PRE-TRAINING ASSESMENT OF BOAT BUILDING AND ENGINE MAINTENANCE IN MALAWI

BY

TEVETA

PRE-TRAINING ASSESMENT OF BOAT BUILDING AND ENGINE MAINTENANCE IN MALAWI

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Acknowledgement

We would like to express sincerely thanks to Salima Technical College for the call to do the training needs assessment which then translated to an overall assessment of the trade in respect to human resource, institution, and the market. Such a call has brought to light the trade that is nearly getting forgotten in training institutions in Malawi.

It is also worthy while to acknowledge the contribution from Ministry of Transport in guiding the whole process in line with marine standards and regulation. It won't suffice not to acknowledge the contribution of institutions like Marine College, Mpwepwe Boat Yard, Malawi College of Fisheries, Mr. Ngozo (the boat builder), and the other boat builders, boat engine maintenance technicians and fishermen along Lake Malawi for their contribution towards this assessment.

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ABSTRACT

Malawi despite having good fresh water lakes has over the years not ventured into boat building and engine maintenance training, a skill that is threatened to be lost on the labor market. At the mean time only seven people out of the fifty eight people who are in the industry have had professional training representing 13 percent. This then indicates 87 percent learnt how to build boats and maintain the engines on the job and informally. However looking at dangers associated with navigation and after subsequent calls from stakeholders, Salima Technical College thought of getting people trained in the threatened field. Therefore the TEVETA Research Office conducted a pre-training assessment on the viability of the training on the market and an assessment of the college to validate if it is well equipped to start the training. However the assessment indicates that there is no sustainable market for the trade in Malawi and has therefore recommended the incorporation of boat building into carpentry and joinery and similarly engine maintenance into automobile mechanics and the training of the already existing labor force.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

EPA	-Economic Partnership Agreement
ESA	-East and South African Region
GDP	-Gross Domestic Product
GoM	- Government of Malawi
GTZ	-German Technical Cooperation
IMO	-International Maritime Organisation
MALDECO	-Malawi Development Company
MAPOL	-International Convention for the Prevention of Pollution from Ships
SOLAS	-International convention for Safety of Life at Sea
STCW	-International Convention on Standard of Training, certification and Watch keeping for Seafarers
TEVETA	- Technical Entrepreneurial and Vocational Education and Training Authority
UN	-United Nations
WTO	-World Trade Organization

CHAPTER ONE

BACKGROUND

1.1 Introduction

Despite Malawi being classified as one of the least developed countries in the world, the country is heavily endowed with natural resources that are so unique. The largest of these resources is Lake Malawi which covers almost a third of the country. The lake is 360 miles long and 52 miles wide, hence sometimes known as the "calendar lake" (Ziljma, 2012). The Lake is known of being; third Africa's largest lake, huge fresh water lake, with good beaches, lies along the great lift valley, and shared by three countries. Besides Lake Malawi, the country has other three lakes namely: Lake Kazuni located in Vwaza Mash; Lake Chiuta, a shallow lake located between Lake Chirwa and Lake Amaramba; Lake Chirwa located between Zomba Plateau and Mount Mulanje, the only protected wetland and inland drainage lake with numerous migrant birds; and lastly Lake Malombe, an oxbow lake on Shire River. Figure 1 below shows the physical location of Lakes in Malawi.

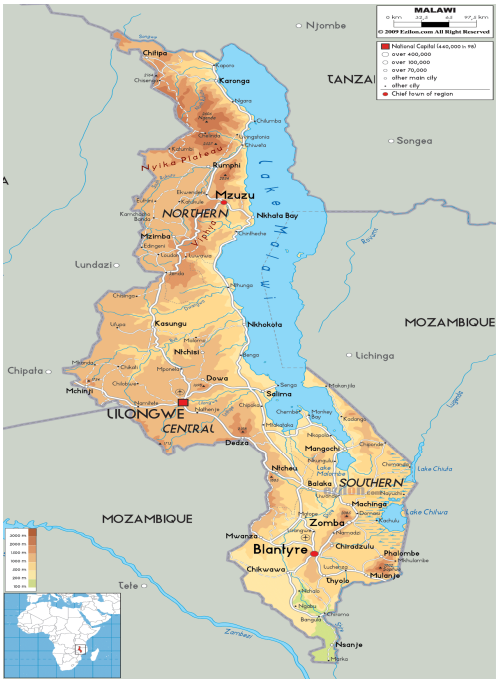

Figure 1; Physical Map for Malawi (Source; ezilon.com)

The major activity on these lakes is fishing. Mkoka (2003) stipulates that over 300,000 people are employed in the fisheries sector, with 14 percent of lakeshore communities survive through fishing, fish processing, marketing, boat and gear sales and repair, and allied industries. To this effect, he further acknowledges that fish in Malawi has a key role in food security, and at one time it contributed as much as 70 percent of animal protein in rural and urban areas. However Banda *et al*. 2005 in Kapute 2008 states that this has declined to about 30 percent in recent years due to dwindling fish stocks. From the Gross Domestic Product (GDP) contribution, around 2003 fishing contributed around 4 percent of the total GDP (Mkoka, 2003). However the from the 2010 statistical year book based on 2007 base year is that the contribution of fishing to GDP has still gone down to 0.9%. The figure below shows the trend of fishing contribution to GDP from 2004 to 2010.

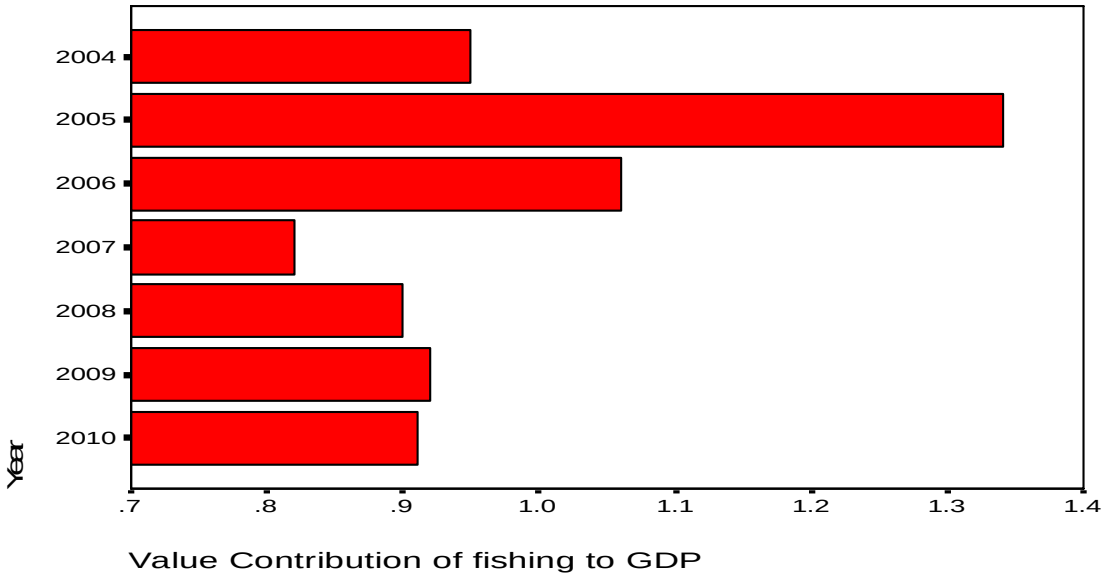

Figure 2; Contribution of fishing and aquaculture to GDP (2004-2010) based on 2007 prices (Source: Statistical Year Book)

It can therefore been seen that the contribution of fishing to GDP has been somewhat stochastic but still showing a declining trend over the years. It has to be noted however that as other sectors are growing the fishing sector has not grown as may have been desired. Several factors that have contributed to the decline among which is the use of non-recommendable nets which catches even the fingerings which could have been left for breeding.

The basic aids in this fishing are the boats and canoes. Over the years boats and canoes have been built from wood except in some instances the tourism boats which are largely fiber glass and steel. With the deforestation the wooden boat builders have also faced the challenge of the specified planks in boat building like Mkalati, Mulanje Cedar and Ngongomwa. Apart from affecting the boat building, the scarcity of these planks has also ushered in the use of non-recommended planks in boat building which then poses a challenge on the safety of life on Malawian Lakes. Coupled with the challenge of building materials, there is low specialization on the use of boats on Malawian Lakes. Same Boats are used for fishing, cargo, transportation, and sometimes tourism. This therefore suggests that the usage does not consider the requirements for the boats in use.

