international space and tailor their services to the preference of their potential customers.

There is an urgent need for collaboration between the private and public sectors of this industry to address the multi-layered challenges faced by engineering service exporters. Engaging in productive dialogue and consulting with all the key players in the industry would be a step towards the right direction for as long as achieving the objective of global expansion performance remains the primary goal.

While Kenyan engineering service exporters encounter formidable challenges in gaining access to global markets, there are several opportunities for growth and innovation in the industry. By taking the necessary steps towards overcoming these hurdles, Kenya can realize the full potential of this sector and solidify its position as a competitive participant on the international stage.

Picture: Courtesy

Investigation of the Root Causes of High Transformer Failures on the 33 kV Feeder

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1. Introduction

Good quality of power supplies and system loss reduction are one of the Kenya Power (KP) key pillars for sustainability of the company's profitability path [1]. The latter constitute both technical and commercial losses. Unserved units are categorized as commercial losses and are usually associated with system power outages; planned or unplanned. The unplanned power outages are mainly attributed to system disturbances such as system faults or breakdown of electrical equipment. One of the critical electrical device in the company is distribution transformer which enables the power utility to supply electricity to consumers by stepping down high voltage to a low voltage appropriate for use in domestic, commercial and industrial connected loads. Transformer is designed to have a service life of approximately >35 years [2]. It is imperative to note that, faulty transformer inconveniencies power end users. This is mainly because power supply is interrupted for a prolonged period before the faulty transformer is replaced or repaired. Although there are more distribution transformers as compared to power (primary substation) transformers, the fault diagnosis of distribution transformers is paid less attention compared to power transformers. This is due to the fact that they are not as expensive as latter and also due to large volume of distribution transformers in the network. Currently, the Kenya network has an estimate of seventy thousand plus (70k+) installed distribution transformers countrywide with total demand capacity of approx. 9,000 MVA.

Transformer failure can be attributed to several causes as shown in Figure 1. As depicted in the Figure, it is difficult to identify the specific transformer failure cause due to many independent variants involved [3]. For instance, a sustainable fault due to low voltage conductor short-circuits or a high impedance earth fault could have devastating degradation to transformer insulations if the low voltage (LV) fuses do not operate within a reasonable time.

Picture: Courtesy

This study investigated the feeders with highest number of distribution transformers failure. From the data obtained, the case study feeder (A) was among the feeders with the highest number of distribution transformer failure rate countrywide as depicted in Table 1.

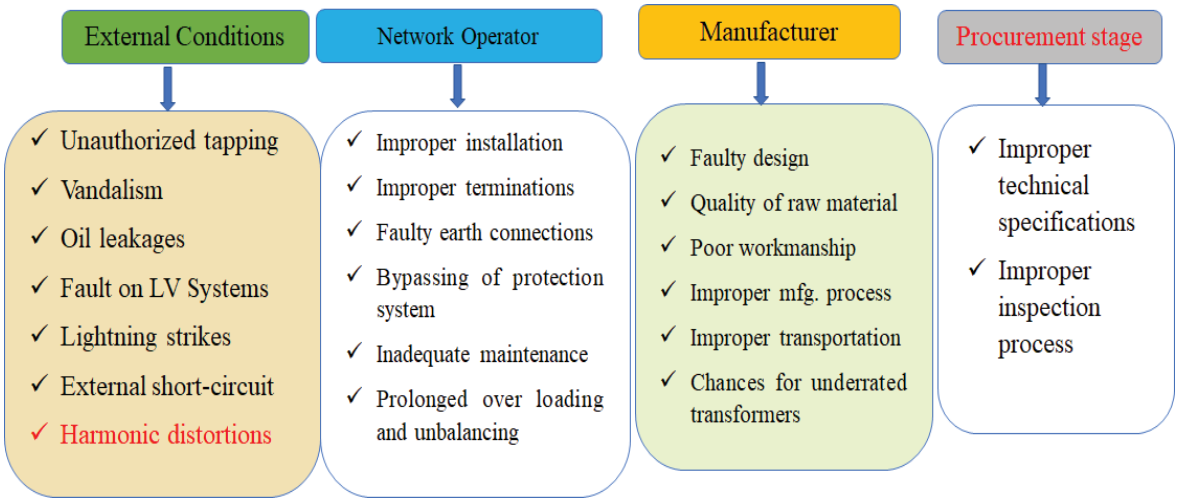

Fig. 1: Probable causes of transformer failure

Table 1: Feeders with highest distribution transformers failure rate

No	Feeder name	Feeder line voltage (kV)	No. of transformers failed past one year
1	A	33	80
2	B	33	52
3	C	33	41

From the Table, it's clearly seen that feeder A is the leading with the highest number of failed transformers over the study period (one year period). The salient dominators of the three problematic feeders were that the three feeders are located within one region and are 33 kV line to line nominal voltage.

2. Methodology

Both quantitative and qualitative data gathering were deployed during this study. Primary data was obtained from logged power quality analyzers (PQAs) installed at feeder source, that is, at primary substation. Questionnaires were also used to collect data such as frequency of transformer failure at each of the installation site among others. Secondary data gleaned entailed number of incidences recorded for each feeder. The data gathered was analyzed using available software to generate the report on the field findings. Different strategies were employed by the team during the exercise, which were namely;

i. Administering of questionnaires
ii. Feeder ground patrol
iii. Installation of power quality analyzer at primary substation

Figure 2 depicts the feeders' area coverage. As can easily be seen, the feeders are widespread and cut across vast geographical area.

Fig. 2: A feeder circuits

3. Field Results and Discussions

Following are field findings and discussions of the field data obtained;

3.1 Questionnaire analysis

Seven (7) respondents dully filled the questionnaires. The responses provided were as per Table 1.

Table 2: Probable root causes of high transformer failure rate supplied by feeder A

Main causes of the high failure rate of the transformers installed along this feeder (Suspected cause)	No. of responses	Agree/ strongly agree	% of agree/ strongly agree
Lightning strikes	7	6	86%
Vandalism	7	5	71%
LV system	6	4	67%
(a) Transformer overload	7	4	57%
(b)Overgrown vegetation along the LV network	7	5	71%
(c) Over-rated fuses	7	6	86%
(d)Lack of earthing	5	4	80%
(e) Missing arcing horns	7	5	71%
(f) Phase loading imbalances	6	4	67%
(g) Over distance	7	5	71%
(h) Sagging conductors	7	5	71%
(i) Lack of surge diverters	7	6	86%
Broken Bushing/ Rods	7	2	29%
Burnt Bushing/ Rods	6	2	33%
Accidental damage	7	1	14%
Failed on commissioning	7	0	0%
Lack of training of the teams in construction standards and transformer maintenance	7	4	57%
Lack of maintenance materials	7	5	71%

From the team responses shown in Table 1, the following were deduced;

i. The possible leading causes of transformer failure are lightning bolts, overrated fuses and lack of surge diverters. This is because they were rated as the highest causes by 86% of the responses. Other mentioned causes include; poor earthing, vandalism, overgrown vegetation along the LV network, missing arcing horns, over distance, sagging conductors, and lack of maintenance materials.

ii. Transformers failing on commissioning, accidental damage and broken bushing/rods were rated least as the probable root causes of high failure rate of distribution transformers supplied by the study feeder.

iii. Mitigation measures proposed to address the root causes of high rate failures of the transformers were two-folds; short term (low lying fruits) measure: LV network inspections and maintenance, intensive training of the inspection and maintenance team members. On the other hand long term measures proposed include adequate provision of materials such as surge diverters and earthing rods and shortening of feeder length by converting some of 33 kV feeder spurs to 11 kV by introducing 33/11 kV step down transformers.

3.2 Feeder ground patrol findings and discussion

The team carried out ground inspection on sampled sections of the feeder. During the ground inspection, several irregularities were noted that required to be addressed. The main anomalies observed were as listed hereunder.

i. Few distribution transformers were noted to be missing surge diverters thus likely to be exposed to lightning strikes that are rampant in the region.

ii. Some earthing rods were observed not properly terminated. This could result to poor earthing of the installed equipment with mass of the earth.

iii. There were several sections of the feeder where the team noted over-grown vegetation. This could result to high impedance earth fault when vegetation branches are in contact with live conductor.

iv. The team also observed several transformers low voltage (LV) circuits installed with overrated fuses. In case of LV circuit conductor crashing/short- circuit, transformer feeds the fault with high current resulting to over-heating/ deteriorating of the transformer windings.

v. Some of the transformers were noted to have misaligned arcing horns. Arcing horn is a device that discharge the lightning strikes surges without been damaged or getting worn-out. It is the first protection device to discharge/ quench the voltage surges safely to the ground. When it is absent or misaligned, surges pass through the surge diverter that may cause it operate/ get damaged.

vi. Few incidences of third parties interferences were observed. There were several illegal lines as well as vandalized transformers noted at the tail end of the feeder (farthest end of the feeder).

3.3 Analysis of PQAs captured data

a. PQAs gleaned data

Two PQAs were installed at 132/33 kV substation; one at HT (transmission line- 132 kV) and the other at 33 kV (feeder output) of step down 132/33 kV, 23 MVA transformer. The PQA installed at former installation failed to capture the data (was noted later it malfunctioned) and therefore this section gives the analysis of the quality of power at secondary side of the transformer, that is, bus bar of 33 kV feeder. From the data downloaded from the PQA, it clearly shows that there are more incidences of high voltage than voltage dips. Voltage swell are noted to occur mainly in the evening after peak load. It was interesting to note that Blue phase had highest incidences of high voltage. The reason was yet to be identified as there was no data captured on 132 kV bus bar. This can be seen in Figure 3.

Worth mentioning is feeder power factor which was noted to be capacitive, that is, a leading PF. This is well depicted in Figure 4. This shows the ripple effect of Ferranti phenomena, during the feeder light loading as shown in Figure 5.

