FUTURE MARINE MANUFACTURING TO SUPPORT BLUE ECONOMY GROWTH IN KENYA

Newton Fund Researcher Links Workshop Final Report

Robert Kiplimo and Simon Benson

Foreword

We welcome you to this report summarising the findings and insights of a two-day workshop, funded through the British Council Newton Fund, on *Future Marine Manufacturing to Support Blue Economy Growth in Kenya.* The workshop was attended by over 30 stakeholders involved in the maritime sector of Kenya including representatives from universities, government agencies and industry. They were joined by seven academics from British universities engaged in internationally leading maritime research.

Kenya is aiming to drive the rapid expansion of diverse blue economy activities including fishing, transport, aquaculture and offshore energy. However, with a few notable exceptions, most marine manufacturing to support this sector within Kenya is currently by SME artisan boat builders and low technology engineering firms. We believe that future development and expansion of this manufacturing base is possible. This will be to design, construct, repair and maintain vessels servicing both artisanal and high technology blue economy activities. It will be essential for sustainable growth and will provide new economic development in Kenya, especially benefitting coastal communities away from current economic centres.

The interactive workshop addressed the key challenges for Kenya to expand and mature its SME dominated marine manufacturing sector and explored how UK-Kenyan marine technology research collaboration can reduce the technology and skills gaps within the sector. The workshop focused on four themes, which are described in this report, and identified eleven specific project areas for potential future research collaborations.

We believe this report provides an inspiring and timely summary of current research drivers which can impact positively on the Kenyan maritime sector. We look forward to engaging with new partners from Kenya and the wider East African region, together with the opportunity for further collaborations with experts in the UK. We thank the British Council Newton-Utafiti Fund, NRF Kenya and all participants for their support of the workshop.

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Introduction

The Future Marine Manufacturing to Support Blue Economy Growth in Kenya workshop brought together researchers from four UK maritime universities and two Kenyan universities together with key stakeholders from governmental and industrial sectors. The workshop format followed a brain-storm approach to enable discussions in groups on four broad themes:

1. **Moving towards sustainable shipping**
   focusing on energy efficiency, reducing air pollution and the impacts on the Kenyan maritime sector

2. **Improving maritime safety**
   focusing on the challenges on inland waters, inshore operations such as fishing and offshore safety

3. **Developing marine manufacturing, services and education**
   focusing on the future potential maritime economy including the development of skills and innovation to support new economic growth

4. **Linking coastal communities to the maritime economy**
   focusing on the wide variety of maritime activities that impact coastal communities, particularly those away from current economic centres

Objectives

<u>Objective 1: Roadmap the future Kenyan marine manufacturing sector including sustainability issues.</u>

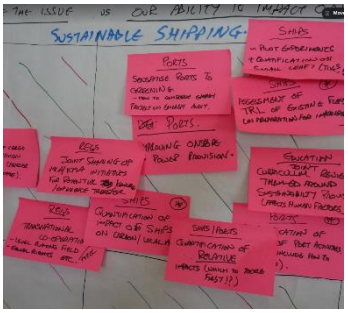
- host expert government representatives (including KMA, KPA, Kenya Navy)
- highlight and discuss key aspects of the Integrated National Maritime Policy of Kenya.

<u>Objective 2: Identify key technology and skills gaps within the marine manufacturing sector.</u>

- Match the expertise of workshop participants, and sharing experiences from the UK, Kenyan and international marine manufacturing sectors.
- Determine region specific commonalities and differences with the Kenya maritime sector

<u>Objective 3: List key priority areas for research collaboration which will close these technology and skills gaps.</u>

- Discuss in the workshop sessions and by breakout work of the academic partners.
- The lead researchers will collate findings and co-produce a white paper for publication in physical and digital formats.



<u>Objective 4: Link these priority areas to experts within the UK and Kenyan maritime sector and enable future collaboration.</u>

- Pair stakeholders from the UK and Kenya to form research partnerships.
- Partnerships will continue to interact after the meeting with the objective of securing research grant funding.