One problem that has come out clearly and on which something can be done in the medium term, is that the builders of these boats are those who have never gone for training in boat building. This paper therefore explores the possibility of training people in boat building and engine maintenance in Malawi. Basically the paper will be answering three questions: Is there a possibility of training people in Boat building? Who can train these people? And, can these people find a market once trained?

1.2 Organization of the study

The paper will start by providing a brief trend in water transport in Malawi and the regulations and provisions in boat building. Chapter Three will provide conventions guided boat building and navigation according to International Maritime Organization (IMO). Chapter Four will then provide training needs assessment for both Salima Technical College as an institution and its staff. Finally Chapter Five will provide market analysis of the trade and recommendations.

CHAPTER TWO

WATER TRANSPORT AND BOAT BUILDING IN MALAWI

2.1 Introduction

This chapter presents an overview of water transport in Malawi especially the vessels and boat building that has been happening in Malawi. It will further provide the trend in boat ownership and numbers especially along Lake Malawi, and lastly present an overview of boat building training in Malawi, its background and the present.

2.2 Water transport in Malawi

Besides the fishing that has talked much in chapter one, the lakes have also been used for transportation especially to areas that are not connected to road network and some which can never be connected or else its shorter travelling by water. Such places include Chisi Island on Lake Chirwa, Likoma Island and Chizumulu Island on Lake Malawi; Makanjira, Usisya, and Ngolongota respectively. This transportation has been for both passengers and goods. The water transport apart from facilitating mobility and business, it also forms the core of the history of Malawi since the slave trade to missionaries when the water way was used for transporting slaves and the missionaries. Traces are still there that the missionaries and slave traders used the Zambezi River sailing into Malawi through Shire River to Lake Malawi. At present one boat that was used in this antic by Dr. Robert Laws is still available at Mulowe, up Lake Malawi.

The least of all uses on the lakes in Malawi is tourism. The most notable destination of tourists is the shores of Lake Malawi however the lake itself is not necessarily utilized for tourism. At the mean time only three notable tourist boats are in existence on Lake Malawi, while about five are on Shire River. Due to such patronage, much assessment done of these lakes and their contribution has hinged on transportation of passengers, and cargo and fishing which has already been alluded to. Therefore the figure below shows the freight and passengers that have used these lakes in Malawi over the eight years period (2003-2010) disregarding the purpose of the

trip. The trend in transportation is however stochastic as is the case with fishing over the referred period in chapter one.

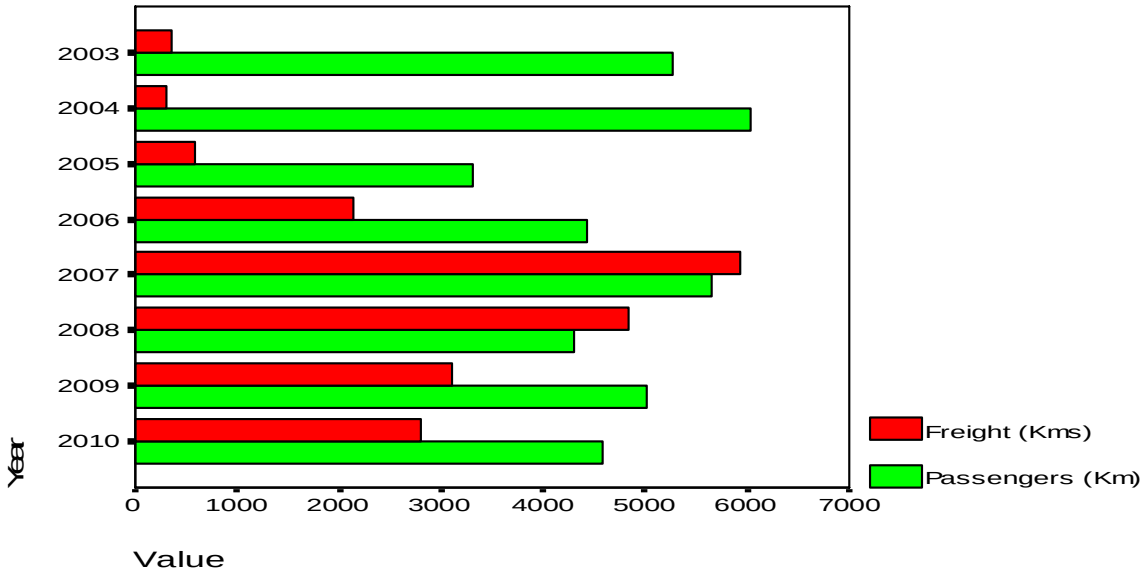

Figure 3; Freight and passenger usage of Malawi Lakes (Source: Statistical Year Book)

It has to be acknowledged that canoes on the Malawi Lakes play a great role in both transport and fishing, which may partly be attributed to their greatest population on Malawian lakes than the rest; boats and ships. The high population of these canoes can be attributed to the low cost associated with canoe manufacturing and also the fact that the canoes are not regulated. However because of its informality it is hardly possible to exactly account for all freight and passengers using the canoes. But qualitatively a special reference on contribution of canoes to fishing has been made by Common Wealth and GTZ during the ESA Meeting on Trade and Sustainable Approaches to Fisheries Negotiations Under WTO/EPA held in Mauritius in 2007 that on Malawian waters, dugout canoes and plank boats, with or without engines are the main fishing vessels. However their non-recognition by the Malawi Inland Waters Shipping Act and the associated susceptibility to accidents puts lives at a high risk than the rest which are certified on their fitness, and also licensed to operate on these lakes. The closer alternative to canoes, are boats which vary in size and type, with Boti-bwato being the very closest boat. Boti-bwato takes the shape of the canoes but built as boats to the closest of the common type Cross Boats, named after Cross the man behind the introduction of the design in Malawi.

Above the contribution of these small boats, the mention of water transport in Malawi seems synonymous with the name Malawi Lake Services because of the monopoly firm structure that has existed for so long since the end of 19th century. So far Malawi has had eighteen vessels that have been in operation from 1899 out of which eight are still in operation including the illustrious Ilala and Mtendere. Table 1 on next page shows the vessels that have existed and operated on Lake Malawi. Apart from those shown in the table, there are some that are operated by Club Makokola (Tourism ship), Hydrographic survey Vessel, Police Launch, MALDECO trawlers, Fishing Department Trawlers, and some private trawlers.

It is worthy extending that due to high costs associated with tourism boats, the availability of these boats has been limited to big tourism resorts among which are; Mvuu Camp, Hippo View Lodge, Nkopola, Club Makokola, and Sunbird Livingstonia Beach, of which all are in the southern tip of the lake except the first two which are on Shire River. This limitation is not the case with fishing boats. The difference in the numbers can be therefore attributed to two things, capital and existence of the market. It has been observed that with a simple boat one can still have a catch from the lake and has already an existing market for the catch compared to the tourism boat which needs larger capital and special marketing.

Though the number of fishing boats way exceed tourism boats, as observed earlier, there is a competitive market structure when it comes to canoes. The only drawback is that the regulation by the Marine Department as guided by the Malawi Waters Inland Shipping Act, has left out the canoes unregulated, such that there is no comprehensive picture as far as the number of canoes is concerned. It is also pertinent to mention that the regulation has largely been on Lake Malawi waters, leaving the other lakes unregulated. Currently the number of registered boats is 1206 found between Nkhotakota and Mangochi. For a distribution per district refer to Table 2 after next page which give the vessels that have operated in Malawi.