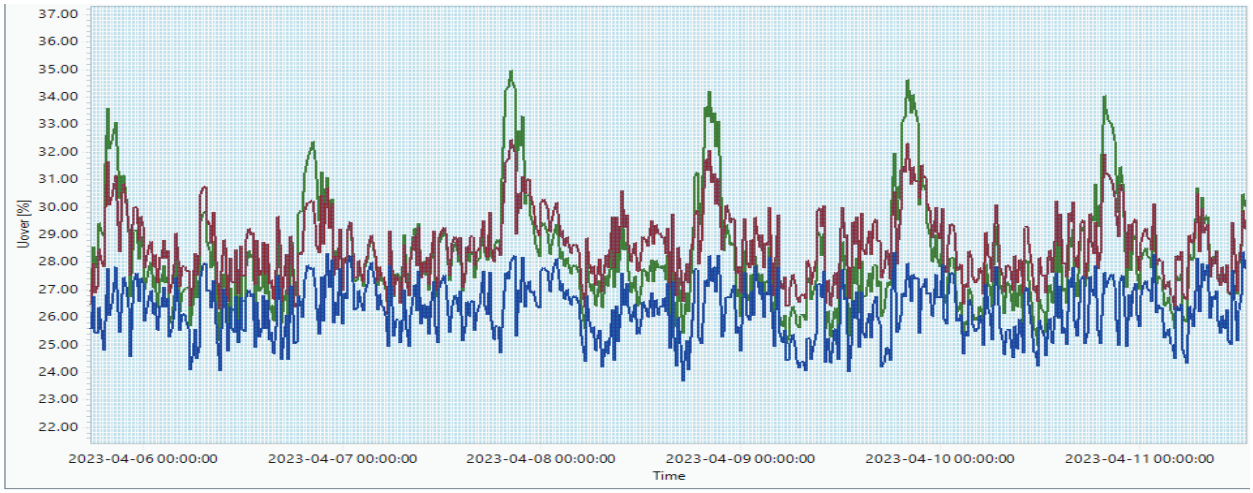

Fig. 3: Voltage deviations

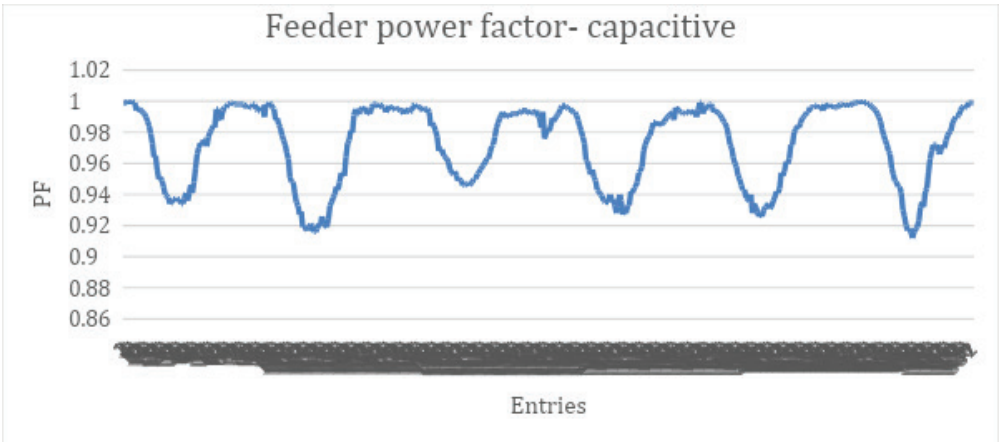

Fig. 4: Feeder power factor that shows is capacitive

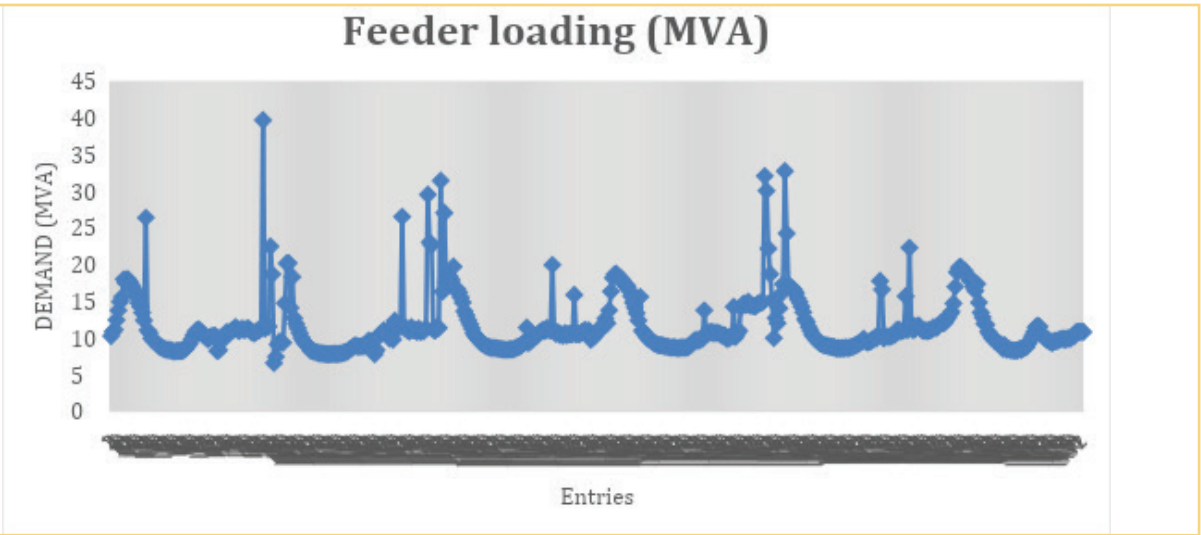

Fig. 5: Feeder loading (MVA)

From Figure 5, it clearly shows that the feeder maximum loading recorded during the data logging period was approx. 40 MVA with an average loading of 11 MVA.

4. Challenges Encountered

There were myriad of challenges the team encountered. Some of the challenges include;

i. Delay in obtaining access permit to install the two PQAs at primary 132/33 kV substation.

ii. Site inaccessibility. There was heavy downfall that made mode transformers difficult to reach flagged for inspection.

iii. Insufficient time to inspect the critical transformers targeted, thus the team sampled just a few that were easily accessible.

iv. The PQA installed at HT side of the 23 MVA transformer malfunctioned, hence no data was captured.

5. Conclusions

This case study investigated root causes of high failure of distribution transformers, that is, ailing factors that were assumed to contribute to the high failure rate of the installed distribution transformers supplied by a 33 kV feeder. Some of salient irregularities observed were missing surge diverters, misaligned arcing horns and over- grown vegetation.

6. Recommendations

From this study, it is strongly recommended that the in-charge O&M team ameliorate anomalies identified to a completion. The investigation team to keep close monitoring and evaluation of the feeder performance and continue supporting the O&M team for any technical assistances.

Acknowledgement

This study was successful due to unwavering support of Institute of Energy Study and Research (IESR). The profound support of the O&M team, from the case study county, contributed immensely to completion of this study.

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Picture: Courtesy

Eng. Sammy Tangus

Meet the Treasurer of IEK Editorial Board

When you immerse yourself into a passion of yours, you fail to notice how much time has gone by. A case in point is Eng. Sammy Tangus, Treasurer of the Editorial Board of The Institution of Engineers of Kenya since 2017, a fact that surprised even him! In this time the magazine has undergone definitive changes that has propelled it to be Kenya's premier engineering publication.

Well-spoken and articulate, Eng Tangus has been in the industry for over 30 years, specializing mainly in the road sector. He has been Chairman of two Boards; Kenya Postal Corporation and Kenya Year Book Editorial Board. He is now part of the Executive leadership of Engineering in Kenya magazine and the African Journal of Engineering, Research, and Innovation (AJERI).

What are the highlights of your time on the IEK Editorial Board?

For once engineers have an avenue for channeling their ideas, experiences, challenges etc, through a written publication. Secondly, we have an established channel for informing our engineers about developments in different industries within the engineering spectrum, both locally and globally. This publication also serves as a voice for the student engineers. Generally it is a good space for the engineers to channel their vision, their thinking, their research and all issues that affect engineers from their perspective

How do you see to it that difficult concepts are explained in a manner that is easy to comprehend while also maintaining the technical accuracy?

The editorial policy is to make sure that the copy is as simple as possible, much as it speaks mainly to engineers. This publication is meant for engineers to get out information that they previously may not have been able to share. Engineers and people in the sciences share the belief that their work should speak for itself. In the current world, you have to communicate and get your ideas across in a manner that is understood because that is what engineers do – we provide solutions to the everyday challenges; so we must be able to communicate our role simply and effectively. This way even people who do not belong to the field may gain an understanding and appreciate our roles and the solutions we provide.

What changes have you overseen during your time on the board?

The circulation of the magazine has increased, so has the quality. These has generated interest and participation by the engineers in the public and private sector, regulators, and policy makers. Notably, the circulation outside Kenya, in Africa and the world has been the tremendous. The feedback from other engineering institutions on the magazine has been positive and very encouraging.

How do you keep abreast with all the changes and developments in the engineering world?

IEK now has a journal that captures current trends and research in the engineering world. Sitting on the editorial board means taking deliberate steps to stay informed. This means attending symposiums, conferences and reading widely. I now have a deep appreciation of the various roles played by the different engineering fields and professional bodies – and how they are interlocked in order to achieve the same goal. .One thing this experience has led me to deeply appreciate the role synergy plays in realizing goals and shaping policies in the industry.

What would you highlight as the biggest personal success during your time?

Personal success to me is not measured in material things, but rather the legacy you leave behind through mentorship. Sharing the experience I have, guiding younger engineers and imparting in them knowledge and skills that has transformed them into highly capable, professional people is to me my biggest personal success. Mentorship is very pivotal to me because you have to look at the future and you need to make sure it rests in the hands of people who are capable, even when you are no longer active or have hanged you boots..

What is the biggest challenge you face in your position?

We share the same challenge that affects many other sectors of our country, that is, bad politics anchored and driven by personal interests as opposed to greater good. Having served on various boards, the goal is to make sure it does not affect our output, but it gets more difficult when the forces are external and have influence on one. My observation is that personal and unfortunately short-term issues tend to cloud the greater picture.

