THE ROLE/PLACE OF QUANTITY SURVEYORS IN SUSTAINABLE INFRASTRUCTURE DEVELOPMENT – EXPERIENCES FROM KENYA

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**INTRODUCTION**

**Who is Quantity Surveyor?**

The Quantity Surveying (or QS) profession was developed during the 19th century from the earlier "measurer", a specialist tradesman (often a guild member), who prepared standardized schedules for a building project in which all of the construction materials, labor activities and the like were quantified, and against which competing builders could submit priced tenders. Because all tenders were based on the same schedule of information, they could be easily compared to identify the most economic one (Beusch, 2011).

Quantity surveyors **estimate and control costs for large construction projects**. They make sure that structures meet legal and quality standards. Quantity surveyors are involved at every stage of a project.
INTRODUCTION

Quantity surveying is a profession that blends engineering, construction, and economics. Quantity surveyors manage the costs on a construction project. They help to ensure that the construction project is completed within its projected budget.

A competent quantity surveyor is one that has enough skills and knowledge to perform any service that is satisfactory and is up to standards. The basic competence of a quantity surveyor includes; personal and interpersonal skills, skills in business, IT, professionalism, measurement, law, mapping (RICS, 1998). The core competencies are; construction economics, contract law, financial and procurement management, construction technology etc. (RICS, 1998).
INTRODUCTION

• Most English-speaking Quantity Surveyors (QS’s) are affiliated with the professional institution which is the UK-based Royal Institution of Chartered Surveyors (RICS) and BORAQS in Kenya. Others are the Chartered Institute of Building (CIOB), Quantity Surveyors International (QSI) and Institution of Civil Engineering Surveyors (ICES). Those who are qualified members of the RICS can use the term "Chartered Quantity Surveyor" or simply "Chartered Surveyor" (Beusch, 2011).

• The QS often reports to the Project Manager or Project Director and provides advice in the decision-making process throughout the management of a project from initial inception to final completion.
INTRODUCTION – WHAT IS SUSTAINABLE INFRASTRUCTURE DEVELOPMENT?

Infrastructure refers to **equipment and systems that are designed to meet the population's essential service needs** — including roads, bridges, telephone pylons, hydroelectric power stations, etc.

Sustainable development is described as "**development that meets the needs of the present without compromising the ability of future generations to meet their own needs.**" - 1987 Bruntland Commission{Brundtland Commission, also known as the World Commission on Environment and Development (WCED), it is also called the UN Special Commission on the Environment.}
INTRODUCTION – WHAT IS SUSTAINABLE INFRASTRUCTURE DEVELOPMENT?

Sustainable Development Goals (SDGs) and Infrastructure

Sustainable Development Goal 9 seeks to build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. This SDG encompasses three important aspects of sustainable development: infrastructure, industrialization and innovation.

UNEP Launched in 2018, the Sustainable Infrastructure Partnership (SIP) is a platform to promote and support integrated approaches to sustainable infrastructure planning and development. Such approaches recognize the centrality of infrastructure to the 2030 Agenda for Sustainable Development, and can help to deliver optimal social, environmental and economic outcomes of infrastructure development by considering the complex interlinkages between different infrastructure systems, sectors, phases, governance structures, and aspects of sustainability.
INTRODUCTION – WHAT IS SUSTAINABLE INFRASTRUCTURE DEVELOPMENT?

• Sustainable Infrastructure Engineering examines how a project relates to the broader social, economic, and environmental context. Engineering Project Implementation concentrates on the operational aspects of implementing a project.
The Kenyan construction market is dominated by mega infrastructure projects which contribute between 3%-10% of the Gross Domestic Product (GDP). This generates a strong job market for the professionals in the construction industry.

A number of Public bodies involved in the Public Sector especially in Energy and Telecommunications Sectors have in-house quantity surveyors while foreign Consultancy firms that have undertaken works in Kenya have had a place /role for a Qs in their operational structure.
THE KENYAN CONSTRUCTION INDUSTRY AND THE ROLE OF QS

The role of quantity surveyors in infrastructure project /civil engineering construction works in Kenya has been underplayed.