Table 1; Vessels that have operated on Lake Malawi

Vessel	Built	Passengers	Dry Cargo	Petroleum Capacity	Type
MALAWI LAKE SERVICES					
Mtendere	1980	420	45 Mt		Passenger Vessel
Ilala	1949	380	100 Mt	30000 Liters	Passenger Vessel
Nkhwazi	1954		200 Mt	27000 Liters	Cargo Ship
Karonga	1975		300 Mt	90000 Liters	Cargo Ship
Katundu	1992		750 Mt		Container ship
Ufulu	1983		32 Mt	312200 Liters	Petroleum tanker
Viphya	1976				Tugs
Viphya	1974		600 Mt		Pontoon
MOTO LAUNCH-TEMPORARIRY OUT OF SERVICE					
Ncheni	1957				Moto Launch
Out Of Service					
Chancy Maples	1899	180	20 Mt		Passenger Vessel
Mpasa	1935		225 Mt		Cargo Ship
Mulanje	1947				Tugs
Zomba	1947				Tugs
Thyolo	1947				Tugs
Dowa	1947				Tugs
Barge 300	1966		300Mt		Barge
Barge OP1	1971		20 Mt		Barge
Barge 201	1956		30 Mt		Barge
Barge 203	1956		203 Mt		Barge
Barge 91	1950		91 Mt		Barge
Oil Pontoon 1	1965		600 Mt		Pontoon
MARINE DEPARTMENT					
DREDGER					
Elicott	1994				Dredger
Out Of Service					
Secare	1971				Dredger

Source: Institutional Support to the Malawi Ministry of Transport (n.d.) & Malawi Joint Transport Review (2010)

Table 2; Number of registered boats

DISTRICT	NUMBER OF REGISTERED BOATS
Mangochi	900
Salima	202
Nkhotakota	104

Without being confined to the registration, it is an established trend that boats on Lake Malawi are concentrated on the southern tip of the lake especially the three districts mentioned. This is especially the case because the southern tip of the Lake has good fishing grounds than the upper part which therefore acts as a pull factor for the fishermen. The presence of such fishing grounds and existence of a good number of boats in these areas has also created a boat building and maintenance industry close to them. However, as observed with canoes, the major problem is that there is no regulation on who has to build and maintain boats, a situation that poses a threat to life at sea. The figure below presents the estimated number of boats and the actual number of boats registered.

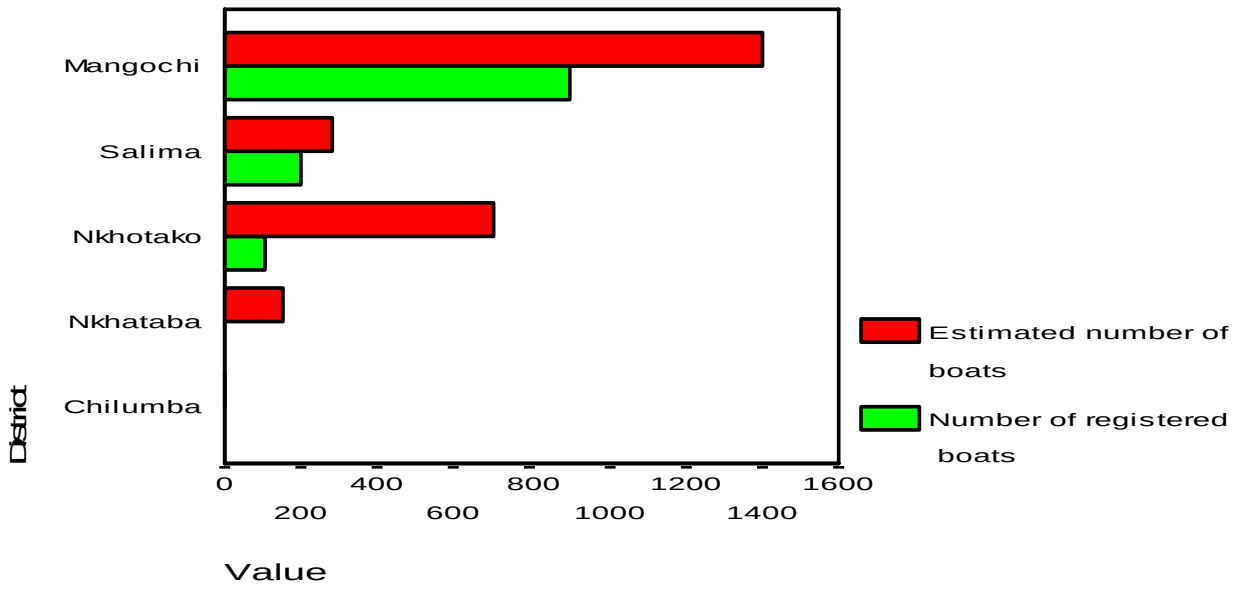

Figure 4; Number of boats

From the figure it is so clear that the registering of boats needs to be enhanced more especially in Nkotakota and the upper Lake Malawi shores like Nkhatabay despite the diseconomies of scale

associated with the areas. As mentioned and clearly seen, at the mean time the registration has concentrated much in Mangochi and Salima.

2.3 Boat Building Training

The existence of such a big number of boats would bring in mind the question as to where do these fishermen get their boats, and how good are the boats? Who is building these boats in the absence of a proper training base and regulation?

A brief history of boat building training in Malawi hinges on the contribution of Mpwepwe College of Fisheries now known as Malawi College of Fisheries, and soon to be under University of Marine Biology. Mpwepwe was established in 1966 with the aim of providing practical client focused quality training in sustainable fisheries management and aquaculture development to achieve food security and reduce poverty for sustainable social economic development through linkages with relevant stakeholders. Among the practical client focused courses that were taught within the institution was boat building. However in May 1999 following privatisation of government entities, the boat yard became an independent entity under new management. So far in the history of Malawi Mpwepwe College of Fisheries is the only institution that has been known to have been involved in the training of people in boat building till 1999 and its contribution has still left a legacy in the industry. Since that time there has been no institution that has been training people as its orientation.

It is worthy recognising that Mpwepwe boat yard despite the privatization has continued training people in boat building on a smaller scale as a latent informal function and has also been building boats on commercial basis. Recently the now Malawi College of Fisheries has revived the boat building course which is meant to develop the capacity of fish farmers in boat building and fish management. Therefore to develop competencies of the students, the college still collaborates with the boat yard for the practical sessions despite having a smaller workshop within its premises. With the help of TEVETA the college has also developed a curriculum in boat building and engine maintenance which has not yet been implemented.

Beyond Malawi it is worthy recognising the contribution Mbegani Institute of Fisheries in Bagamoyo Tanzania which has trained notable boat builders currently operating in Malawi. The

Institution has been accredited for its ability in wooden boat building, the same type which is largely been built and used on Malawian waters.

Besides the training that has been happening in these two local institutions, the informal sector has had an upper hand in training boat builders on the job. It is pathetic to note that those now available who have gone through formal training are only 13 percent of the total labour force in the boat building industry. This therefore partly justifies the claim by the Senior Boat Examiner of Marine based in Mangochi that at the mean time 90 percent of the boats that are in operation can be condemned because they don't comply with the boat building standards.

Similarly in engine maintenance it has been noted that there is no institution that has concentrated on the small engines to make sure that the large number of small boats are kept in good functional order. The Marine College, which is the only higher college responsible for seafarers and engineers, as part of their training has been training people in engineering with a bias to the ship industry. In the absence of a college that can focus on the smaller engines, there has been a gap created on the market for the artisans to work on these small engines. The current labour force has only 9 percent who have professionally been trained compared to the 13 percent of boat builders.

This low availability of skilled workforce in boat building industry has a mixed feeling among those in the industry. The first is that according to those who are formally recognised and have had the training, there is high risk of life at sea because most people do not follow regulations and standards in boat building. Partly this is a resultant effect of no regulation on who has to build boats. In other words the industry has no barrier to entry on the boat builders. Secondly, threatening their existence also is that the addition of tax on their boats which raises the prices of the boats they are to build such that local customers prefer the cheap boats while disregarding the regulations and standards that boats must abide by. While among those in the informal sector who learnt boat building on the job, they feel that there is no need for somebody to get into class and learn boat building when anybody else can do it.

Besides the boat building the other common activities to keep the boat sailing are associated with the maintenance of the hull, usually known as boat maintenance, and the maintenance of the engine. The boat maintenance has been found to require similar skills of boat building. However

commonly it has been found that local people have depended much on simple and nonprofessional means of repairing their boats which do not need training at all. The common means is the use of adhesives that can stop water from entering the boat in case there is water leakage in their boat, or nailing an object to stop water entering the boat, commonly plastic with some adhesives to act as a punch that can stop the water. For those who want a good job or are aware of the risk involved on the lake, they take them back to those who build boats for maintenance. As is the case with the human resource training in boat building, largely it is those who learnt through on the job who are involved in the maintenance. This then increases the risk or exposure of the fisher men and those travelling on the lake to capsizing as a result of breakages or lack of stability.

Turning to engine maintenance, so far there in no institution that is involved in the training of artisans in out-board engine maintenance. Those who have been trained either got the training outside the country or under a special initiative of Stansfield Motors. This therefore partly explains why the number of those who have gone for training in boat engines is so low. From the assessment done, it has been observed that in case of an engine problem, the owners go through trial and error or else observance learning on how they can maintain and service their boat engines. For those who can manage they take them to motorcycle repairers because that is the closest engine to out-board engines so far.