What is the direction you would like the magazine to take?

I am seeing a future where this magazine will be the one-stop shop for everything engineering. Not only should it be able to inform, but it ultimately should shape policy development and agenda, contribute to development, and impacts of the society through providing ground-breaking, wholesome information and ensure sustainability.

What is your final word?

I would like to call upon the engineering fraternity to support the magazine, so the country is well informed, and our development is anchored on sustainable engineering solutions. There is a need to jealously guard the tenets, and principles of engineering and to synergize in order to achieve greater goals. I hope we shall one day have a vibrant engineering research in Kenya driven by the Universities and supported by the Private and Public sectors.

How do you regard the influence of digital media on the magazine, is it complimentary or do you like many other print industry professionals decry its impact on print publication?

If anything, the impact has been largely positive because the circulation has greatly increased. With the click of a button, we can reach our members and distribute our soft copies. The magazine can now easily be shared beyond our borders. On sustainability, digital platforms have greatly lowered our production costs, which is also one of our ultimate goals. This is not to say that the hard copies will go away, those will be around for a long time. It is up to us to diversify and embrace the positives of the digital platforms.

IEK LAUNCHES THE INFRASTRUCTURE REPORT CARD (IRC)

By EiK Correspondent

The Institution of Engineers of Kenya (IEK) during *President's Dinner 2024* in partnership with the Engineers Board of Kenya (EBK), jointly launched the Infrastructure Report Card (IRC), on 15th, March ,2024. The IRC is a research-based project with the objectives centred around capacity assessment of the country's infrastructural investment.

Among key personalities who graced the event include the PS, State Department for Roads, Eng. Joseph Mbugua, CBS; CEO & MD KPLC, Eng. Dr. Joseph Siror; CEO & MD KENGEN, Eng. Peter Njenga; Director General KURA, represented by Eng. Oginga; Chairman EBK, Eng. Erastus Mwongera, CBS, Registrar/CEO EBK Eng. Margaret Ogai together with other dignitaries.

The convergence of the top-notch industry leaders symbolized a momentous occasion for collaboration and knowledge exchange within the engineering sectors. The delivery of the IRC highlighted the dedication and expertise of engineering professionals in advancing Kenya's infrastructure and technological development.

The main aim of IRC is to deliver a scorecard on the nine major subsectors of the economy components highlighted below:

i. Transportation-Rail, Roads, Airports, Water Transportation.

ii. Water and sanitation-Water supply, Solid waste Management, Sanitation and Wastewater, Sector Coordination and Regulation

iii. Energy- Electricity, Oil and Gas and Other Energy Resources.

iv. Production and manufacturing- Manufacturing Industry, Processing Industry, Assembly Industry, Informal Manufacturing Sector and Cottage Industry

v. Building sector -Residential and Non -Residential

vi. Agriculture sector-Crop Farming, Livestock Farming, Aquaculture Horticulture, Supply Chain and Value Addition

vii. Telecommunications sector- Fibre Infrastructure and Wireless Network

viii. Coverage health sector-Health Facilities, Medical devices, equipment, and hospital supplies, medical insurance services and Pharmaceuticals

ix. Education sector -Basic Education, Tertiary Education, the ECDE Sub-sector, the Primary Sub-sector, Secondary Sub-sector, TVET, University Sub-sector, Adult and Continuing Education.

The Infrastructure Score Card Report covers the above main sector areas and has the scope of assessments covering infrastructural capacity and gaps assessments, emissions controls, accessibility, quality controls, and technological advancements.

The Council and management of IEK extends gratitude to the key sponsors of the Presidents dinner. These are: CHINT, KPLC and KURA who made this event success.

Chairperson of IRC Taskforce – Eng. Jennifer Korir

Country manager West Asia & Africa, CHINT Ms. Amy Fan-giving remarks about IRC

Official launch of IRC

MD KPLC, Eng. Dr. Joseph Siror leads cake-cutting celebrations to mark the official launch of IRC Report

PS, State Department for Roads Eng. Joseph Mbugua, CBS, receiving the honours of admission into the college of fellows, IEK.

Technoeconomic Analysis of Hybrid Solar-Diesel Minigrids in Kenya:

A Case Study of the Retrofitting Eldas Diesel Minigrid - Pilot Site

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Picture: Courtesy

1. Introduction

Over the years diesel generators in Kenya have been used to power households in off-grid rural setups and towns where the extension of the grid is prohibitively expensive. The use of diesel generators has been preferred due to their capability to supply power for 24 hours. However, the increased fuel prices and harmful carbon emissions have made the use of diesel generators only unattractive and expensive. Renewable energy systems on the other hand have been adapted due to the concerns of greenhouse gas emissions, which are contributing to climate change (Yamegueu et al. 2011).

The use of hybrid systems (diesel and solar and storage) is gaining popularity, because the use of solar energy is maximized during the day, the stored energy in batteries is maximized during the night and optimal-sized diesel generators are used to supply extra power that may be required during the peak and night hours hence ensuring reliable power. In addition, other benefits accrued include; adoption of renewable energy systems, reduction of fuel costs and reduction of carbon footprint.

To this effect, the Ministry of Energy in Kenya is supporting the Rural Electrification and Renewable Energy Corporation (REREC) and Kenya Power & Lighting Co. Ltd (KPLC) to hybridize 18 sites. The ministry of energy spends about Ksh. 62.7 million on diesel fuel costs for Eldas power station and Ksh. 5 billion for all the 23 diesel powered mini grids in off grid areas on annual basis. In this paper, we focus on doing a techno-economic analysis of hybridizing the diesel minigrid site in Eldas, Wajir County.

Numerous authors have conducted techno-economic analysis in various parts of the (Asrari et al. 2012; Himri et al. 2008; Nema et al. 2009; Rehman and Al-Hadhrami 2010; Said and Ahmed 2014; Yamegueu et al. 2011), however, we have not come across any published work for Kenya on techno-economic analysis of hybridizing the diesel minigrid site in Eldas.

2. Methodology

2.1 The existing layout of Eldas hybrid minigrid

Eldas' power plant currently consists of a 300kVA diesel generator operational since 2016, a 36kWp Solar PV power plant installed in August 2015 and one 1MVA 415V/33kV step-up transformer. The solar plant has not been operational for some time.

2.2 Solar radiation analysis from satellite data

The Global horizontal irradiance (GHI) and temperature for the Eldas area ranges from 5 kWh/m2 to 6.3 kWh/m2. Temperature in the area ranges from 200C to 36 0C.

2.3 The daily energy demand profile

The daily energy demand for Eldas varies from a minimum of 45 kW during the day to a peak load of 145 kW at night as shown in Figure 1 below.

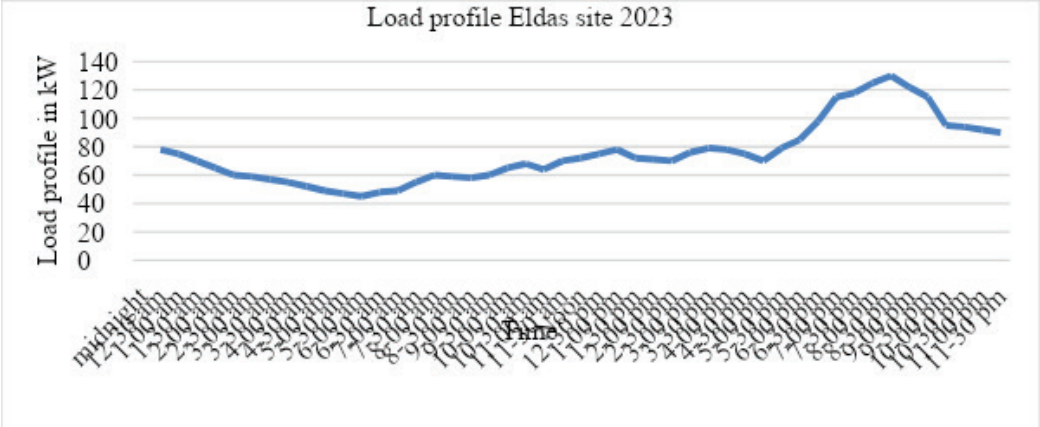

Fig 1: Daily energy demand profile for Eldas

2.4 Hybrid minigrid sizing and simulation

Design and sizing was carried out as detailed below and verified by simulation using Homer software as shown in Table 1 and 2.

Table 1: Solar PV plant sizing

Peak load	2% yearly load increase in Zero year	6.5% yearly load increase	5% yearly load increase	22% (Losses factor)
145 kW	147.9 kW	202.6 kW	259 kW	315.5 kW

Table 2: Generator sizing

Peak load	2% yearly load increase in Zero year	6.5% yearly load increase	5% yearly load increase	30% (Losses)	1/6	1/6	1/3	1/3
145	147.9	202.634	259	336.2	56.03	56.0	112.1	112.1

The distribution of the nominal power of the diesel generators is calculated as follows (33%/33%/16.7%/16.7%) as shown in Equations 1 and 2; to allow for the flexibility of picking load step-wise as it increases. Therefore, power per genset (at prime power)

$$\frac{Pnorm}{6} = \frac{336}{6} = 56 \text{ kVA} \quad \text{with a +/- 20\% margin} \qquad (1)$$

$$\frac{Pnorm}{3} = \frac{336}{3} = 112\text{kVA with a +/- 20\% margin.} \qquad (2)$$

Thus, the total kVA prime rating is 400 kVA with the sizes are; generator 1 – 65kVA, generator 2 – 65kVA, generator 3 – 135kVA, and generator 4 – 135kVA

Battery sizng was carried out as detailed below. The energy storage capacity for the battery is determined as shown in Equation 3

$$Energy\ storage\ capacity = Power\ requirment\ x\ duration\ of\ back\ up\ power\ (hours)$$

$$= 259kW\ x\ 1\ hr = 259kWh \qquad (3)$$

Table 3 shows the parameters used to calculate the battery capacity.