Many projects especially in the roads sector have been undertaken without the involvement of the QS especially at the Government level and Engineering Consultancy level. However, it is an established fact that all the big contractors involved in such projects would without exception hire a Qs.

Some have been arguing that quantity surveyor’s role is only limited to building projects and that their role in civil works is not of greater significance to such projects.
THE KENYAN CONSTRUCTION INDUSTRY AND THE ROLE OF QS

- While the participation of quantity surveyors in infrastructure projects can help in overcoming the above challenges, the official involvement of Quantity Surveyors in Infrastructure Projects — roads in particular, in Kenya was “in principle” accepted by the Ministry of Public works in the early 2000’s However, the same has never been implemented.
Seely (1993) identified nine major aspects around which engineering contract administration revolved.

These are:
- contractual arrangement,
- contract documentation,
- tendering procedure,
- site organization,
- site supervision,
ROLE OF THE QS IN SUSTAINABLE INFRASTRUCTURE DEVELOPMENT

- communication,
- measurement and valuation of works,
- instruction and variations,
- settlement of claims, and certificates
THE ROLE/PLACE OF QUANTITY SURVEYOR IN SUSTAINABLE INFRASTRUCTURE DEVELOPMENT

Infrastructure Projects have become more complex in nature and requires input of a mix of skill sets that are not limited to one profession: Sustainable infrastructure therefore needs to be planned, designed, delivered, managed and decommissioned to minimize its negative impacts and maximize its positive impacts. Meanwhile, infrastructure assets—throughout their entire lifecycle—should have positive impacts on the economy, society and the environment.

The emerging characteristics of Infrastructure projects that create opportunities for the Quantity Surveyor:

- **Pressure on Governments**

  Infrastructure development is characterized by large upfront costs and long investment time frames. This makes infrastructure governance essential in order to create a more resilient society and promote future economic development. Such governance includes the institutions, processes, and procedures that guide planning, allocation of money, and implementation of projects.

  Governments around the world are under intense fiscal pressure to develop planning and monitoring systems based on a long-term infrastructure vision that includes an assessment of needs.
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- Stronger planning and monitoring can help decision-makers understand the long-term effects of infrastructure projects and take climate impacts into account. There is need to put in place a rigorous process to appraise and select projects by assessing the economic, social, fiscal, environmental, and climate-related costs and benefits. Projects should also account for the full life cycle of assets, to ensure value for money. Decisions should take into account impacts that are hard to put a price on, such as biodiversity, as well as trade-offs between different objectives. In the medium to long term, the net benefit on average of investing in more resilient infrastructure in developing countries is $4.2 trillion globally with $4 in benefit for each $1 invested, according to the World Bank report *Lifelines: The Resilient Infrastructure Opportunity*. 
Disruptions to Business – Covid 19 Pandemic

• COVID-has had the effect of slowing down investment in resilient infrastructure, making effective governance critical to ensure infrastructure projects are well planned, funded, and implemented.

• The response to the governance challenge must encompass managing the limited resources in an integrated way to achieve quality infrastructure investment that helps us tackle these challenges in an integrated way, Investing in resilient and adaptive infrastructure post COVID-19. There is need to make infrastructure investment more efficient through early planning, which leads to better project selection and value for money.

• It is reported (IMF) that developing countries lose an average of 32% of their investments due to inefficient planning and development. For fiscal sustainability, infrastructure investment should be linked with budgets and medium-term spending plans.
Banks, Financiers, insurance companies, Investment funds interest in sustainable infrastructure development

- **Guiding principles**

To guide the financial industry towards sustainability, UNEP FI has unveiled a series of guiding frameworks including:

- the 2019 *Principles for Responsible Banking*;
- the 2012 *Principles for Sustainable Insurance*; and
- the 2006 *Principles for Responsible Investment*.