But what does it entail to learn how to build a boat and service the engine. For the skills, it has been proven that one must have good drawing, calculation, and interpretation skills above the competences in carpentry and joinery to qualify as a good boat builder. Besides these he must have knowledge of regulations and conventions guiding boat building. These stipulated skills have been found wanting in the informal boat builders such that they don’t qualify as good boat builders. Because of such a gap, they just copy what their friends have done or else use an already developed template to produce a boat. This assessment has therefore registered that largely it is memorization and copying of other peoples work that happens in the informal sector without clear understanding of what is the theory and reasoning behind what they are doing. Such issues relate to size, shape and the type of boat. Therefore for one to have learnt how to build boats must acquire the stipulated skills and knowledge.

In drawing of boats, there are special trained people who are called naval architects, who are responsible for the production of the drawings and designs. So far in Malawi there is no naval architect who can produce designs and diagrams suitable for Malawian waters. However, there is special recognition of Mr. Ngozo who was one of the people trained at Mbegani, a man with exceptional talent and attributes who is able to design and build boats. So far this is the only person existing in Malawi, but is not a naval architect. This is therefore a skill that Malawi has to think of investing in.

Turning to engine maintenance, those who are in engine maintenance are supposed to have the artisanal skills of engine maintenance for them to qualify as engine maintenance technicians. Therefore they are supposed to undergo proper training as is the case with automobile mechanics and motorcycle repair. The only difference with boat engines is the cooling system. The boats uses water as a medium for heat exchange compared to air in the car engines. Therefore one has to be clear on the cooling medium being used. However the techniques remain the same.

2.4 Conclusion

This chapter basically was looking at the boat building and transport in Malawi. It has provided an overview of water transport in Malawi especially the vessels and boat building that has been happening in Malawi. It has further provide the trend in boat ownership and numbers specifically on Lake Malawi, and lastly the training and statistics of labor involvement in boat building and engine maintenance. As has been alluded to in Chapter One, a critical thing is the standards and regulations associated with boat building and operation. Therefore the next chapter presents the conventions that are applicable to marine.

CHAPTER THREE

CONVENTIONS IN BOAT BUILDING

3.1 Introduction

This chapter will only consider the conventions related to operations and associated activities at sea. It is has to be noted that convention basically refers to a treaty. A treaty is therefore an agreement under International Law entered into force by actors in international law, namely sovereign states and international organizations. A treaty may also be known as international agreements, protocol, covenant, convention, exchange of letters. Treaties can be loosely compared to contracts: both are means of willing parties assuming obligations among themselves, and a party to either that fails to live up to their obligations can be held liable under international law for that breach.

In marine, there are conventions that govern the activities on the water. The conventions that are in existence are Safety of Life at Sea (SOLAS), Marine Pollution (MARPO), and Standard CT Watch Keepers (STCW). This chapter will therefore concentrate on these conventions with an objective of giving the reader an understanding on some assessment that was done.

3.2 Background to the Conventions and the International Maritime Organization

The year 1863 saw the inception of the first ever set of rules to prevent collision at sea. These set of rules came into being with effort of the British board of trade in consultation with the French Government. However the set of rules was not exhaustive as far as safety of life at sea was concerned. This was so evident with the April 1912 incident where the world's newest and largest passenger ship, the white star liner "Titanic" sank on her maiden voyage killing more than 1500 passengers and the crew. Due to this accident the British Government in 1914 convened a conference to develop international regulations. This conference was attended by representatives of 13 countries and then adopted the first international convention for Safety of

Life at Sea (SOLAS). A series of conferences followed but the entry into force of the convections was distracted by the world wars.

In 1982 an international conference was convened by UN in Geneva to consider the establishment of a new organization to deal with international shipping. This conference adopted the convention establishing the new organization which was originally called Inter Government Maritime Consultative Organization. The name was changed to International Maritime Organization (IMO) in May 1982. So far IMO has promoted the adoption of some 41 conventions and protocols. It has adopted over 800 codes and recommendations.

The conventions adopted by IMO fall into three main categories.

1. Conventions concerning with Maritime Safety.

2. Conventions concerning the prevention of Marine Pollution.

3. Conventions concerning with liability and compensation, especially in relation to damage caused by pollution.

Outside these major groupings are a number of other conventions dealing with facilitation, tonnage measurement, and unlawful acts against shipping and salvaging, which are not covered in this assessment. The critical conventions are:

1. International convention for Safety of Life at Sea (SOLAS) 1974, as amended

2. International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997 (MAPOL).

3. International Convention on Standard of Training, certification and Watch keeping for Seafarers (STCW) as amended, including the 1995 and 2010 Manila Amendments.

3.2.1 International Convention for the Safety of Life at Sea (SOLAS), 1974

Adoption: 1 November 1972; Entry into force: 25 May 1980

The SOLAS Convention in its successive forms is generally regarded as the most important of all international treaties concerning the safety of merchant ships. The first version was adopted in 1914, in response to the Titanic disaster in 1912, the second in 1929, the third in 1948 and the fourth in 1960. The 1974 version includes the tacit acceptance procedure-which provides that an amendment shall enter into force on a specified date unless, before that date, objections to the amendment are received from an agreed number of parties. As a result the 1974 Convention has been updated and amended on numerous occasions. The Convention in force today is something referred to as SOLAS, 1974 as amended.

The main objective of the SOLAS Convention is to specify minimum standards for the construction, equipment and operation of ships, compatible with their safety. Flag states are responsible for ensuring that ships under their flag comply with its requirements, and a number of certificates are prescribed in the Convention as proof that this has been done. Control provision also allow contracting Governments to inspect ships of other Contracting States if there are clear grounds for believing that the ship and its equipment do not substantially comply with the requirements of the Convention. This procedure is known as Port State Control. The current SOLAS Convention includes Articles setting out general obligations, amendment procedure among some, followed by an Annex divided into 12 Chapters

Other Conventions Relating to Maritime Safety and Security and Ship/Port Interface

1. Conventions on the International Regulations for Preventing Collisions at Sea (COLREG), 1972
2. Convection on Facilitation of International Maritime Traffic (FAL), 1965
3. International Convention on Load Lines (LL), 1966.
4. International Convention on Maritime Search and Rescue (SAR), 1979.
5. Convention for the Suppression of Unlawful Acts Against the Safety of Marine Navigation (SUA), 1988, and Protocol for the Suppression of Unlawful Acts Against the safety of Fixed Platforms located on the Continental Shelf (and the 2005 Protocols).
6. International Convention for Safe Containers (CSC), 1972 Convention on the International Maritime Satellite Organization (IMSC C), 1976
7. The Torremolinos International convention for the Safety of Fishing Vessels (SFV), 1977.

8. International Convection on Standards of Training, Certification and watchkeeping for Fishing Vessels Personnel (STCW-F), 1995.

9. Special Trade Passenger Ships Agreement (STP), 1971 and Protocol on Space Requirements for Special Trade passenger Ships, 1973.

3.2.2 International Convention for the Prevention of Pollution from Ships (MARPOL)

Adoption: 1973 (Convention), 1978 (1978 protocol), 1997 (Protocol-Annex VI); Entry into force: 2 October 1983 (Annexes I and II)

The MARPOL Convention is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. It is a combination of two treaties adopted in 1973 and 1978 respectively and also includes the Protocol of 1997 (Annex VI) it has been updated by amendments through the years

The convention for the Prevention of Pollution from Ships (MARPOL) was adopted on 2 November 1973 at IMO and covered pollution by oil, chemicals, and harmful substances in packaged form, sewage and garbage. The Protocol of 1978 relating to the 1973 International Convention for Pollution from ships (1978 MARPOL Protocol) was adopted at a conference on tanker safety and pollution prevention in February 1978 held in response to a spate of tanker accidents in 1976-1977. As the 1973 MARPOL Convention had not yet entered into force, the 1978 MARPOL Protocol absorbed the parent convention. The combined instrument is referred to as the International Convention for the Prevention of Marine Pollution from ships, 1973, as modified by the protocol of 1978 relating thereto (MARPOL 73/78), and it entered into force on 2 October 1983 (Annexes I and II). In 1997 a Protocol was to add a new Annex VI.