Table 3: Battery capacity parameters

Energy storage capacity kWh	Days of Autonomy	Battery efficiency	Depth of discharge	Battery capacity kWh	C-rating
259	1.5	0.98	0.8	496 kWh	1C

Actual battery capacity is calculated using Equation 4

$$= \frac{Energy\ storage\ capacity * Days\ of\ Autonomy}{Battery\ efficiency * Depth\ of\ Discharge} = \frac{259\ x\ 1.5}{0.98\ x\ 0.8} = = \ 496\ kWh \quad (4)$$

The battery selected is made of Lithium Ion and has 14 cells of 3.2 volts 280Ah. Therefore the battery voltage is as shown in Equation 5.

$$3.2V \times 14 \ = \ 44.8V\ at\ 280Ah\ (12.544\ kWh) \quad (5)$$

One battery string has 17 batteries connected in series of 12.544 kWh each. Therefore, one pack has 213.25 kWh as shown in Equation 6.

$$17\ x\ 12.544 \ = \ 213.248\ kWh \quad (6)$$

The battery string voltage is as shown in Equation 7. This voltage is within the converter ouput voltage (40 V-900 V) and the battery inverter input voltage (600V-900V).

$$44.8V \times 17 \ = \ 761.6\ V \quad (7)$$

The number of battery strings required to meet the actual energy battery capacity is as shown in Equation 8. The total actual energy capacity is 639.744 kWh as shown in Equation 9.

$$496/213.25 \ = \ 2.3\ strings \approx 3\ strings \quad (8)$$

$$213.248\ x\ 3 = 639.744\ kWh \quad (9)$$

2.5 PV module, inverter, converter capacity calculation and selection

The solar PV panel selected was monocrystalline 540W and the parameters for the module at standard test conditions include; Open–circuit voltage (Voc) 49.6 V, Short-circuit current (Isc) 13.86 V, Operating voltage (Vmpp) 41.64 V and Operating current (Impp) 12.97 V, Temperature Coefficient of Voc 0.26%/°C . The DC-DC converters (model PDS1-400K) selected are modular in design and housed inside a cabinet that can hold up to 8 pieces of the modular converters. Each modular converter is rated at 50kW with an input current of (0-130 A) and an input voltage of (250-800V). The cabinet is rated at 400kW. Therefore, the sizing of the PV array is as shown in Equation 10.

$$\text{No of panels} = \frac{315{,}900\ W}{540\ W} = 585\ pcs \quad (10)$$

The voltage and current of the PV string should be within limits of the 50 kW converter input current and voltage levels. One string comprises 15 panels with a Voc of 744 V as shown in Equation 11, while Equation 12 shows the Voc with consideration of temperature coefficient of 0.26%/°C .

$$V_{oc} = 49.6\ V \times \text{No. Of panels per string (15)} = 744V_{oc} \quad (11)$$

$$744V\ x\ [1 + (25^0C - 20^0C) x\ 0.26\%)] = 753.67\ V_{oc} \quad (12)$$

$$585\ \text{panels}/15\ \text{panels per string} = 39\ \text{strings}$$

The string current (Isc) is 13.86A and the number of strings per DC-DC combiner in use is 6. The maximum string array current per DC – DC converter,peak power per converter and selected string DC-DC converter rating are as shown in Equations(13,14,15) respectively.

$$=13.86\ A\ x\ 6 = 83.16A \quad (13)$$

$$\text{Peak power per converter} = 15\ \text{panels}\ x\ 6\ \text{strings}\ x\ 540W = 48{,}600W \quad (14)$$

$$39\ \text{strings}/6\ \text{strings per converter} = 6.5 = 7\ \text{converters} \quad (15)$$

The available capacity for the designed value for the string DC-DC Converters is 50 kW. Therefore 7 DC-DC converters are used for this system.

2.6 Battery Inverter sizing

The loads supplied are AC in nature thus there is a need to use a battery inverter for converting DC output to alternating current (AC) therefore; six inverters of 62.5 kVA were selected for this hybrid plant as shown in Equation 16. The

cabinet holding 8 pieces of inverters is rated at 500kVA. The inverter is selected in such a way as to achieve an AC-to-DC ratio of 1.0 to 1.25 as shown in Equation 17.

$$\text{Payback period} = (Capital\ cost\ in\ Ksh)/(\ Avoided\ fraction\ of\ fuel\ cost\ annually\ in\ Ksh\ -\ O\&M\ cost\ (2\%\ of\ capex)) \quad (18)$$

The selected inverter model PWS1-500KTL-NA specifications include a nominal power of 500 kVA, battery voltage range of (600-900V), DC current of 837 A, AC voltage of 400 V, and AC current of 720 A. In addition, two isolation transformers are also provided each rated at 200kVA.

2.7 The Eldas hybrid Minigrid schematic/single line diagram and homer simulation extract

System Architecture

Component	Name	Size	Unit
Generator #1	GEN 1. 65 KVA / 52 kW	52.0	kW
Generator #2	GenGEN 2. 65 KVA / 52 kW	52.0	kW
Generator #3	GEN 3. 135 KVA / 108kW	108	kW
Generator #4	GEN 4. 135 KVA / 108kW (1)	108	kW
PV	Generic flat plate PV	316	kW
Storage	Generic 1kWh Li-Ion	640	strings
System converter	System Converter	375	kW
Dispatch strategy	HOMER Load Following		

Fig 2: Homer simulation extract

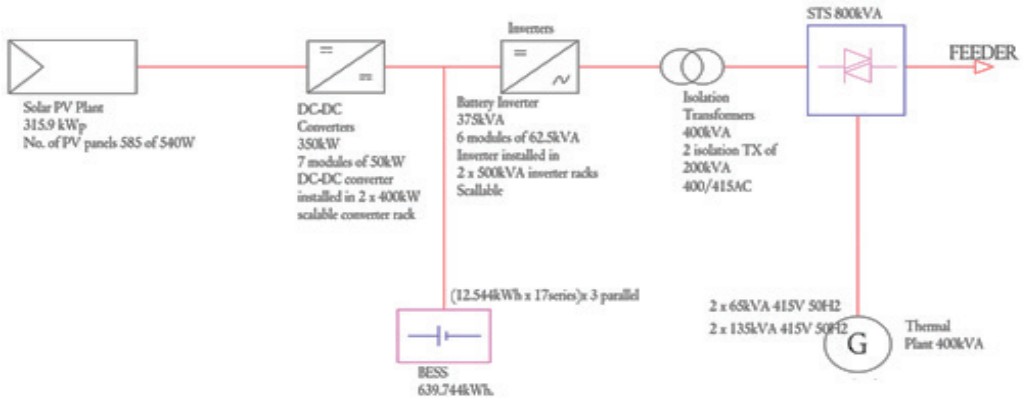

Fig 3:Eldas single line diagram

Figures 2 and 3 show the Homer simulation and Eldas single line diagram respectively.

2.8 Economic feasibility to appraise the viability of the project

The overall project cost for the Eldas site was Ksh. 374, 151,594.5. The benefit accrued from the plant installed is the avoided cost of fuel. Ksh is spent annually on fuel for diesel generators at the Eldas site. Simulation through Homer shows that after installation 70% of the plant power supplying the loads will be from renewable energy. Therefore, the payback period can be calculated as shown in Equation 18.

$$\text{Payback period} = (Capital\ cost\ in\ Ksh)/(\ Avoided\ fraction\ of\ fuel\ cost\ annually\ in\ Ksh\ -\ O\&M\ cost\ (2\%\ of\ capex)) \quad (18)$$

The total amount of money spent by the government on fuel for the 23 diesel-powered sites is Ksh. 5,273,180,524.20. Equation 19 shows the estimation of the fuel cost savings. With the installation of the solar PV diesel plant in all 23 diesel-powered sites, the fuel consumption will be reduced by 70%.

$$\text{Annual fuel cost for all the diesel-powered plants in Ksh x Renewable energy fraction} \quad (19)$$

2.9 Carbon Balance calculation

The carbon balance is calculated using the energy yield of the PV installation for one year as computed by the PVsyst simulation, the system lifetime of 25 years, the grid LCE given in gCO2/kWh and PV system LCE, given in tonnes of CO2 (the total amount of CO2 emissions caused by the operation and construction of the PV installation) as shown in Figure 4.

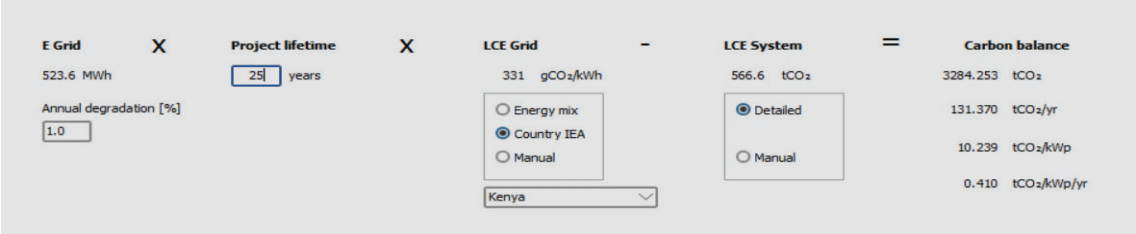

Fig 4:Carbon balance calculation

3. Results

Figure 5 shows an extract of the simulation from Homer. The total yearly production from solar PV is 511,712 kWh/yr, accounting for 69.4 of total generation. On the other hand, the annual generation from diesel generators is 317, 711 kWh/year which accounts for 30.6% of total generation.