Towards Sustainable Shipping

The Challenge

Improving the sustainability of the shipping industry in terms of social, environmental and economic impacts is a global challenge for the maritime community, but also raises specific challenges for coastal African nations such as Kenya. The workshop group debated the challenges Kenya currently faced in transitioning to a highly efficient, low carbon, low pollution and economically sustainable shipping and logistics infrastructure.

The key challenges raised during the workshop were:

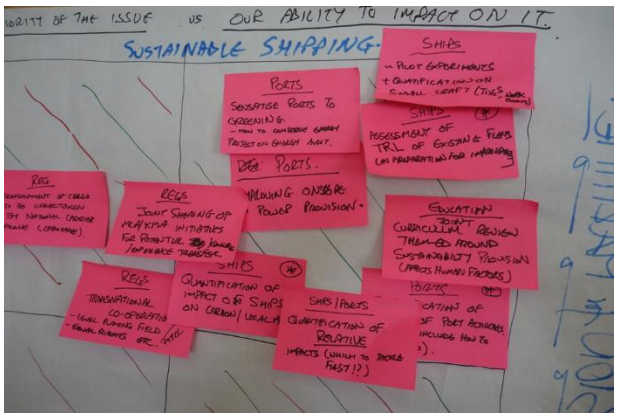
- **Ignorance of shipping** - there may be significant knowledge gap of the shipping industry within the wider community who are stakeholders in the import and export of goods from Kenya. This can lead to complexities in the supply chain which drive up costs and increase environmental impacts.
- **Red tape** - In Kenya these are compounded by complex regulatory and administrative systems with multiple agencies and interventions during cargo logistics from ship to shore.
- **Links to road and rail -** New logistics opportunities linked with the SGR also brings challenges to both road and rail transport of goods.
- **Measuring impact** - Environmental agencies in Kenya commonly think about emissions on land transport but are relatively ignorant of maritime. There is no national policy about how environmental regulation is handled locally in ports. There is no established method to measure pollution from ships. It was noted that the UK has very similar challenges.

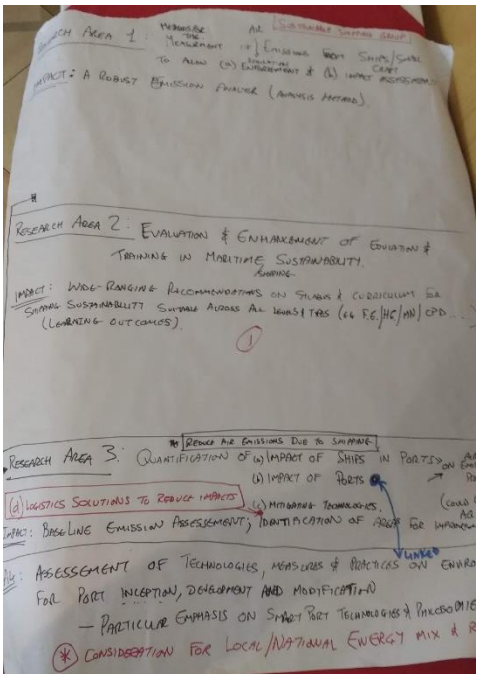
It was noted that the Maritime Technology Cooperation Centre (MTCC) hosted by JKUAT is a strategically important step for the sustainability vision. This opens up opportunities to effectively implement energy-efficiency and emissions reduction measures through technical assistance and capacity building. See http://mtccafrica.jkuat.ac.ke/ for more details.

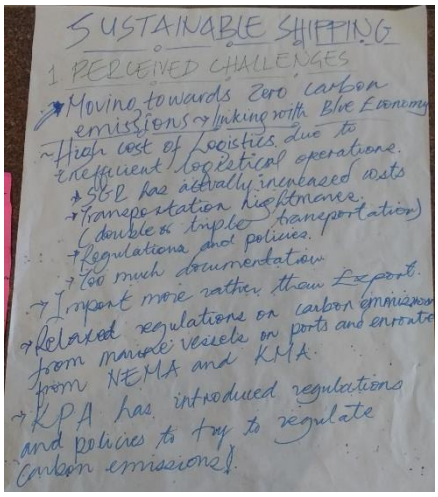
The Vision

The workshop group discussed current and future initiatives that together formed the vision for a sustainable shipping sector. These included:

- A national shipping line has the ability to establish a fleet of sustainable ships and influence the policy of how all ships operate within Kenyan and international waters
- Improved road and rail infrastructure to reduce the number of lorries operating from the port and reduce logistics distances. This is linked to the “all cargo by railway” vision of SGR
- New and expanded ports developed to sustainable levels (e.g. using floating docks)
- “Cold ironing” shoreside power supply for ships to substantially improve local air quality
- The development of smart ports with the ability to harness big data to make step changes in sustainability.
- A maritime academy board established to account for maritime education; developing policy on sustainable shipping for education and training of people throughout the maritime sector







Possible Solutions

The workshop group brought together ideas under three broad headings: ships, ports and education/training.

Ships

- There is a need to start quantifying the effect of ships on local air and water quality (this is linked to MTCC objectives).
- Are there pilot/small craft which could be investigated first? It is a reasonably easy way to do research on because they are accessible
- We need to understand what the technology is on ships commonly entering Kenyan waters right now and what future technologies could there be
- There is a joint Kenyan-UK parallel to this initiative (and wider internationally), as similar efforts are needed for UK shipping

Ports:

- Perhaps in parallel to the need for shipping, there is a need to start quantifying the actual impact that port activities have on sustainable issues
- Ports are distinctive from other activities
- There is opportunity with the development of Lamu port together with government legislation to think about some of the green technologies embedded in port infrastructure, particularly onshore power. This is a huge opportunity and will need supporting research on cost/impact/what it would look like
- Research could impact on energy auditing ports to get ports to be more energy efficient
- This research has the potential to positively impact on logistics Infrastructure and also on the refinement of future regulations, helping to remove red tape whilst improving standards.

Education/Training:

- Formal education on maritime sustainability from school through to university, coupled to training opportunities for people currently in the maritime sector, is essential to drive change.
- Can we embed sustainability in the education culture?
- This aspect links to all four themes discussed at the workshop.

Improving Maritime Safety

The Challenge

The maritime safety group initially discussed three specific sectors which they felt were most important with respect to investigating possible safety led research:

- Small scale artisanal fisheries
- Local ferry services
- Port operations

Ports are large scale operations and are already highly controlled through authorities such as the KPA. Although there are continuing safety issues related to ferries, they also already gain close oversight from authorities such as KMA.

It was therefore decided to focus on the fishing sector, particularly the artisanal fishing fleet which is prevalent in coastal and lake regions of Kenya. These are normally wooden built canoes or Dhows built and maintained by artisanal boatbuilders within the regions that the boats then operate. They normally consist of a sail, with several different rigging configurations, but are also equipped with engines – outboard for smaller canoes and inboard for some larger Dhows.

The group considered some specific challenges for the artisanal fishing sector:

- Tend to go out at night with lights
- Bad weather fatalities
- Collisions
- The safety culture of the community
- Lack of training and education awareness
- Issue of regulations and enforcement
- Challenges of maintenance.
- Lack of finance.
- Environment, particularly waste management
- Search and rescue: organised operations coordinated at the coast. But no dedicated SAR locally, it is only coordinated by navy

Overall, the group considered that safety solutions must be culturally driven as much as technological, and that this must be linked to training and education within fishing communities and the wider maritime sector.

The Vision

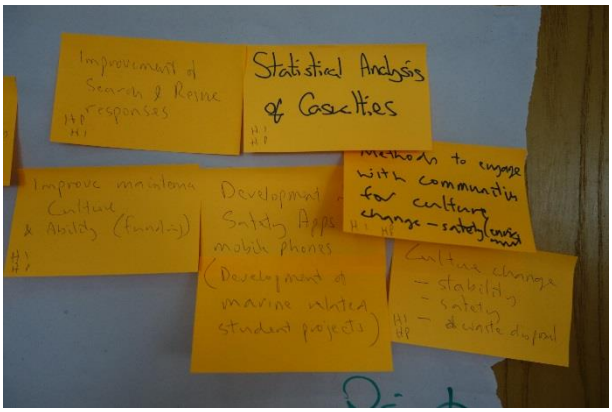
The overarching vision of maritime safety is “Safety of People and Safety of Environment”