The Convention includes regulations aimed at preventing and minimizing pollution from ships-both accidental pollution and that from routine operations-and currently includes six technical Annexes special areas with strict controls on operational discharges are included in most Annexes.

Other Conventions Relating to Prevention of Marine Pollution

1. International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (INTRVENTION), 1969.
2. Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter (LC), 1972 (and the 1996 London Protocol)
3. International Convection on Oil Pollution Preparedness, Response and Co-operation (OPRC), 1990.
4. Protocol on Preparedness, response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances, 200 (OPRC-HNS Protocol).
5. International Convection on the Control and Management of Ship's Ballast Water and Sediments, 2004.
6. The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009.

Conventions Covering Liability and Compensation

1. International Convention on Civil Liability for Oil Pollution Damage (CLC), 1969.
2. 1992 Protocol to the International Convention on the Establishment of an International Fund for Compensation for Oil pollution Damage (FUND 1992)
3. Convention relating to Civil Liability in the field of Maritime carriage of Nuclear material (NUCLEAR) , 1971
4. Athens Convention relating to the Carriage of Passenger and their Luggage by Sea (PAL), 1974.
5. Convention on Limitation of Limitation of Liability for Maritime Claims (LLMC), 1976.
6. International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and noxious Substances by sea (HNS), 1996 (and its 2010 protocol)
7. International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001.
8. Nairobi International Convention on the Removal of wrecks, 2007.

3.2.3 International Convention on Standard of Training, Certification and Watchkeeping for Seafarers (STCW)

Adoption: 7 July 1978; Entry into force: 28 April 1984; Major revisions in 1995 and 2010

The 1978 STCW Convention was the first to establish basic requirements on training, certification and watchkeeping for seafarers on international level. Previously the standards of training, certification and watchkeeping of officers and ratings were established by individual governments, usually without reference to practices in other countries. As a result standards and procedures varied widely. The Convention prescribes minimum standards relating to training, certification and watchkeeping for seafarers which countries are obliged to meet or exceed.

3.3 Conclusion

This chapter aimed at presenting a brief overview of the conventions related to operations and associated activities at sea. The conventions basically divided into three categories; safety of life at sea, marine pollution and training of watchkeepers and seafarers have been presented. The reason behind the presentation of these conventions is not an assessment neither an analysis of the same, but a basis for the assessment that was done on human resource which follows in the next chapter.

CHAPTER FOUR

TRAINING NEEDS ASSESMENT

4.1 Introduction

In boat building, though the skills might be related to carpentry and joinery, especially in wooden boat building, but the trade calls for some specialized skills especially in joinery, material selection, and drawing interpretation. It is also crucial for boat builders to be conversant with conventions guiding marine industry, the act and environment in which the vessels will be operating. This being the case, the exercise also incorporated training needs assessment of the trainers that will be involved in training people in boat building. This section therefore presents results of the institutional assessment and training needs assessment for those who will be involved in training boat builder and engine maintenance artisans. For the training needs assessment, the section will only present an overall assessment of the training staff. In case an individual assessment is needed for any intended intervention, the reader can consult TEVETA Research Office.

4.2 Institutional Assessment

The institutional assessment indicates that generally the institution has all the capabilities and necessities as far as boat building is concerned. The vital aspect is that of being close to the lake, which makes the college so unique. The college is on the shores of Lake Malawi and the five workshops that the college has are very close to the lake than any other building which makes it easier for the construction of the dock and the boat building yard. At the mean time, none of these workshops is being used for the purpose. Beyond the availability of these workshops and closeness to the Lake, the college has more land which is lying idle which can be used for the extension if need be to construct a special workshop to be used for boat building.

The closeness to the lake has further opened the college to the boat business which the college has never taken advantage of, as part of its entrepreneurial ventures. It has been reported that those who are building boats around the college, they have been bringing their planks to the college for preparation and they go out and build or maintain the boats. This is an indication that the college has what it takes to build a boat as far as equipment is concerned. Therefore, an assessment of the college equipment, indicates that the college has more than what is required to

build the hull. The meeting of standard equipment has taken into consideration the old equipment that the college had and the donation by the Indian Government of machinery which are now in good working older. Among the critical equipment that the college has are; the learth machine, band saw, hand saw, planes, chisels, screw drivers, potable power saw, power plane, power drill, router machine, and tenon saw. A comparative assessment with Mpwepwe boat yard vindicates that the college has more than what the boatyard has.

Beyond the space and equipment, the college has an advantage in that it has already technical expertise in carpentry and joinery which is so fundamental in wooden boat building. The college also trains people in general fitting, which may help in metals and possibly build steer boats in case there is a need. The presence of such engineering courses within the college therefore would provide peer learning benefit for those who will be pursuing boat building.

However the college has been found lacking in the orientation of the workshop and absence of marine equipment. The current workshops none was designed for the construction of boats. This therefore calls for the redesigning of the workshops or a completely new project to build a workshop for boat building. As observed above, this can be easily done taking advantage of the closeness of the workshops to the lake or else the land that is available if need be to construct a new workshop. This will therefore require the building of a workshop for hands own work and a concrete water trough part of which should be in the lake with a minimum size of 100meters by 30meters for docking the boats.

From the machinery aspect, there is need of purchasing marine engines, and possibly simulators for hands own knowledge in engine maintenance. Beyond the engines the institution requires testing, diagnostic and repairing tools for these engines. This assessment therefore suggests acquisition of modern equipment with modern technology to aid in the training. Similarly this will require a workshop, store rooms and cleaning bay.

From human resource perspective the college has currently no establishment in boat building and none of the trainers has gone through boat building training. The only lay of hope for the college is that the ministry is willing to have an establishment in boat building within its structure, and also help in acquisition of equipment to help in training those to undergo boat building and engine maintenance training. Beyond the Ministry, the African Development Bank is also willing

to invest in the area of training related to boat building including capacity development of the trainers.

From development perspective, the college lacks foresight as far as the boat building venture is concerned. The first is that it did not take advantage of the people that were coming for plank preparation to establish its own boat building and maintenance yard. Secondly the impetus to start the training is from external forces. Nick Nicholson was the first person to bring to the attention of the college on what it can do with its closeness to the Lake, seconded by it was Botswana Training Authority and then TEVETA Official. Therefore the call to start the training can be stated to have resulted from such calls despite the college already helping people who are building boats, a development that could have opened the college up to be doing the actual boat maintenance or building. To the present time none has ever brought a boat to the college for maintenance.

It has also been noted that despite the college not getting into boat maintenance, some of the members of staff on their own have been engaged in the business. This therefore can be stated to be underutilization of the available staff or else can be presumed that either they were not given a chance to practice the trade within the college setup or were protective of their expertise. Despite their engagement in boat maintenance, this report has to acknowledge that none of them has formally been trained in boat building.

Beyond the college, the lack of initiatives to introduce the training has reportedly been attributed to government bureaucracy. Different from personal enterprise, the introduction of an additional course and subsequent employing of relevant people has to follow government procedures and creation of an establishment. This therefore shows that despite all initiatives that the college might have, if they will not get approvals from higher offices they cannot be realized. Below is therefore a SWOT analysis of the college.

Table 3; SWOT Analysis of Salima Technical College

Strength	**Weakness**
1)Technical experience and know how in carpentry and joinery, automobile mechanics, and general fitting. 2)The college is well equipped to mount up the training. 3)There is a possibility of peer benefit.	1) Lack of foresight, self promotion and innovations. 2) Underutilization of personnel. 3) Lack of infrastructure to carry all works in boat building. 4) Lack of experience in boat building.
Opportunities	**Threats**
1) Strategically positioned- right on the shore. 2) Easily accessible by road. 3) There is ready market for the products.[1] 4) Existence of Mpwepwe College of Fisheries which would offer learning ground, from their experience in boat building and maintenance.	1) Bureaucracy.

4.3 Staff Needs Assessment

The training needs assessment targeted all trainers within the institution especially those whose trade is related to boat building and engine maintenance. Among the trades targeted are carpentry and joinery, general fitting and motor vehicle maintenance which are the core. Ten trainers were interviewed.

Competence, Knowledge and Applications

[1] This assumes there is a production unit. However there is need for the market for the graduates.

This section therefore will concentrate on the assessment of trainers who will be involved in the training of the artisans. The assessment focused on the competences and knowledge, surrounding the trades, nautical experience, conventions, and application of the knowledge. The outcome of the assessment is that at the mean time Salima Technical College cannot be able to offer boat building and engine maintenance as is required of the trade due to gaps that exist among the training staff.