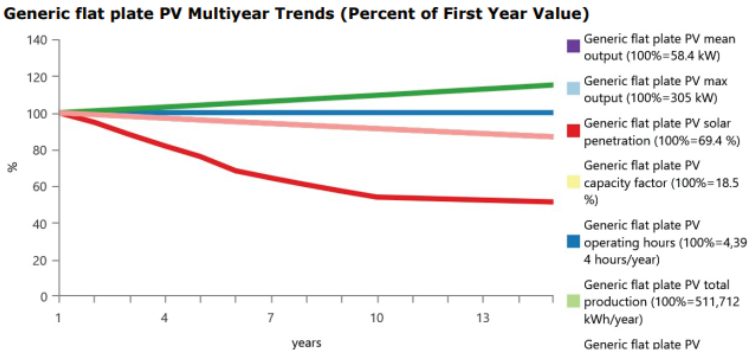

Fig 5: Homer simulation extract

Economic analysis of hybridizing Eldas power plant shows that the payback period is 9.4 years as shown in Equation 14. In addition, hybridizing all the sites shows that 3.3 billion shillings will be saved by the Kenyan Government as shown in Equation 15.

$$\text{Payback period} = (Ksh.\ 374{,}151{,}594.5) / \ (62{,}745{,}216 \times 0.7 - 3741515.945) = 9.4 \text{ years} \quad (14)$$

$$\text{Ksh. } 5{,}273{,}180{,}524.20 \times 0.694 \text{ (renewable energy fraction)} = 3{,}659{,}587{,}283.79 \quad (15)$$

4. Discussion

Design and simulation of the solar PV plant using Homer shows that a 315.6Wp solar PV, 400 kVA diesel generator set (65, 65, 135, 135) kVA, battery storage of 640 kWh will be sufficient to provide reliable power for the town of Eldas (for current loads and future loads).

Economic analysis shows that the payback period of hybridizing the plant is 9.4 years which is favorable as it is less than the lifetime of the solar-diesel hybrid plant. Hybridizing all the sites shows that 3.6 billion shillings will be saved which the government can channel to more useful areas of need. In addition, a carbon balance of 3,284 tons of CO2 is achieved. Diversified sources of energy to constitute the hybrid plant will also ensure reliable power at all times for the residents of Eldas and its environs.

5. Conclusions

In this work, we carried out a techno-economic analysis of hybridizing the Eldas site. Design and sizing was carried out and verified using Homer software. Economic analysis was also done to determine the payback period of hybridizing the Eldas site and the carbon balance was calculated. Therefore, this work shows that 315.6Wp solar PV, 400 kVA diesel generator set (65, 65, 135, 135) kVA, battery storage of 640 kWh will be sufficient to provide reliable power for the town of Eldas (for current loads and future loads).

In addition, the payback of the project is 9.4 years. Hybridizing all the diesel-powered sites also shows that the government of Kenya will save 3.6 billion shillings annually. A carbon balance of 3,284 tons of CO2 is also realized. Thus, the techno-economic analysis of hybridizing Eldas site shows that it is technically and financially viable.

Acknowledgment

We wish to thank Kenya Power and Lighting Company (KPLC) for the provision of data and facilitation of funds to finance the hybridization of the project.

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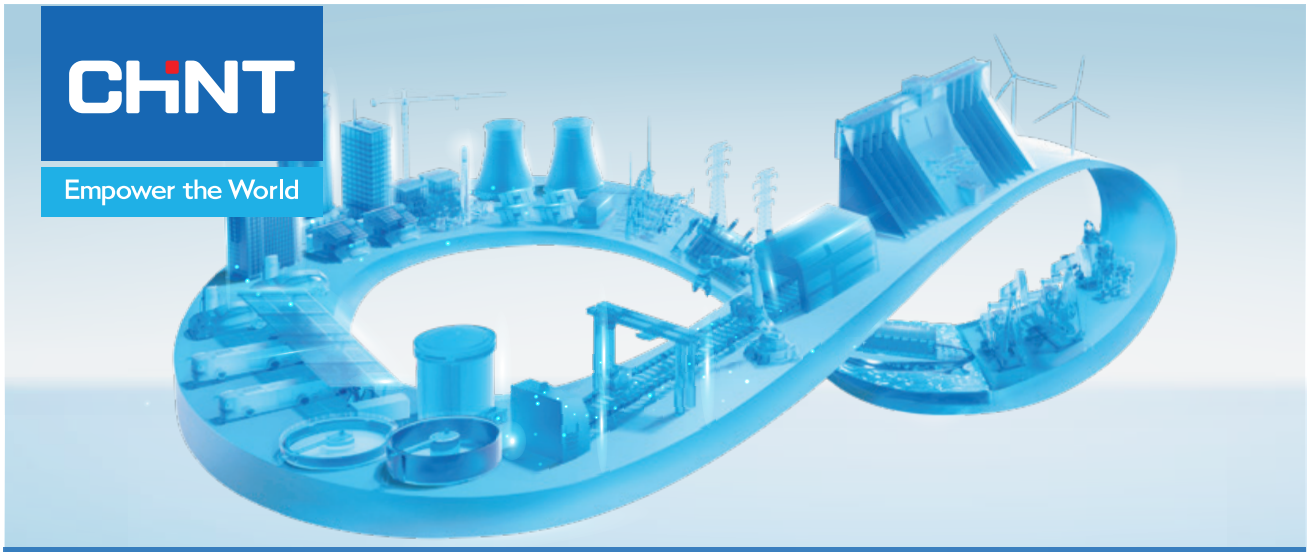

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CHINT Kenya stands at the forefront of driving Kenya's renewable energy transition, exemplifying excellence in infrastructure development and nurturing engineering talent for a sustainable future. Among its notable achievements is the recent completion of the 11/132 step-up substation project for the 35MW Sosian Geothermal Power Plant at Menengai in Nakuru.

The project underscores CHINT'S commitment to advancing renewable energy solutions in Kenya. As a key player in the energy sector, CHINT's scope encompassed the supply, installation, testing, and commissioning of essential electrical and automation equipment. This included critical components such as the 50MVA, 11/132 power transformer,132kV circuit breaker, isolators, surge arresters, and associated electrics, ensuring the seamless integration of the power plant into the national grid.

Securing the contract from Kaishan Group; Engineering, procurement, and Construction from China highlights CHINT's reputation for delivering innovation and reliable solutions on a global scale The successful completion of the project underscores CHINT's technical expertise and commitment to excellence in execution.

Beyond its contributions to infrastructure development, CHINT Kenya is dedicated to nurturing the next generation of engineering talent. Through knowledge sharing, skills development initiatives, and mentorship programs, CHINT empowers aspiring engineers to become future leaders in the field of renewable energy and sustainable infrastructure.

The commissioning of the Sosian Geothermal Power Plant in September 2023 signifies a significant milestone in Kenya's renewable energy journey. By harnessing the earth's natural resources, the project not only contributes to meeting Kenya's growing energy demands but also reduces the country's carbon footprint, aligning with global efforts to combat climate change.

As Kenya continues to prioritize renewable energy expansion, CHINT remains committed to supporting the nation's sustainable development goals. By leveraging its expertise, fostering innovation, and investing in local talent, CHINT Kenya is poised to play a pivotal role in shaping the future of the country's energy landscape.

In conclusion, CHINT Kenya's dedication to renewable energy solutions, infrastructure development, and talent nurturing exemplifies its role as a leader in Kenya's engineering sector. Through collaboration, innovation, and a shared commitment to sustainability, CHINT is driving positive change and paving the way for a brighter, greener future for Kenya and beyond.

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Covering Countries & Region	**Creating Jobs in the Industrial Chains**	**Accumulated Authorized Patents**	**Annual R&D Investment Obtained from the Percentage of Sales**
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The African Manufacturing Sector in the Battlefield: Technology to the Rescue - Challenges and Opportunities

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1. Introduction

This paper looks towards the findings that are currently inhibiting the manufacturing setting that is expected to drive manufacturing warfare14 as well as the challenges and opportunities that will be employed by manufacturers that is most expected to revolutionize the future and achieve inclusive manufacturing development goal in Africa. Africa has not lacked manufacturing development programs, but the weakness in the implementation. The manufacturing programs which successive administrations developed were often weak, segmented, truncated and isolated from various sectors of the economy1.

Within the last few years, there has been a great upsurge of interest by the author, engineers, non-engineers, public and private sectors, continental technical working groups and even manufacturers to identify and assess socio-economic factors affecting machinery manufacturing establishment in Africa. Manufacturing is central to the process and course of socio-economic development in Africa. It not only transforms inputs into outputs, but also embodies ICT and digital technological economic changes, which holds the key to successful industrialization, urbanization, modernization and accelerated socio-economic growth. There are no such indigenous manufacturers in Africa and this is one of the aims and objectives of the paper1.

The challenges can be complex since the continent is characterized by so many socio-eco-growth factors like weak public institutions along with political15, social, commercial, financial and economic instability and where a large proportion of the population lives in persistent poverty. Other factors or threats confronting manufacturing establishment in the continent are unstable government policies, poor emphasis on manufacturing education, poor planning and poor management, lack of dedication to execution of government policies, projects and poor funding, lack of qualified manufacturing engineers2. There are several raw material resources sites and well-known public sector projects, some key existing research, development & capacity buildings, policies and regulatory bodies in Africa that can fast stimulate additional socio-economic growth towards the attainment of the continent's vision of becoming one of the world's top economies by 2050. However, some have been poorly managed, stagnated, collapsed and died over the years as a result of poor management. This paper concludes and recommends a new manufacturing revolutionary paradigm to address these concerns and states that without urgently harnessing manufacturing in Africa, all other social, governance and economic activities might come to a halt.

1.1 Statement of the Problems

The following are some socio-economic factors identified and assessed as possible current socio-economic bottle-necks or inhibitors bedeviling institutional arrangements regarding manufacturing establishment activities in Africa: Shortage of raw materials production and plant location; bad leadership and bad government policies; lack of qualified manufacturing engineers; insufficient capital and misuse of capital; high degree of foreign dependence; poor quality manufacturing labour; low purchasing power of the populace; inadequate power supply; unnecessary competition with foreign goods; shortage of entrepreneurs; poor management; political instability; inadequate transportation and communication facilities.