The short term vision:

- Linking and extending the safety culture within existing Beach Management Units
- Sensitisation of the operators/stakeholders
- Engagement with youth groups for education activities impacting on cleaning/improving the environment

The long term vision:

- The actors (operators) are better educated on aspects of maritime safety
- A capable fleet equipped with cost-effective and culturally appropriate safety equipment
- Fishing communities empowered financially (through larger boats)
- Maintenance culture embedded
- Concise regulations that involved/owned by the communities that use them
- A dedicated search and rescue team (rather than the coastguard)
- Fishing fleet formed into unions/cooperatives for collective seeds of change



Possible Solutions

A number of ideas were highlighted for possible research projects leading to positive impacts on the maritime safety of Kenyan fishing operations:

- Discovering what safety equipment the fishing fleets needs and bringing this together with entrepreneurs who can take local manufacture forward.
- Promote enterprise to encourage locals to produce equipment. For example JKUAT can promote student projects for use by the maritime sector. Also technologies – for example smartphone apps for use by the maritime sector. Even developing an app that would tell you about the behaviour of your craft.
- Improving and coordinating search and rescue response. Train the trainers.
- An analysis of statistics of casualties, operations should be completed. For example types of boat, region, weather. These statistics should inform future policy and be useful to track improvements in maritime safety on implementation of new safety policies.

Although not discussed specifically at the workshop, other factors to consider inlcuded:

- Materials
- Financial empowerment
- Organisation of local communities into cooperatives
- Waste management
- Enforcement of regulations

Developing Marine Manufacturing, Services, Training and Education

The Challenge

This group, which included representatives from the Kenyan marine manufacturing sector, discussed the challenges for the growth of marine manufacturing in Kenya, but also linked to the associated services, training and education available.

A large part of the discussion focussed on the challenges for current manufacturing quality. The supply chain for the marine manufacturing industry is entirely external from nuts to engines. For example, the local steel industry is not focused on maritime sector. This raises cost of production (duties, shipping etc).

There were also a wish for specific measures by Kenyan government to support shipbuilding. Currently most shipbuilding is for export, and domestic ship procurement such as ferries are not usually awarded to Kenyan companies.

There is a lack of link between the boatbuilders and the operators. The certification of boat building is imported from abroad, which increases costs of production.

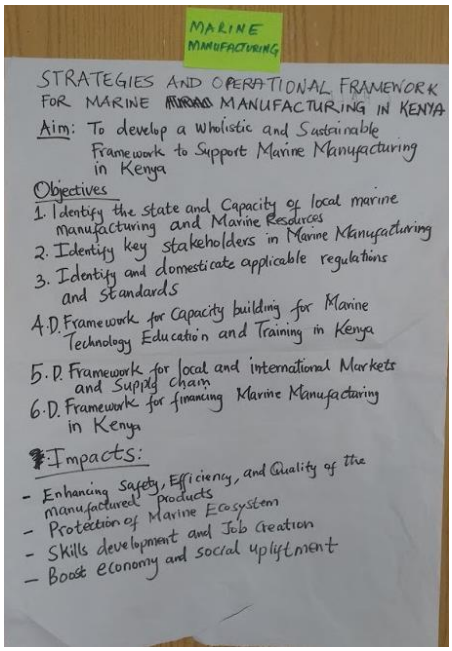
The Vision

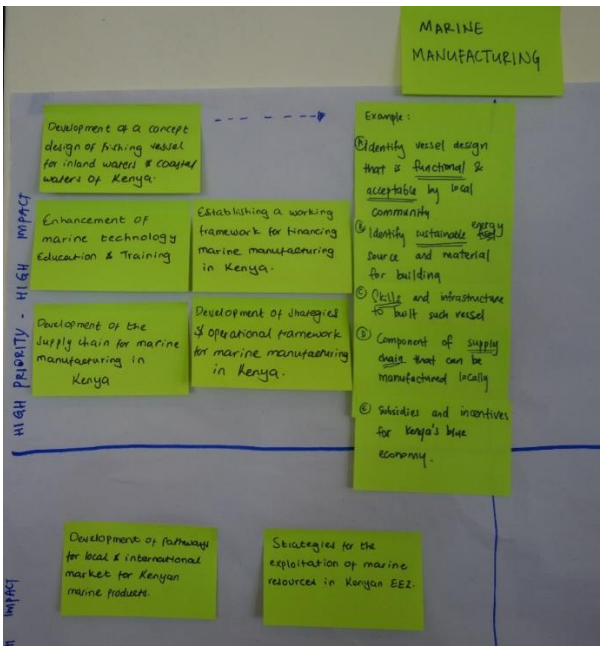
The group considered the following visions for future manufacturing:

- Regulations for boatbuilders and maintainers (that are locally acceptable)
- Sensitise the local manufacturers to safe boat building practices
- Government subsidies for local manufacturers
- Engaging the financial sector to finance new boatbuilding initiatives
- A local supply chain to supply boat manufacturing (bolts, nuts, nets)
- Sensitise the local manufacturing sector to maritime needs and markets for the maritime sector
- A new concept fishing vessel design. What vessel could be sustainable and efficient which could then be mass produced locally

Within the education and training to service future manufacturing, the group considered the following:

- Early stage awareness amongst students of potential marine manufacturing and maritime economy. Link to the current Kenyan Blue Economy agenda.
- Grow maritime institutions with courses in marine engineering, naval architecture. (for example, JKUAT is developing a naval architecture programme).
- Develop and expand an academic maritime campus at the coast
- Promote exchange programmes with established manufacturing plants for skills/knowledge.





Possible Solutions

The group took a different approach to other themes within the workshop, and focused on the development of an overarching research project which would match the vision for manufacturing, services, education and training.

Strategies and Operational Framework for Marine Manufacturing in Kenya

Aim:
To develop a holistic and sustainable framework to support marine manufacturing in Kenya

Objectives:

1. Identify the state and capacity of local marine manufacturing, supply chains, training opportunities and educational feeds
2. Identify key stakeholders in marine manufacturing
3. Identify and demonstrate applicable regulations and standards for the maritime manufacturing sector
4. Develop a framework for capacity building for marine technology education and training in Kenya, including the development of feeder routes for students to follow careers within the sector
5. Develop a framework for local and international markets and supply chains centred within Kenya
6. Develop a framework for financing new marine manufacturing activities within Kenya.

Impacts:

- Enhancing safety, efficiency and quality of the manufactured products
- Improve the protection of the maritime eco-system and environment
- Enhanced skills development and jobs creation
- Boost the maritime economy and enable social mobility for the communities within the maritime sector.

Linking Coastal Communities to the Maritime Sector

The Challenge

The challenge of linking future marine manufacturing activities to the range of communities involved in maritime activities, who are mostly located away from urban centres.

Three principal areas were discussed: fishing, trade and leisure

Some of the challenges for communities raised by the discussions included:

- The community in Mombasa uses the ferry to cross to mainland – issue of safety and congestion at embarkment. Also issues of breakdowns which leads to delays
- Environmental issues, using diesel for vessels and carbon emissions
- Issue of overloading – when tides are low the ferry carries people and vehicles. Challenge for big trucks to embark. Infrastructure
- The fishermen conflict with dredging.
- Illegal fishing in Kenyan waters. Policy on coastguard but limited capacity
- The market for fish are not well developed.
- Lake Victoria poisoning and pollution affecting fish stocks
- Fish becomes more expensive from lake Victoria
- Problems with oil spills at port
- Coastal communities cannot get their fish out to markets across the country. Adequate cold storage facilities for fish markets.

The Vision and Possible Solutions

A key message from the group was that high impact does not have to cost a lot

To get to the root of change. Who are the decision makers, who are the influencers, who pulls the levers? Village chiefs, household dynamics. Youth may be influential but do not make decisions

Can we help communities to:

- Develop appropriate fishing vessels and equipment.
- Think about new propulsion methods and sources.
- Convey the message that some actions damage health and ecosystems
- Capacity building – building new equipment such as nets and safety gear

Community empowerment is essential to ensure voices are heard at top level

"How will communities be affected by the building of infrastructure and new technology development?"