A critical component is that none of the trainers has been in boat building training nor ever participated in boat building despite registering that only one trainer (Mr. Levi Maulana) is involved in maintenance of boats and preparation of planks on private basis. It has to be further acknowledged that despite engineering trades, and carpentry and joinery modules having some components similar to boat building namely; material selection, seasoning timber, joining materials, and adhesives, the trainers have never trained anyone on boat building or maintenance nor applied their knowledge serve the one afore mentioned. This therefore indicates the existence of knowledge transfer incapacitation among these trainers which may be attributed to the background of their training and the limitation of the materials guiding their trades. This therefore would pose a challenge to the knowledge of these trainers in boat building and how best have can deliver the modules except in the case they have undergone some training in the area.

The other deficiencies noted in this training needs assessment is the knowledge of the Occupational Safety and Health (OSH) in marine. As much as it is appreciated that OSH is being taught as a fundamental subject in technical trades, the type of occupations the current OSH targets are somehow different from the marine occupations especially from the nautical aspects, like safety of life at sea which is covered in SOLAS Convention, the safety regarding the vessel as is covered in COLREG 1972, FAL 1965, LL 1966, and SAR 1979 convention. Therefore the absence of such knowledge in OSH related to marine, would compromise the safety standards which the very training would like to enforce.

The bringing of the training to the college would have assumed the existence of knowledge on the conventions just mentioned, however the assessment indicates that none of the trainers has knowledge in these maritime conventions. Similarly none of the trainers has knowledge of the

Malawi Inland Shipping Act which governs the activities on the Lakes in Malawi. It is vital to for trainers to have knowledge of such provisions not only from the aspect of mandatory provisions but also to be above the requirement of the trade. This is the reason why this report took an initiative to provide the conventions in the preceding chapter.

It worthy accept that despite the fact that sailing experience does not directly contribute to the training, as far as boat building is concerned it is a crucial aspect in appreciating the strength of the vessel. The delivery of boat building lessons without prior sailing experience can be equated to automobile mechanic trainer who does not know how to drive the very car he is teaching. The exercise therefore incorporated the maritime experience on either sailing or manning a vessel. However, only one has ever manned a vessel and the rest have ever sailed except two. It was further noted that sailing have even negative attitude towards sailing, which may in the end affect the delivery of the training. This therefore signifies a need for both sailing, and building and maintenance aspect in the upgrading of the trainers if boat building training is to start. The sailing experience would provide the trainers with the experience of the buoyancy that the boat need and the challenges on the waters which it has to withstand if people, cargo and marine life are to be protected.

The exercise however, appreciated that there are strengths as well on the side of the trainers. The things that stand out in these trainers as far as boat building is concerned are basically two; the ability to interpret the drawings and the application knowledge. Since the interpretation of drawings cuts across the trades, almost every trainer claim to have the necessary skills to interpret the drawings, especially the orthographic projections (side views and plan). Secondly, they have application knowledge from carpentry which makes it easier for them to go through boat building training and master the competences with all easiness. Such knowledge include adhesives used in marine which is discussed in science, identification of timber and wood treatment, materials used in boat building (selection of materials), and the joinery aspect on wooden boats. Similarly those in engineering trades have the designing, maintenance, engine mechanics (though with deficiencies in water cooling systems), and welding and fabrication knowledge which gives them an advantage.

Isolation of Gaps

For simplification of the needs assessment, several gaps have been isolated as follows;

Competence

1. Design a boat.
2. Assemble boat parts.
3. Build a boat;
   a. V-Shaped boats.
   b. Passenger boats.
   c. Cargo vessel- focusing on freight especially construction of compacts and load determination; stability; safety, and security.
   d. Tourism boats.
4. Maintain a boat;
   a. Engine maintenance.
   b. Hull maintenance
5. Navigate a boat.

Knowledge

1. Maritime conventions.
2. Malawi Inland Shipping Act
3. Boat building regulations.
4. Code of practice regarding boat building.
5. OSH in relation to marine.
6. Concepts in marine engineering.
7. Boat construction theory- the mathematics, physics and science involved in boat building.
8. Ship technology (including environmental conditions and hazards prevention).
9. Categories of ship.

5.3 Conclusion

This chapter aimed at assessing the viability of the institution in offering the boat building trade from two perspectives; the social, physical, and natural resources that make the institution be in a position to offer the trade and also the human resource, which is the actual resource utilizing the others in producing the output. The section has therefore managed to present results of the institutional and training needs assessment. From the results it can therefore be stipulated that the institution is better placed to offer the trade if workshops and equipment are improved, however the gaps in technical staff to be involved in the training are so critical that the training cannot

yield desirable results unless these gaps are covered either by training the staff or by having an establishment of such a post within the institution and filling it with the right person.

CHAPTER FIVE

MARKET ANALYSIS

5.1 Introduction

The availability of trainers and institution for the raining of the artisans are not in themselves a magic potion for the development of the training. The institutions will accommodate the to-be artisans and the trainers will put in the effort to bring out the best, however the conditions of the market have to determine three things; what calibre of people does the market demand, in which areas, and how many are needed for the market? Adopting this school of thought, the assessment included a market analysis on the potential trade in the areas of boat building and engine maintenance, focusing on the current status of employment absorption, the future absorption and demand, the number of boats today in comparison to what is needed in five years time, referred to as the medium term, in relation to the demand and occupation. This section therefore will present the results of this assessment and the implication of the status of the results.

5.2 Current Market

In relation to the training section above, it has to be noted that maintenance is the routine activity that has to be done if the boat has to be kept in shape and fit for its work. Besides the owners of the boat who use their own experience to maintain the hull, the boat builders are also largely involved in the maintenance of the boats both those built by others or themselves. This maintenance of boats largely generates the market for this occupation. This may be attributed to the low scope nature of the work, the time taken to maintain the boat, the low competence needed in maintenance, and the number of boats available that need maintenance. However the generation of the market for boat builders from the maintenance side is affected by the nature of the maintenance activities as well. As indicated before the need for maintenance is an ongoing activity which the owners of the boat upon mastering the skill through on job (experience) they tend to start working on their boats, which later they regard themselves as competent to an extent of working on other peoples' boats.

Above the skills needed in maintaining boats are the boat building skills. Building of boats requires higher competence compared to maintaining of boats. This being the case, the market for people in boat building seemingly might be thought to be greater than that of boat maintenance. However, the situation is not the case. This assessment has found that people would rather repair their boats than build a new one, indicating an increased demand for maintenance rather than new boats. This is partly due to the cost associated with building a boat which on average has been calculated at K250,000.00 for a standard engine boat. The second factor can be the life of a boat which is not short as may be thought. As to how long is the boats' life span, the answer varies with type of construction, choice of materials, and overall workmanship. However, with the conditions prevailing on Lake Malawi, and with good inputs a wooden boat if maintained yearly can stay for twenty to twenty five years on average, a fibreglass boat can stay for life time unless broken, similarly a steel boat. This should therefore indicate that boats though expensive, they can also be cheap depending on the type labour and materials used. It has also to indicate further that the longer the life span the low marginal increment on demand per year.

The effect of higher costs associated with good boats, has therefore two implications on the demand of the boat building industry. The first is that it has pushed consumers of the services to cheap labour and materials which can do the same job as that of a higher cost vessel. Secondly it has made the demand of the boat building to be derived demand, such that no boat builder ventures into boat building with his private resources. The consumer of the service has to demand the production of the boat and bring the materials, or else the financial resources to the builder for the purchase of materials, some of which are sourced from Tanzania. Upon the purchase of such materials the boat builder builds the boat and charges the agreed upon price. This pre-assessment of the market indicates that during business booms on average, the boat builders can work on four to ten boats depending on the type of boat in a month, while in business slumps they can work on only one boat.

It is worthy registering that this derived demand in boat building and preference for cheap labour is a cause of concern as to how well will the boat building graduates be placed to compete with those already existing but cheap builders who do not have the right competence? This therefore calls for a need to put in place mechanisms which can insure the flourishing of those with right

skills at the same time consider the demand of the market vis-à-vis the output of the training.

Turing to engine maintenance, those in engine maintenance have basically two sources of their work, general servicing and engine faults. After several catches and voyages depending on the type of boat, as is also the case with every automobile, the engine needs servicing. This has therefore greatly contributes to the engine maintenance market than that of faults. On average those in engine maintenance if all is well they are able to service twenty to fifty engines in a month and one to three engines when the business is in a slump. However with faults the demand is stochastic depending on perils that the engine is subject to over the period of usage. The major threat to boat engines is the rocks submerged in the waters that can break the engine if no care is taken.