1.2 Aims and Objectives of the Study

This paper investigated Africa's readiness to adequately key into manufacturing model for actualizing its economic development objectives. The paper highlighted the current state and challenges of the African manufacturing sector and possibilities of the sector to benefit from the potentials of the 4th industrial revolution. This has been to take a long term and strategic look at manufacturing out to 2050, to: - identify and analyze important drivers of change affecting the Africa manufacturing sector; identify important challenges and opportunities that lie ahead and which require action by Government and industry; and advise how Government policy needs to be refocused and rebalanced so that it is better positioned to support the growth and resilience of Africa manufacturing over coming decades. In so doing, a specific aim is to inform further development of the Government's industrial and sector strategies. With the current poor African manufacturing sector, the adoption of 4th industrial revolution may be a viable alternative for achieving inclusive economic growth.

1.3 Hypothesis

The hypothesis aims at determining the impact of manufacturing establishment as a strategic catalyst for domestic socio-eco-growth and sustainability of the continent.

H0: there is no positive relationship between the number of established manufacturing and gross domestic product (GDP) of the continent.

H1: there is positive relationship between the number of established manufacturing and gross domestic product (GDP) of the continent.

1.4 Significance/Justification of the Study

The study aims at evaluating the immense contribution of manufacturing establishment towards stimulating productivity and other socio-economic activities in Africa. The role of manufacturing establishment in trade and commerce cannot be swept under the carpet because the machinery population agglomeration, movement of people and goods from one place to another is very important. It is a statement of fact that without an effective and efficient manufacturing establishment in the continent all other socio-economic activities would come to a halt. More so, going by the present government transformation agenda and indigenization policy cum African Content Act in meeting the sustainable development goals, the role of manufacturing establishment in the provision of job opportunities, technological cum infrastructural development, funding of education and research, training cum skilled manpower development and invariably improve the standard of living and general well-being of the people cannot be over emphasized.

1.5 Scope and Limitation of the Study

The scope of the study is limited to manufacturing establishment and also to the major nerves of the continent, where raw materials available and engineering practices are ongoing.

2. Literature Review

Africa, pre-independence and post16, with a population estimated at more than 1.5 billion people, from over 3,000 ethno linguistic communities and accounts for about 18% of world's human population is heterogeneity being constantly manipulated by traditional, religious and modern political elite in their race for the control of the state and continental resources1. Africa is the world's second most populous continent after Asia in both aspects and is the youngest among all the continents, the median age in 2012 was 19.7 when the world-wide median age was 30.4. At about 30.3 million km2 (11.7 million km2 miles), including adjacent islands, it covers 20% of earth's land area and 6% of its total surface area19. Despite a wide range of natural resources, Africa is the least wealthy by total wealth, behind Oceania9.

Economic activities began with the use of human labour and simplest tools. However, human labour and simplest tools could not provide the required energy17 for economic activities and was replaced by machines due to drudgery and ineffective energy output among other limitations. The replacement of human labour with machines marked the beginning of the first industrial revolution. The shift in the type of technology employed in manufacturing processes is called "industrial revolution". Industrial revolution can also be defined as technological revolution that focuses on the sources of development which shapes the world around us10. The 1st industrial revolution began around 1760s and characterized with the use of steam engine as source of power for economic activities. Roger12 argued that the first industrial revolution in Britain took place due to its unique price and wage structure. The 1st industrial revolution witnessed slow pace and required an emergence of mechanization of industrial activities. The 2nd industrial revolution occurred between 1870 and 1969 with production of steel, iron and light bulb and focused on the mass production, electrical energy utilization and division of labour5, 6. The 3rd industrial revolution, which started in 1969, led to the automation of the production process by using extensive electronics and information and communication technologies (ICT)7. In addition, computers networks and IT systems in the third industrial revolution from 1969 to 2015 were used11. The automation in production and intelligent control robots as well as other integration gave the breakthrough (Schmidt et al, 2015). The first 3 industrial revolutions (the steam engine, the age of science and mass production) have transformed our modern society and changed the world around us fundamentally29. The 4th industrial revolution started in 2011. The Deloitte13's report on Global Manufacturing4 Countries and Regions Competitiveness Index showed that developed countries came up with their models for the 4th industrial revolution. For instance, while Germany nicknamed her 4th industrial revolution model as 'industrie 4', 'smart industry' was the symbol of the Dutch's 4th industrial while China and Taiwan termed theirs as 'made in China' and 'Taiwan productive 4 initiative' respectively. The United States of America (USA), France, Spain and the United Kingdom also came up with their 4th industrial connotations. With the advent of the 4th industrial revolution, it is obvious that the world is experiencing a scientific and technological revolution." It is also a warning signal for developing countries like Africa to wake up from their slumber.

3. Research Methodology and Organization of the Study

The empirical and exploratory method of research was adopted that examined and discussed relevant issues of interest in the history of Africa manufacturing establishment as an economically viable option for economic development. Because of the nature of the study (macro), the writers rely on published documents in the area of manufacturing industry using commissioned studies, non-commissioned studies and published works from various sources. Some of these secondary sources are narrow in view, perspective and scope but they serve as useful materials for researchers wanting to embark on a macro-study.

Others include library books, previous works by the author, detailed investigations done on manufacturing establishment by the author, internet and articles from learned journals. During the study there was no case where anybody or scholar delved into discussing developing manufacturing establishment as

economically viable option for socio-economic development in Africa.

4. Socio-Economic Factors Influencing the Location of Manufacturing Establishment in Africa

Many socio-economic factors are considered20 before manufacturing establishment is located in an area. These socio-economic factors include but not limited to the following:

- **Proximity to source of raw materials:** manufacturing should be located close to sources of raw materials to reduce cost of transportation.
- **Nearness to market:** There should be ready36 market for the products of manufacturing (market-oriented industries) to be sited in a place. Fragile goods like glass, bulky goods like iron ore and steel should be located near the market. Such manufacturing located or directed towards the market are called.
- **Availability of capital:** There should be enough capital to purchase manufacturing input before and after setting up manufacturing establishment. manufacturers or capital-intensive industries should have access to loans. Fixed capital should also be easily acquired.
- **Nearness to source of power:** There should be ready and dependable source of power. Source of power could be electricity, coal, thermal, petroleum products, etc.
- **Availability of labour:** There should be high quality skilled labour. The design of production machineries requires a detailed knowledge of the technical procedure for converting raw materials into the finished products. Erroneously, a lot of engineers, not to talk of laymen, seem to believe that the design process is a textbook affair requiring knowledge of the design of shafts, housings, moving and transmission elements as well as the electrical, pneumatic or hydraulic controls as the case may be.
- **Adequate transport network:** Transport is required essentially to move raw materials to manufacturing sites. Transport is also required to convey finished goods to the market or areas of consumption and use. Transport could be by road (cars, buses, trucks, etc.) by sea (boats, ship) or by air (aeroplane).
- **Political stability:** A stable Government encourages industrial growth. Communal wars and conflicts do not favour manufacturing growth.
- **Favourable climate:** There should be favourable climate conditions for manufacturing to grow. A favourable climate is also required for some machine tools firms to thrive.
- **External economies or location of other firms:** Firms are often set up near others in order to take advantage of external economies.
- **Joint research and training centres:** Research and training centres can easily be jointly established since all the industries involved are producing similar products. The cost of such projects will be minimal when it is jointly financed. It is now quite obvious that the industrialized world is not prepared to divulge her technical secrets with the less developed continents as this will affect their leadership position in the world.
- **Government policies:** Government can encourage the location of manufacturing through certain policies.

5. A New Vision for Africa Manufacturing

Manufacturing in 2050 will look very different24 from today, and will be virtually un-recognizable from that of 30 years ago. Successful firms will be capable of rapidly adapting their physical and intellectual infrastructures to exploit changes in technology as manufacturing becomes faster, more responsive to changing global markets and closer to customers25.

Successful firms will also harness a wider skills base, with highly qualified leaders and managers whose expertise combines both commercial and technical acumen, typically in science, technology, engineering or mathematics.

Constant adaptability4 will pervade all aspects of manufacturing, from research and development to innovation, production processes, supplier and customer interdependencies, and lifetime product maintenance and repair. Products and processes will be sustainable, with built-in reuse, remanufacturing and recycling for products reaching the end of their useful lives. Closed loop systems will be used to eliminate energy and water waste and to recycle physical waste. These developments will further emphasize the key role of physical production in unlocking innovative new revenue streams and manufacturers make use of the increasing pervasiveness of 'Big Data' to enhance their competitiveness. In the public sector, policy frameworks that affect the manufacturing sector directly and indirectly will need to recognize the extended nature of value creation and the new ways it is being developed. Public planning cycles should match the timescales of firms' own long term planning requirements. And it will be important that flows of highly skilled workers, patient capital, and support to promote critical mass in small and medium sized enterprises are all intercontinentally competitive. The implications for Africa manufacturing firms and the Africa Government are substantial. Some businesses are already adapting and are world class, but many are not positioned to succeed in a future world where greater opportunities will be balanced by greater competition. The Africa needs to radically change its approach to providing a constant and consistent framework within which all firms aspire to prosper. A business-as-usual approach will not deliver that outcome. Other economies are already ahead, and catching up will require an adaptive capacity that the Africa has not yet demonstrated. Achieving this is essential, as the future competitiveness and health of Africa manufacturing will affect many other parts of the economy through its numerous linkages. The key message is that there is no easy or immediate route

to success, but action needs to start now to build on existing support, and to refocus and rebalance it for the future. Above all, policy design will need to address entire system effects. This report sets out many areas where action is needed at both strategic and more detailed levels. However, the following should be particular priorities. The quality and skills of the workforce will be a critical factor in capturing competitive advantage. It is essential that Africa policy makers focus on the supply of skilled workers, including apprenticeship schemes, support for researchers, and the supply of skilled managers. Firms will need to pay much more attention to building multidisciplinary teams to develop increasingly complex products, and also innovative business models. It will also be crucial to address the current image associated with manufacturing. Government and industry should work together to further promote and market the opportunities for careers in manufacturing industries at all levels of education. Financial challenges for the sector include a shortage of risk capital38. This is particularly evident as a funding gap between research and early development and the funding for proof35 of concept that is usually required before the market steps in. There is also a shortage of funding for applied research and development in some areas such as the development of advanced green energy sources. there are excellent schemes for public support such as Knowledge Transfer Partnerships, funding of the Technology Strategy Board, the future of manufacturing: A new era of opportunity and challenge for the Africa and public private partnerships such as the Energy Technologies Institute, these are much smaller than in competitor continents. Addressing this mismatch should be a priority. Recent years have seen a resurgence in the development of industrial policies by governments in the AFRICA and overseas. In the Africa, industrial policies have been developed in 11 sectors, led in most cases by groups from the public and private sectors, with many of these encompassing manufacturing industries. One specific development has been the creation of the Catapult Centers. In particular, the High Value Manufacturing Catapult provides a strong base on which to build substantial further effort. It is recommended that its funding is substantially increased, and used in part to encourage the greater involvement of smaller firms in particular. Whilst specific initiatives are essential in areas mentioned above, more is needed39. Recognition that the Africa's continental infrastructure suffered from fragmented policy making led to the creation of Infrastructure Africa. Manufacturing suffers from similar challenges and is no less strategic for the future40 strength and resilience of the Africa economy.