- These industry frameworks have attracted widespread support among financial institutions. Some 80 per cent of the investment industry has committed to the Principles for Responsible Investment while 260 banks, representing $70 trillion in assets, have signed onto the Principles for Responsible Banking.
THE ROLE/PLACE OF QUANTITY SURVEYOR IN SUSTAINABLE INFRASTRUCTURE DEVELOPMENT

**Increased Private Sector Involvement in Sustainable infrastructure development.**

Development of sustainable infrastructure will require a combination of sustained support and participation at governmental level, commitment to public and private investment and a legal and regulatory framework that permits growth whilst governing the social, economic and environmental standards that are the basis of sustainability.

Burgeoning urban growth will require proper planning, integration of the interests of diverse stakeholders and a focus on sustainable building materials and practices. It will also require better collection, use and analysis of big data.

Technology and innovation will have a key role to play in the switch to a low carbon economy with sustainable infrastructure. The internet of things is transforming building energy and water management. Footfalls are being measured to develop real time traffic management. Smart roads
CHALLENGES FACING DEVELOPMENT OF SUSTAINABLE INFRASTRUCTURE – OPPORTUNITIES FOR THE QS

Growing demand

As the world’s population expands, delivering basic services will become increasingly challenging. And as more and more people live in cities, pressures on urban infrastructure are becoming intense. By one estimate, infrastructure investment of up to US$3.2trn-US$3.7trn per year is needed between now and 2030.19 Infrastructure investment gaps issue in many emerging and developing markets, totaling US$452bn over 2014-20, with actual spending of an estimated US$259bn dwarfed by requirements of US$711bn - World Bank, “Infrastructure Investment Demands in Emerging Markets and Developing Economies”, September 2015, http://documents.worldbank.org/curated/en/141021468190774181/pdf/WPS7414.pdf
CHALLENGES FACING DEVELOPMENT OF SUSTAINABLE INFRASTRUCTURE – OPPORTUNITIES FOR THE QS

Funding and resource gaps

• Given the rate at which governments need to build infrastructure, many will struggle to secure the financing to meet demand. Tight public-sector budgets, particularly in developing countries, mean governments will need to tap into some of the trillions of dollars in global capital markets.

• Yet the many risks to infrastructure investments, from complex permitting and potential construction delays to the large amount of time before assets generate cash flow and produce a return on investment, deter private investors. Of the more than US$120trn in assets under management by banks and institutional investors globally, infrastructure makes up only about 5%.25
Moreover, for assets that deliver public good, it is often hard to find a business model that would generate the kinds of financial returns private investors seek.

Countries often lack human resources (engineers, town planners and technical specialists) with the required skills to plan, deliver and manage sustainable, resilient infrastructure at the scale required to meet demand, particularly in developing countries, where the lion’s share of the world’s infrastructure gaps exist.
CHALLENGES FACING DEVELOPMENT OF SUSTAINABLE INFRASTRUCTURE – OPPORTUNITIES FOR THE QS

**Governance Issues**

A number of governance challenges exist to the development of sustainable infrastructure,;

• Short-termism in policy development vis-a-vis election cycles,

• Lack of appropriate legislation, codes and standards

• Lack of capacity.

• Given the sums of money involved, lack of transparency and corruption - infrastructure provides big opportunities for rent-seeking, resulting in white elephants and grossly over-budget or underperforming infrastructure projects

• Competing priorities for governments.
EMERGING/EXPANDED ROLES OF A QS IN SUSTAINABLE INFRASTRUCTURE DEVELOPMENT

- Future technology will be focusing on producing unique solutions and flexible components for continuous adaptability and cost efficiency.

- The quantity Surveyor must be prepared to play the expanded role of Quantity Surveyor (QS) in the sustainable buildings that will entail, but not limited to, life cycle costing, value engineering, cost comparison of different building materials and cost of achieving green rating.

- Quantity Surveyor (QS) is the cost expert in the construction industry, hence the traditional roles of have to evolve to accommodate sustainable infrastructure in conjunction with the ever changing construction trend to make themselves stay relevant and sophisticated in the industry.
Emerging/Expanded Roles of a Qs in Sustainable Infrastructure Development

**Green Costing**

Cost models have to be developed to cater to Clients’ needs in regards to the extra over costs for achieving the different levels of green building certification. The cost model for green buildings will take into account local conditions based on specific country, the use of different green building rating system, maturity of the construction industry and the availability of materials and technology.
EMERGING/EXPANDED ROLES OF A QS IN SUSTAINABLE INFRASTRUCTURE DEVELOPMENT

Carbon Footprint

Carbon footprint - the current level of carbon emissions is essential for building owners to set benchmarks to measure carbon performance and to compare amongst other properties.