The other source of engine faults is the usual wear out of spare parts which comes with time of usage. Due to such unpredictability in wearing out and breakages, in this assessment it was not possible to register the demand of fault maintenance. However what has to be noted is that engine maintenance market is far from saturation despite the numbers being lower than could be envisaged. It has therefore to be registered that those who are currently working on boat engines, some of them are those trained to service motorcycles, however because of the similarities existing between these engines people have trusted them to have the competence to work on their engines. The next section will therefore present the future demand in comparison to the current demand in both aspect of boat building and engine maintenance.

5.3 Future Market of the Boat Industry

With the current status of the demand all things held constant, it is saddening to report that the market for boat building and engine maintenance is not that promising. Several factors can be noted for such a stipulation with low levels of fishing topping the list. This is mainly due to the large number of boats used as fishing vessels compared to the alternative uses as reported earlier on. A better picture on depletion and the levels of effort needed to yield the same catch can be sourced from FAO's publication (http://www.fao.org/docrep/005/T0783E/T0783E12.htm) on the exploitation of Chambo a rare species for Lake Malawi. In this document it is so clear that over the years, more effort is needed to realise the same catch compared to some years ago. A good

picture can be got from the figure below, which shows the need for more effort for a catch as compared to several years back. The medium term assessment would indicate that marginal effort (the increment of effort in each subsequent year) has been constant and oscillating between $\pm$ 100, while catches marginal increment has gone above $\pm$ 1000. However, the overall assessment shows that the effort has been increasing while the catch has gone down above the + 100 and slightly below -100 respectively. Since most of the boats on Malawi lakes are built for fishing, it has been noted that the realisation of low catches has therefore reduced the demand of boats on the market.

A notable trend that has to be accepted and has also been recognised by the stated report is that the deep water fishing is the one which is now viable. However, this requires the use of trawlers which work in pairs and subject to several regulations on fishing grounds. Such being the case, this deep fishing has therefore needed large investment which most fishermen cannot afford. This therefore means that the demand of boats has gone down unless a special project on trawler building can be done. The linkage programs that have been there to improve fish management for better catches are those encouraging cage culture however they have met a lot of challenges that have reduces the patronage, however a good assessment on these has to be done for better conclusion on their viability and the boats that were specifically designed for fish management in cages.

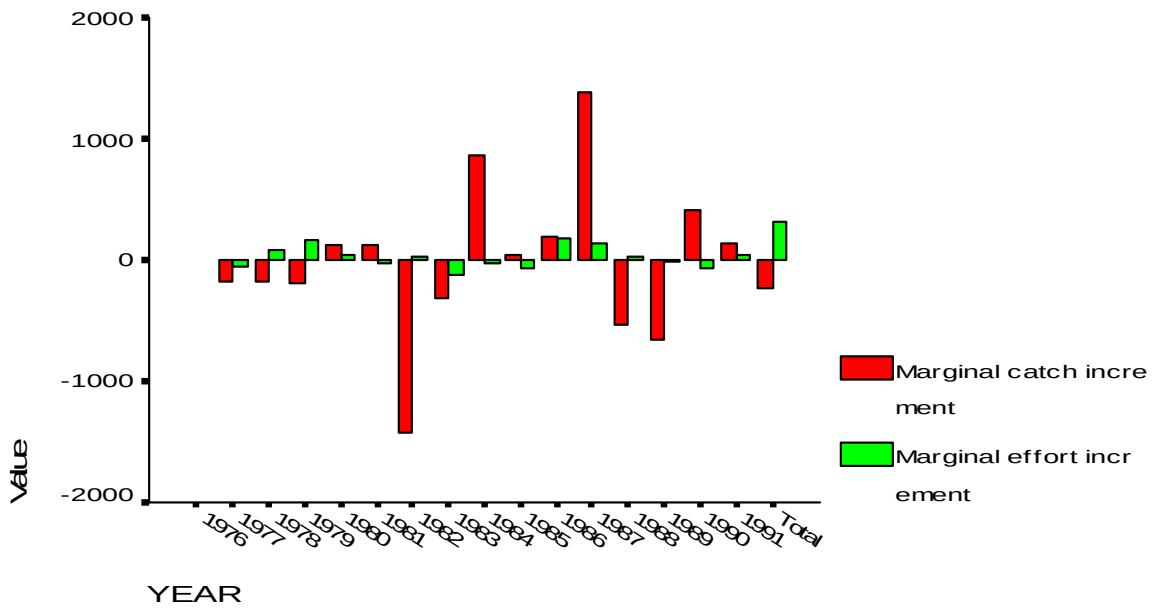

Figure 5; Marginal comparison of catch and effort from 1976-1991

As seen in the subsequent chapters, the other common use of boats apart from fishing is tourism; however this function has lagged behind in contributing to the gross national productivity of the nation despite the potential it has above the other sectors of the economy. The other drawback over the past three years was lack of political will, fuel, and foreign currency scarcity. However, the consolation now emanates from two points; the just adopted Malawi Growth and Development Strategy II (MGDS II) under sub theme 6 and the step taken by the government to priorities the sector as announced in the parliamentary maiden speech of the President, Her Excellency Mrs. Joyce Banda.

The stated strategy, points to promoting the development of high-quality tourism facilities in designated areas, by providing infrastructure that is supportive to tourism. The goal of the strategy on water transport is to promote inland water transport system and improve access to the sea. However the key strategies emphasize on promotion of safe and affordable water transport and acquisition of vessels which would be presumed to be regulation function, and purchase of big vessels which are above this pre-assessment and they cannot be built by the training institutions as is intended. This therefore means that more is yet to be done on tourism boats and water transport revitalization if boat building industry is to be viable in Malawi.

The State President, Her Excellency Mrs. Joyce Banda in recognizing the slump the economy went through, She pointed out the intention of her government to giving overriding priority to mining, industrial development, energy, and tourism in order to accelerate the recovery of the economy. Specifically to tourism she pointed out the need to redesign Lake Malawi as a tourism destination for both lower and high income tourists, and engaging a strategic investor to drive the tourism industry which will in the end raise the profile of tourism in Malawi. If boat building will be part and parcel of the redesigning and investment, then a market for boat building in tourism is likely to improve. Several things will therefore be needed to take a paradigm shift. Amidst such things are, recurrent expenditure to shift towards tourism, developmental/ investment expenditure to be enhanced towards the sectors infrastructure and aids, and campaign and marketing strategies to be put in place or rejuvenate the efforts of the concerned ministry in marketing. Failing to do this, the sector will still stagnate.

This pre-assessment in estimating future demand vis-à-vis current demand adopted point estimates with a five year midterm estimation. The current number of boats on Lake Malawi is two thousand three hundred and forty seven most of which are for fishing. Along Lake Malawi currently the sector employs fifty eight people who directly work on boats out of which eleven work on engines. The worry with these artisans in boat building is that only seven representing 13 percent are professionally trained. In five years all things constant, there will be a need of three thousand and seventy five boats indicating a thirty one percent increase. Assume there was equal spread of boats being built, this would then indicate that fifty boats were built by each person over the years. If the business cycle stipulated earlier on is factored in the calculation and get the minimum of one boat per month (thirty one man days), then it would translate to four years (one thousand and twenty one man days) in which all the existing boats were built. If things have improved on average four boats per months, depending on the type on boat, then the fifty boats were built in one year one month (approximately 380 man days). The variation therefore of building the demanded fifty boats per person is one to four years of labor. Looking at the period which can be stated to be so small, this calculation assumes no breakages, and continued maintenance of the existing boats as has been stated on life span.

In five years time, the market will need three thousand and seventy five boats inclusive of the current which can then be termed future demand. Due to the small difference this would then

indicate not much difference from the current estimates. If divided equally per person assuming no increment in labor from any other source, then this would indicate sixty five boats per person, a 15 boats increment. Adopting point estimates, to meet the future demand, it would translate to maximum of five and half years with minimum of one year four months if business has boomed and slumped respectively. This therefore means if the concentration would be on the percentage increment of 31 percent as is being demanded by the market, it would take a maximum of one year three months and a minimum of four months to saturate the market assuming booms and slumps respectively. The table below therefore summarizes the calculations.