6. Recommendations

Various strategies36 have been recommended which will remove the constraints to facilitate rapid manufacturing establishment in Africa. These are:

- **Acquisition of skill:** Skills required for manufacturing operations should be acquired by people through regular training in manufacturing education.
- **Good government policies:** There should be good government policies and regulations to encourage and protect local manufacturers.
- **Active government participation:** There should be active government participation in manufacturing development, that is, co-ownership of manufacturing.
- **Incentives to local manufacturers:** There should be incentives to local manufacturers, e.g., tax holiday, interest free-loans, subsidies, etc.
- **Provision of transport and communication facilities:** These should be provided to ensure easy distribution of goods produced.
- **Creation of manufacturing zones:** This will also provide an environment with all the infrastructural facilities for the manufacturing.
- **Establishment of manufacturing banks:** and other development banks should be set to provide loans to manufacturers.
- **Stable government:** There should be stable government in order to encourage indigenous private investors.
- **Local sourcing of solid minerals:** There should be exploitation of raw materials locally for manufacturing.
- **Organisation of management courses:** Management courses should be organised on regular basis for workers.
- **Building and maintenance of infrastructural facilities:** Infrastructural facilities such as roads, telephone, water, electricity, etc. should be built and maintained regularly.
- **Establishment of more power plants:** Plants such as thermal or hydroelectricity plants should be established to boost power supply to manufacturing.
- **Increase in gross continental product (GNP):** The industrial sector, through its operations like payment of taxes, increases the earnings accruable to the continent.
- **Employment opportunities:** Manufacturing provides employment (jobs) for many people.
- **Intercontinental trade** - improves trade balance: Most of the products of manufacturing like machineries and spare parts are usually imported from Western continents. This forms the basis for intercontinental trade and improves trade balance between countries.
- **Stimulation of other sectors:** The manufacturing sector stimulates the growth of other sectors like agriculture, mining, lumbering, etc.
- **Control of inflation due to mass production:** With modern technology, products like car, machinery, etc. can be mass produced. This can help to reduce inflation.
- **Technological development:** manufacturing can also lead to the development of technology in the continent.
- **Infrastructural development:** The establishment of manufacturing in a place stimulates the development of infrastructural facilities like roads, telephone, electricity,

pipe borne water, etc.

- **Diversification of the economy:** Manufacturing helps different countries to prevent over-dependence on only one product, like Africa's present over-dependence on crude oil. If Africa can invest in the manufacturing sector, her economy will in time be diversified.
- **Training and development of skilled manpower:** Many people are trained in different technical areas in order to acquire special skills to manage different aspects or machines in a manufacturing. Owing to manufacturing development, many people are given such skill training.
- **Funding of education and research**: manufacturing provides capital for the funding of education and research works in the Continent, for example the Education Tax Fund (ETF) in Africa.
- **Conservation of foreign exchange:** manufacturing leads to the conservation of foreign exchange which would have been used for importing goods now produced locally.
- **Improving standard of living:** manufacturing also leads to the improvement or the raising of the standard of living of the people through production of goods that are cheap and affordable.

7. Conclusions

From the discussion, the major constraints identified as inhibitors for manufacturing establishment and sustainability in Africa are: - Inadequate development of raw material and resources including human, financial, physical and informational; Shortage of raw materials; Insufficient Capital; High degree of foreign dependence; Poor quality of manufacturing staff; Low purchasing power of the populace; Inadequate power supply; Competition with foreign goods; Shortage of entrepreneurs; Political instability; Inadequate transportation and communication facilities; Small market for industrial goods; Inadequate skilled man-power, Bad Government Policies; Poor management (Corruption, embezzlement, and negligence of duty). Others include low level of development of manufacturing processes which includes engineering, manufacturing research, design, development of engineering machineries, equipment, facilities and infrastructures and a sound engineering manufacturing management practice. Corruption and embezzlement is a major inhibitor or bottleneck at every stage of manufacturing establishment sustainability management development. This is evident considering the fact that some consultants and contractors the various arms Federal government relies on for planning, execution, construction, rehabilitation and maintenance are mere foreigners, traders and unqualified engineers. It is an open secret for those who care to investigate and follow the affairs of the manufacturing establishment that some foreign marketers have taken over the industry, pushing local qualified contractors and consultants of high repute out of the business. Various strategies have been discussed which will remove the above constraints to facilitate rapid manufacturing establishment and development in Africa.

Picture: Courtesy

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STUDENTS' VOICES

Trade in service is the exchange of intangible goods such as education, tourism, health care, entertainment, and financial services across borders. It leads to availability of variety of services, innovation and productivity of the country's economy.

Engineers can benefit from sharing knowledge on materials, designs and new construction technology.To facilitate interactions with the outside world, technologies such as BIM softwares have expanded to allow collaborations between engineers. In Autodesk Revit for instance, the worksharing feature allows all persons involved in a construction project team to view the same model, and make live changes while noting down the reasons.

The future holds the potential for engineers to collaborate and learn remotely, boosting businesses and career growth. While industry leaders like Autodesk and Bentley provide engineering software at no cost through university partnerships, academic institutions need to prioritize incorporating such technology into specific units to better prepare students for the evolving demands of the field.

I believe our Kenyan Universities should be aggressive in patnering up with the developers.

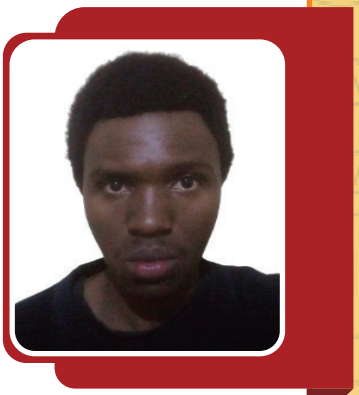
Name: Chirchir Dandon Kipngeno
Age: 26
University name: Kenyatta University
Academic level: Fourth year
Field of study: Civil Engineering

As engineers, society sees us as the first responders to their most daunting problems. Also, given that we provide both consultancy and professional solutions, it is justifiable for us to explore sustainability within the scope of our 'Trade in Services' to better serve and offer solutions that not only function effectively but also operate in harmony with the environment and the societies in which they are implemented.

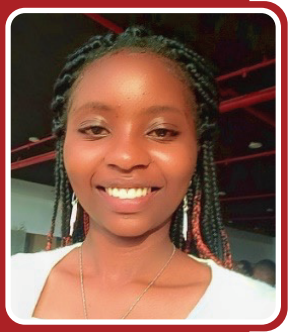
Engineers wield significant influence in shaping society, with a responsibility to consider the lasting impact on humanity, including addressing issues like global warming and its effects on future generations.

In essence , emphasis is on the marriage of sustainability and trade in construction services by integrating environmentally friendly practices. There is need for better designs , with a focus on green building elements to significantly reduce emissions in a sector responsible for 25% of emissions.

Material selection plays a crucial role, advocating for thorough research on affordable and sustainable building materials to combat global warming and reduce a building's embodied carbon footprint. Circular construction practices are encouraged, promoting infrastructure design that allows for reuse at the project's end, fostering a system of interdependency and substantial material and cost savings through recycling.



Name: Gideon Kahindi Muratha
Age: 23 years
University name: Kenyatta University
Academic Level: 5th Year
Field of Study: Civil Engineering



Emerging technologies are critical to transforming Mechanical Engineering in areas such as Manufacturing, Automotive, Aerospace, Energy, and Robotics. They promote efficiency, Productivity, Sustainability, and Innovation. These technologies improve Product Design, Production Efficiency, and Equipment Performance.

JKUAT Tech Expo and seminars supplement my academic program by exposing students to market-oriented initiatives, connecting academia with industry demands. This provides insights into consulting and maintenance careers. Emerging technologies like IoT, AI, ML, and additive manufacturing enhance job prospects, though concerns such as upfront expenses and data security persist. Mechanical engineers leverage these technologies to improve trade in services, offering innovative solutions, enhancing efficiency, reducing costs, and meeting evolving market demands.

Name:Juliet Maingi
Age: 20
University: JKUAT
Academic Level: Undergraduate 3rd Year
Field of Study: Mechanical Engineering

Electrical and electronics engineering is a discipline in engineering that majorly deals with electricity and electrical components, instruments, systems among others. This involves the design, develop, test and supervision of the systems. It can be divided into power option, telecommunication and electronics. Here, one can work both indoors or outdoors. According to which discipline one chooses, you may have a lot of coding.

I love electrical engineering because it allows me to design and implement my ideas, especially in coding and programming. The discipline encompasses emerging trends like IoT, artificial intelligence, smart grids, drones, and renewable energy, contributing to a sustainable future. These advancements, such as green energy production and AI services, enhance efficiency and ease in various applications, promoting environmental conservation and improved service delivery. life.