Research Project Proposals

Each group produced a set of outline research projects including a title, objectives, work-plan, impact and potential funding. In total 11 research project areas were proposed:

1. Smoothing operations, reducing impacts and improving safety of ferry transport in Kenya
2. Evaluating the productivity and technologies used by coastal fishing communities
3. Life-cycles: the future sustainability of artisanal vessels and coastal communities in East Africa
4. Strategies and Operational Frameworks for Marine Manufacturing in Kenya
5. Methods for measuring emissions from ships in an East African container port
6. Quantification of the impact of ships and ports on air quality with consideration of mitigating technologies
7. Development of smart ports for Africa
8. Evaluation and enhancement of training and education in marine sustainability
9. Analysis of casualty data for safer fishing operations in Kenyan waters
10. Enterprise strategy to identify safety and training needs for matchmaking manufacturers and training providers
11. Facilitating a safety culture in artisanal fishing communities on Lake Victoria, Kenya

Workshop Attendees

Godfrey Kotut	Training officer	Bandari Maritime Academy
Lilian Wanhoji	Higher Education, Skills & Scholarships Lead	British Council
Robert Kiplimo	Senior Lecturer	Jomo Kenyatta University of Agriculture and Technology
Bernard Ikua	Deputy Vice Chancellor	Jomo Kenyatta University of Agriculture and Technology
Hiram Ndiritu	Principal, College of Engineering	Jomo Kenyatta University of Agriculture and Technology
Stephen Wakhu	Corp. Commanding Officer	Jomo Kenyatta University of Agriculture and Technology
Mary Ngogi	Ag FO	Jomo Kenyatta University of Agriculture and Technology
Christiaan Adika Adenya	Chairman, Marine Engineering	Jomo Kenyatta University of Agriculture and Technology
Shem Otoi Onyango	Lecturer	Jomo Kenyatta University of Agriculture and Technology

Anne Njonjo	Lecturer	Jomo Kenyatta University of Agriculture and Technology
Shollo George	Superintendent Engineer	Kenya Ferry Services
Tony Cheruiyot	Marine Officer	Kenya Maritime Authority
Luke Samba	Marine Officer	Kenya Maritime Authority
Ian Kanyi	Marine Officer	Kenya Maritime Authority
Joseph Kinyua	Logistics Manager	Kenya National Shipping Line
Wallace Muhuro	Major	Kenya Navy
George Ogola	Senior Marine Engineer	Kenya Ports Authority
Mohamed Hassan	Environment Officer	Kenya Ports Authority
Aziza Mwanthi	Asst. Executive Officer	Kenya Ships Agents Association
Musa Bashir	Senior Lecturer	Liverpool John Moores University
Lydia Ngigi	MTCC Head	MTCC Africa
Simon Benson	Lecturer	Newcastle University
Alan Murphy	Reader	Newcastle University
Richard Birmingham	Professor of Small Craft Design	Newcastle University
Serena Lim	Research Associate	Newcastle University
Name TBC	Production Manager	Southern Engineering Company (SECO)
John Maitha	Teaching Assistant	Technical University of Mombasa
Nick Townsend	Lecturer	University of Southampton
Raminder Kaur	Professor of Anthropology	University of Sussex

Academic Institutions

Jomo Kenyatta University of Agriculture and Technology
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http://jkuat.ac.ke/departments/marine/

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Liverpool John Moores University
Dr Musa Bashir
https://www.ljmu.ac.uk/about-us/faculties/faculty-of-engineering-and-technology/department-of-maritime-and-mechanical-engineering

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This report presents the findings and insights from a two-day workshop, funded through the British Council Newton Fund, on *Future Marine Manufacturing to Support Blue Economy Growth in Kenya.* The workshop addressed the key challenges for Kenya to expand and mature its marine manufacturing sector and explored how UK-Kenyan marine technology research collaboration can reduce the technology and skills gaps within the sector.

The workshop debated key maritime research challenges under four themes: sustainable shipping, maritime safety, marine manufacturing and coastal communities. The report aims to provide an invaluable resource for stakeholders in the Kenyan maritime sector including universities, industry, governmental and non-governmental organisations.