The QS may add value in performing the role of a cost and carbon management consultant through the integration of cost and carbon footprint.

Need for QS to upskill by training in green technologies to be well equipped to measure the carbon footprint as well as to create various carbon models for different developments.
Life Cycle Costing / Life Cycle Assessment

The importance of Life Cycle Costing (LCC) in projects can no longer be ignored.

Importance of LLC:

• used to assist the management in the decision-making process to go green

• Include environmental, social and sustainability analysis, known as Life Cycle Analysis (LCA). Life-cycle assessment as a holistic methodology to quantify the environmental impacts of a project through all stages of its life, including extraction and processing of the raw materials

• used to make it, manufacturing or construction impacts, operation and maintenance, and eventual recycling or disposal.

QS who is an expert in cost management, is in the ideal candidate for this role.
EMERGING/EXPANDED ROLES OF A QS IN SUSTAINABLE INFRASTRUCTURE DEVELOPMENT

**Project Performance Rating**

Property Performance Reporting (PPR) systems that provide independent risk assessments which measure and benchmark property performance against contemporary standards and to provide strategic measures against international and industry standards, QS’s scope of work would includes due diligence exercises or such PPR
EMERGING/EXPANDED ROLES OF A QS IN SUSTAINABLE INFRASTRUCTURE DEVELOPMENT

Green Building Rating Assessment

Green building rating systems such as LEED and Green Mark in international projects has become entrenched.

The QS should train in courses such as the LEED to become achieve professional accreditation and the Green Mark Manager certification.

Understanding of the relevant Green Building rating system and environmentally sustainable Designs; hence be equipped to advice both on the costing and sustainable designs.
CHALLENGES FACING DEVELOPMENT OF SUSTAINABLE INFRASTRUCTURE – OPPORTUNITIES FOR THE QS

- **Building Information Model**

  Use of Building Information Modelling (BIM) systems, the use of object orientated CAD may be able to contain information such as Green Assessment points, intelligent advice on usage, specifications and real time costing.
  
  Automatic generation of bills of quantities from BIM.
  
  Fundamental shift in the role of QSs to focus on higher value added cost estimating.
  
  The QS has to be up to date with the advancement in information technology.
EMERGING/EXPANDED ROLES OF A QS IN SUSTAINABLE INFRASTRUCTURE DEVELOPMENT

Dispute Avoidance & Resolution

Most infrastructure projects contracts are based on FIDIC standard forms or variants of the same.

Fidic 2017 (Red, yellow & silver Books) places a duty on the Engineer to try and resolve disputes between the parties at an earlier stage, before the matters escalate to Dispute Avoidance & Adjudication Board (DAAB) and/or arbitration.

Quantity surveyors have been retained as part of Engineer’s staff as well as Members of Dispute Adjudication Boards and where disputes are escalated as arbitrators.

Can upskill by taking up courses in arbitration and other Alternative Dispute Resolution (ADR) mechanism – in Kenya through the Chartered Institute of Arbitrators- Kenya Branch or the Nairobi Center for International Arbitration (NCIA)
EMERGING/EXPANDED ROLES OF A QS IN SUSTAINABLE INFRASTRUCTURE DEVELOPMENT

Public Private Partnerships – Transition advisors

- Need to have a pipeline of bankable projects backed by clear government policy supportive of sustainability considerations and forward planning to attract suitable Private Sector entities/Financiers to leverage private capital to close the public sector infrastructure financing gaps
- Value for Money (VfM), and Return on Investment (ROI) analysis – requires skills that a Qs possesses
- Can upskill by studying law and Project Finance
EMERGING/EXPANDED ROLES OF A QS IN SUSTAINABLE INFRASTRUCTURE DEVELOPMENT