Egerton University provides a comprehensive education, combining theoretical knowledge, practical sessions, industry visits, and participation in competitions to prepare students for success in their field. The course is both enjoyable and informative, offering hands-on experience in designing and implementing systems. I highly recommend this program for tech enthusiasts, as it allows individuals to explore their potential without limits, fostering excellence in the dynamic field of technology.

Name: Benson Waititu
Age: 23years
University name: Egerton University
Academic level: 4th year
Field of study: Electrical and Control Engineering

Professionals in Electrical and Control Engineering are crucial for advancing the service sector in Kenya, particularly in the Energy, Manufacturing, and Telecommunication industries. Their expertise in sophisticated control systems and electrical technologies boosts efficiency, reliability, and innovation, shaping the nation's business landscape significantly.

Egerton University's comprehensive curriculum and hands-on approach in Electrical and Control Engineering offer me a robust foundation, providing practical experience to tackle real-world challenges. Aligned with Kenya's Vision 2030, the program equips students to meet the evolving needs of businesses, particularly in manufacturing, energy, and telecommunications. The integration of electrical and control systems in these sectors is reshaping operational paradigms, with professionals from this field playing a vital role in implementing and optimizing technologies, driving growth and competitiveness in the market.For students at Egerton University, I wholeheartedly recommend exploring Electrical and Control Engineering courses as the program not only addresses Kenya's industry needs but also empowers individuals to contribute to national technological development, fostering innovation and efficiency.

Name:Alice Kwenya
Age: 23yrs
University:Egerton University
Academic level: 4th year
Field of study: Electrical and Control Engineering

IEK Membership Report

The IEK membership committee meets every month to consider applications for membership of the various classes received at the secretariat. The IEK council at its 519th, 520th 521st and 522nd council accepted the following members under various membership categories as shown below;

MEMBERSHIP CLASS	NUMBER ACCEPTED-519TH COUNCIL	NUMBER ACCEPTED-520TH COUNCIL	NUMBER ACCEPTED-521ST COUNCIL	NUMBER ACCEPTED-522ND COUNCIL	TOTAL
FELLOW	1	5	-		6
CORPORATE	1	3	80	20	104
GRADUATE	46	46	16	34	142
GRADUATE ENGINEERING TECHNOLOGIST	6	7	1	6	20
GRADUATE ENGINEERING TECHNICIAN	1	20	11	14	46
STUDENT	8	11	-	10	29
TOTAL	**63**	**92**	**108**	**84**	**347**

During the period we had 6 member who transferred from the class of Corporate to Fellow member and 104 who transferred from Graduate to Corporate member. In addition, we had 142 graduates, 20 graduate engineering technologists, 46 graduate engineering technicians and 29 students were accepted as members.

Gender Data

Class	Male	Female	Percentage (Male)	Percentage (Female)
Fellow	4	2	66%	34%
Corporate	86	18	83%	17%
Graduate	127	15	89%	11%
Graduate Engineering Technologist	16	4	80%	20%
Graduate Engineering Technician	39	7	85%	15%
Student	21	8	72%	28%
TOTAL	**293**	**54**	**84%**	**16%**

Summary

Gender	No.	Percentage
Male	247	86%
Female	39	14%
	286	**100%**

519TH APPROVAL

FELLOW

S/NO.	NAME	MEMBER NO.
	Damaris Kerubo Oyaro	F.2979

CORPORATE

S/NO.	NAME	MEMBER NO.
	Wayne Daudi Orwa	M.10636

520TH APPROVAL

FELLOW

S/NO.	Member Name	Membership No.
	Hannah Njeri Kamau	F.4512
	Peter Waweru Njenga	F.7481
	Siror Joseph Kiplagat	F.5897
	Silas Kinoti Murira	F.2655
	Wilfred Reinhard Oginga	F.13302

CORPORATE

S/NO.	NAME	MEMBER NO.
	Victor Otieno Ouma	M.5965
	Winnie Lubanga Isanda	M.11604
	Joseph Ndemwa Kali	M.8131

521ST APPROVAL

CORPORATE

S/NO.	NAME	MEMBER NO.
	Abdikhalaq Adan Abdi	M.7857
	Abdimajid Mohamed Hussein	M.8040
	Abdimajid Rashid Abdisitar	M.11030
	Alex Tonny Simba	M.7372
	Alvince Omondi Korero	M.3789
	Benson Muthua Muturi	M.6542
	Bilal Abdulaziz Hussein Varvani	M.5627
	Boma Chrisphine Odiwuor Choto	M.11110
	Brian Aseka Esatia	M.8761
	Bridget Muthoni Njoroge	M.10120
	Catherine Wairimu Mwangi	M.10177
	Charles Mungai Ng'ang'a	M.8679
	Christopher Mbatia Gichuki	M.7125
	Collins Adeti Odera	M.9377
	Collins Gathumbi Mwangi	M.9306
	Collins Omondi Owino	M.9348
	Daniel Kiprop Samoei	M.12238
	David Evans Owuor Jomeli	M.7332
	Dennis Kipchumba Kemboi	M.7858
	Edwin Matoke Ombega	M.3849
	Edwin Oduor Otieno	M.9583
	Edwin Omare Esaba	M.7538
	Elias Kiplangat	M.7093
	Elizabeth Wanjira Wachira	M.8961
	Emily Ngonyo Muema	M.6768
	Florida Nasambu Simiyu	M.7409
	Francis Mutua Nduto	M.12802
	Fredrick Ochieng Ochieng	M.10470
	Geoffrey Olubaha Shitote	M.7815
	George Awinda Khainga Okwomi	M.8471
	George Kironji Nyutu	M.6778
	Gilbert Galugalu Manga	M.10487
	Godfrey Odhiambo Dibogo	M.9357
	Henry Gitonga Munene	M.11505
	Hillary Kipkirui Ngenoh	M.8626
	Hillary Kunyobo Shikuba	M.9426
	Isaac Kiprotich Tarus	M.11634
	Israel Mugondi Kesekwa	M.12976
	Jackline Mene Muisyo	M.6589
	James Muthee Mwangi	M.6602
	James Mutisya Mulwa	M.8728
	James Njue Njeru	M.7811
	Jared Salano	M.12912
	Jilian Kerubo Ouko	M.9145
	John Odongo Saranga	M.8807
	John Robert Otieno Ogallo	M.8449
	Joseph Warwa Otira	M.8314
	Juddy Wanjiku Nyaga	M.9935
	Judith Michelle Oluoch	M.7562
	Kelvin Kinyosi Nyambegera	M.11004
	Kennedy Juma Wamalwa	M.9190
	Korir Gladys Chepkemoi	M.11420
	Lang'at Victor Cheruiyot	M.11513
	Lowry Caleb Tumbo	M.11740
	Maureen Nkirote Nturibi	M.7703
	Maxwell Ndiritu Mugo	M.10680
	Milly Lumumba	M.11909
	Mohamed Morowa Hassan	M.8721
	Moses Kipsang Kachumo	M.7073
	Mulinge Mutuku	M.10688
	Benevolence Muthuri Muriuki	M.11403
	Mutuma Mutethia Mutunga	M.8647
	Nancy Dorine Oprong	M.7601
	Nelinsky Wanjala Wekesa	M.9951
	Newton Kibet Tarus	M.8302
	Odhiambo Clinton Okuku	M.9276
	Paul Kiplimo Kogo	M.9403
	Paul Mwangi Mbugua	M.10047
	Peninah Ayiera Otieno	M.11653
	Peter Njoroge Karanja	M.7490
	Peter Wanyoike Gaitho	M.7131
	Polycarp Kiprop	M.9593
	Raphael Amutete Otwoma	M.10737
	Robert Ouko Onditi	M.8840
	Rosebrendah Karimi Muchiga	M.6962
	Shimrone Otieno Munga	M.6965
	Stanley Macharia Maina	M.7873
	Timothy Kibett Too	M.11664
	Vincent Gitobu Kaburu	M.6586
	Wycliff Omani	M.7867

522ND APPROVAL

CORPORATE

S/NO.	NAME	MEMBER NO.
	Amos Mwangi Ngugi	M.11297
	Bonaventure Lenana Kabiru	M.12682
	Cecilia Wangechi Mwangi	M.10390
	Dennis Kiplangat Chepkwony	M.7963
	Ezekiel Kiptoo Kipyego	M.5035
	Grace Nduta Njoroge	M.9186

S/NO.	NAME	MEMBER NO.
	Isaac Ongae Enoi Kisinyo	M.9556
	Jason Muna Kiragu	M.8493
	Joseph Matheka Mwonga	M.10490
	Joseph Nduma Ruwah	M.4291
	Joyce Njeri Kihachu	M.7961
	Liech Michael Job	M.10438
	Meshack Mutuku Mutungi	M.10893
	Muriki Abed Bruno	M.8173
	Patrick Gikonyo Gatama	M.11752
	Peter Mwangi Karenju	M.11522
	Philip Ingutia Namai	M.6579
	Rachael Ribathi Gichuke	M.7434
	Rose Fiona Akinyi	M.7288
	Wycliffe Odhiambo Owino	M.9642

.The council invites Engineers and affiliate firms to apply for membership in the various membership classes, kindly follow the link members.iekenya.org to register or scan the QR Code below to apply for membership;

The IEK condoles with family and friends of our members who have passed away in the recent past. May their souls rest in peace.

"Death is not extinguishing the light . It is putting out the lamp because the dawn has come."

NuPEA
NUCLEAR POWER & ENERGY AGENCY

Nuclear Power and Energy Agency (NuPEA, formerly the Kenya Nuclear Electricity Board (KNEB) is a State Corporation established in law through the Energy Act No.1 of 2019. The Agency's mandate as stipulated in Section 56(1) Act are to:

a) be the nuclear energy programme implementing organization and promote the development of nuclear electricity generation in Kenya; and

(b) carry out research, development and dissemination activities in the energy and nuclear power sector.

Vision

Provider of Safe and Sustainable Energy Solutions

Mission

To develop nuclear power, and undertake research and capacity building in the energy sector for socio-economic prosperity

Core Values

I-TEC:
Integrity
Teamwork
Excellence
Creativity
innovativeness

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