Table 4; An overview of boat industry in Malawi for now and the coming five years

ITEM	CURRENT NUMBERS AND ESTIMATES
Number of boats now	2347
Number of Boats in five years	3075
Percentage increment of boats in five years	31%
Number of boats to be built in a year in the coming five years to meet the demand	146
Number of people employed in boat industry now	58
Number of people in five years time	113
Number of people professionally trained	7
Percentage increment of people to be employed in boat industry in five years	95%
Additional work force per occupation	55
Work force in engine maintenance now	11
Work force in engine maintenance in the five years	22
Percentage increment	100%
Additional work force	11
Work force in boat building now	47
Work force in boat building in five years time	71
Percentage increment	51%
Additional work force	24

Despite the fact that the percentage increment of people to be employed in the boat industry is so high, reaching 95 percent, the absolute numbers are so small like hundred and thirteen compared to the current fifty eight. If translated into classes of scores, then it would mean about five classes. Just basing on the yet to be developed human resource, then it would mean two classes which would translate to two cohorts to get the market saturated. However the development of

the two classes would bring down the average number of boats to be built by an individual from fifteen boats to eight boats per person[2]. If the business cycle is to be brought into consideration, then it would mean two full working months during business booms and eight working months during slumps.

The percentage increments indicates a dire need for those working on engines (100 percent increment), 51 percent increase on boat builders, against a 31 percent increment in boats to be built. The figure below therefore, plots the increments against each other for better comparison. This clearly shows the in-balance existing in boat building industry.

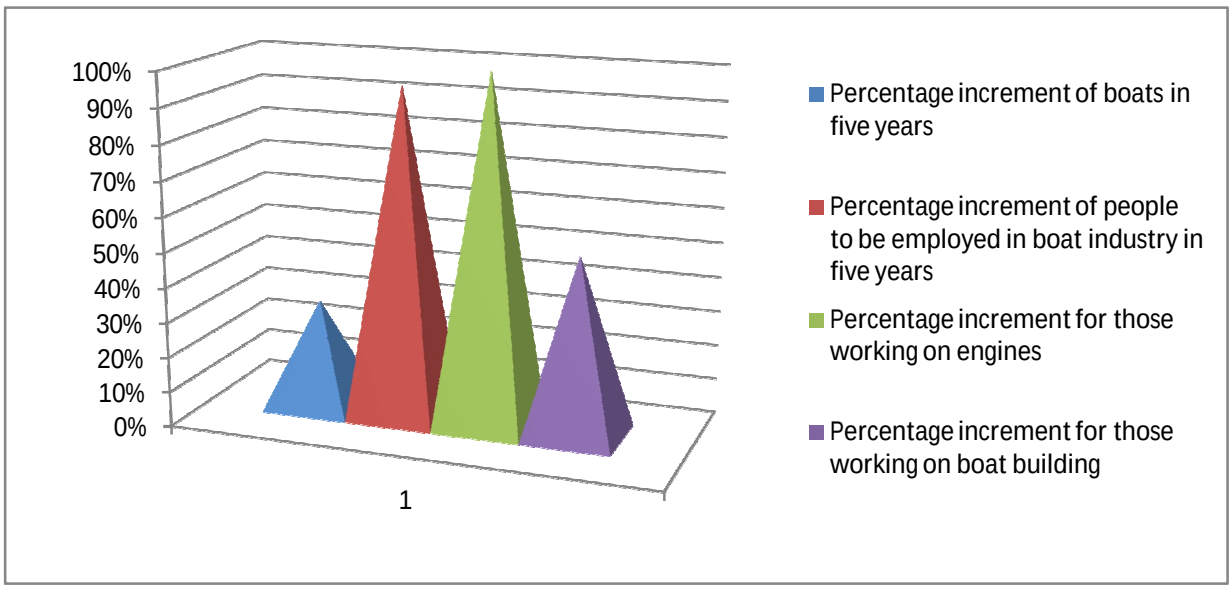

Figure 6; Point estimate of the employment growth in boat industry (Source; Survey data)

To reach equilibrium in this boat industry variables increment, then there is a need to almost double the demand of boats to four thousand five hundred indicating a 92 percent increase. This would then translate to 321 percent increment in the labor force needed for the industry with 91 percent in boat building and 91 percent in engine maintenance. The figure below indicates the increases in the industry.

[2] This is focusing only on the increment of boats not the total number of boats.

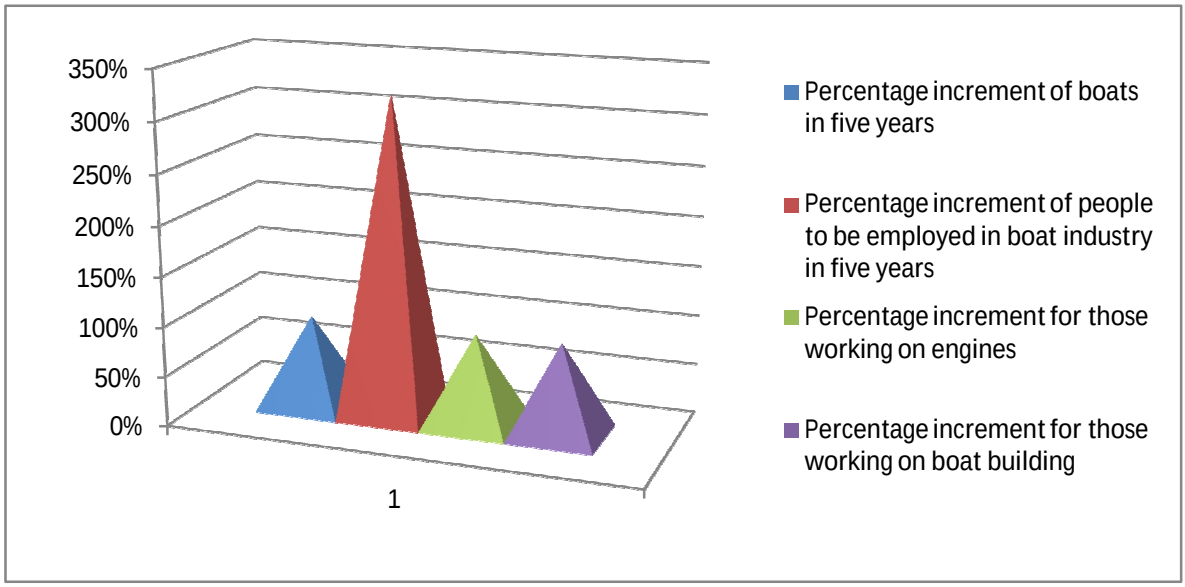

Figure 7; Equilibrium in the boat industry and its effect on labor market (Source; Survey Data)

This therefore means if government efforts could target the revitalizing of the water transport either for tourism, fishing or transport, with an emphasis of local built boats, it would then call for training that could take ten years to saturate the market of those working in the industry, assuming twenty are being trained each year. However the disequilibrium will continue to exist on the market unless there is total control of the labor output for both informal and formal sectors which is unlikely to happen.

5.4 Conclusion and recommendation

The current market demand and estimation for the future all things held constant is however low for any investment in boat building training as alluded to earlier. This development of training would therefore need an initial investment of effort from government to create demand for boats as a first step following which will be an increment in the other variables as response to the government action. The 321 percentage increment is also a result effect of the multiplier effect from the government action. Failing to do this the market will still stagnate.

If something has to be done in this sector, it therefore has to be the development of the labor force available in order to insure safety of cargo and passengers on the lake. One other skill which has been found lacking is the naval architectural skill. At the mean time only one person can be able to come up with drawings for boat building. However he has not been trained as a

naval architect. As a nation, Malawi needs to have people of that caliber if regulation and standards have to be enforced.

This paper therefore upholds the upgrading of the skills of the already existing labor force and concentration of effort on the same and increased regulation of both boats and the builders as a standard enforcement mechanism. The development of training to train new builder and engine maintenance artisans will only saturate the market. The second option would be the incorporation of boat building into the carpentry and joinery curricula and engine maintenance into automobile mechanics such that it will be a competence above the other competences in the occupations. This will then indicate the increased transferability of skills within the trades and opening of opportunities for the traditional curriculum.

The paper also calls for government efforts to invest in boat building industry as part of the tourism strategy. If the government will not invest in the strategy as is indicated, the attracting feature will only be the shores and not necessarily the lake tourism as may be called. This will indicate a further loosing of a skill that could have been secured.

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