Public Projects - Value for Money Audits/ Post Performance Evaluation – e.g.
Infamous Kimwarer & Arror Dam Projects

Engineer, Procure, Construct (EPC) Projects - Contracts/Commercial Experts as part of Engineers staff, underpins the role of the Engineer to determine, review and approve
EXAMPLES OF PROJECTS WHERE QUANTITY SURVEYORS ARE INVOLVED IN INFRASTRUCTURE DEVELOPMENT IN KENYA

Energy sector – quantity surveyors in Kenya are highly involved in this industry through the following entities:

- Geothermal Sector (KENGEN, Geothermal development corporation and their subcontractors).
- Power transmission company (Ketraco)
- Power distribution company (KPLC)
OLKARIA V GEOTHERMAL POWER PLANT AND SUBSTATION
https://www.the-star.co.ke/business/2022-03-30-kengen-completes-83mw-olkaria-i-unit-6-power-plant/
SUSWA SUBSTATION THE FIRST 400KV IN EAST AFRICAN REGION
AREAS WHERE QUANTITY SURVEYORS ARE INVOLVED IN MEGA INFRASTRUCTURE PROJECTS IN KENYA

Water projects - quantity surveyors in Kenya are highly involved in this industry through the following entities:

-Dam construction – All dam contractors have quantity surveyors as part of their construction teams for example Thiba dam in central Kenya.
- Water treatment plants and distribution networks contractors
- Irrigation projects under National irrigation board of Kenya
THIBA DAM IN CENTRAL KENYA – CONTRACTOR SOGEA SATOM

- Construction of Thiba Dam in Kenya, which will help secure the year round water supply for the country’s agriculture. The 40 m tall and 1 km long dam being built about 130 km northeast of the Kenyan capital of Nairobi creates a reservoir that will allow a second harvest every year in the surrounding cultivable area.
AREAS WHERE QUANTITY SURVEYORS ARE INVOLVED IN MEGA INFRASTRUCTURE PROJECTS IN KENYA

Transportation sector – quantity surveyors in Kenya are highly involved in this industry through the following entities:

1. Construction and maintenance of roads
2. Construction and maintenance of railway lines
3. Construction and maintenance of airports and ports
SGR MOMBASA STATION
TRAINING OF THE QUANTITY SURVEYOR TO EFFECTIVELY PARTICIPATE IN SUSTAINABLE INFRASTRUCTURE PROJECTS

• Universities in Kenya such as JKUAT, UoN and TUK have been offering units in civil engineering construction and measurements of civil engineering works using the CESMM with the aim of preparing the students to handle any type of construction work. Education of a quantity surveyor is like an applied science which covers areas in construction works such as, civil works, building works, electrical works etc.
TRAINING OF THE QUANTITY SURVEYOR TO EFFECTIVELY PARTICIPATE IN SUSTAINABLE INFRASTRUCTURE PROJECTS

Tertiary Institutions of learning and Universities must re-orient their training programs to ingrain designs, engineering and project management concepts that include embrace technology and innovation aimed at creating resilience and sustainability in infrastructure development.

QS Practitioners must embrace CPD, short courses and upskill by pursuing training opportunities that will enable them to remain relevant/competitive enough to take up their role/place in the Sustainable infrastructure development.
CONCLUSION

“There is an urgent need to include sustainable and climate resilient infrastructure as an integral part of green growth to deliver energy, water, and transportation solutions that will facilitate opportunity, connection, and sustainable growth,” - Ban Ki-moon, former United Nations Secretary-General and the President of the Global Green Growth Institute, a UNEP partner.

“We can no longer use the business-as-usual approach to infrastructure, which is leading to ecological destruction and massive carbon dioxide emissions. Investments in sustainable infrastructure are not only environmentally sound but also bring economic and social benefits. Low-carbon, nature-positive infrastructure projects can help minimize the sector’s environmental footprint and offer a more sustainable, cost-effective path to closing the infrastructure gap,” said Inger Andersen, Executive Director of UNEP.