



P.O. Box 1390, Skulagata 4  
120 Reykjavik, Iceland

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## **ANALYSIS OF TRAINING NEEDS FOR THE DEVELOPMENT OF POLICY AND PLANNING FOR FISHERIES COMMISSION, GHANA**

Hayford G. Agbekpornu  
Fisheries Commission,  
Ministry of Food and Agriculture, Ghana  
Box GP G30, Accra, Ghana  
hayfodgadry@yahoo.com

Supervisor: Ragnar Arnason (PhD)  
Ragnara@hi.is  
University of Iceland  
Department of Economics

### **ABSTRACT**

Public services all over the world have set up structures and procedures for the training of public servants. This calls for training needs assessments (TNA) to separate training from non-training activities. Training needs assessment (TNA) is a process in gathering information about types of training needs required for an organization such as the Fisheries Commission. It is believed that without TNA, there cannot be any meaningful training in an institution and also, it becomes difficult to tailor training activities to the needs of staff. This can help donor agencies or the Commission to identify and fund needed training programmes. The main objective of this study is to analyse training needs of Fisheries Commission, Ghana and to identify the gaps for continues support through various means. In analysing training needs, a questionnaire was designed and sent through the Director of Fisheries to regional, divisional and unit heads submission to the staff to complete. This was mailed electronically and out of a total of 193 staff who were sampled for the study, 32 percent representing 62 respondents returned (respond rate). In addition to the administered questions were interviews with subject specialists and a review of the relevant literature. Findings show the identified knowledge and skill needed by the institution and staff at the Commission. It also identified possible short and long term programmes which could be included in the curricula of teaching institutions in the country to boost local content for future delivery of fisheries related knowledge and skills.

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## 1 INTRODUCTION

Ghana is endowed with significant and valuable stocks of fish, leading to a tradition and culture of fishing as great as that of any other nation in West Africa. The country produces on average 440,000 tons of fish (including aquaculture production) from its waters each year. This fish production is worth in excess of US\$1 billion annually. As many as 2.2 million people in Ghana are dependent on the fisheries sector for their livelihoods (MoFA, 2009).<sup>1</sup> This includes some 135,000 fishers in the marine sector (of which 92 percent are artisanal fishers) and an estimated 71,000 artisanal fishers operate in Lake Volta (MoFA 2009). About 20,000 women are engaged in full-time fish processing, smoking and salting (IDAF, 1993). The sector's contribution to the country's GDP in 2011 was 1.7<sup>2</sup> percent (GSS, 2012b). These figures underscore the relatively important role that fisheries play in the Ghanaian economy compared to most other nations (Document of the World Bank, 2011).

The fishing industry is regulated by the Fisheries Commission<sup>3</sup> under Ministry of Food and Agriculture (GoG, 2001; MoF, 2008a). It is a policy of the institution to invest in its staff through capacity building and training (MoF, 2008a). Indeed Ghana, as so many other African nations, has come to rely on training to develop critically needed administrative, professional and technical competency (Fisher & Tees, 1992). The importance of investing in the competence of the nation workforce is further underscored by Ginzberg and Volta (1981) who pointed out that "human capital", defined as the "skill, dexterity, and knowledge" of the population, has become the critical input that determines the rate of growth of the economy and the well-being of the population.

The National Fisheries and Aquaculture Policy document (MoF, 2008b), one of the policy document of Fisheries Commission, indicates that there is an inadequate number of trained high-level and mid-level manpower in its departments and certain key activities have suffered as a result (MoF, 2008b). A recent review of Fisheries Commission of Ghana's capacity and capability by World Bank consultants (Document of the World Bank, 2011) similarly indicated many training needs gaps in the fields of research, monitoring and evaluation, aquaculture, procurement and marine fisheries management among others. These assessments suggest that the Commission of Fisheries is currently not sufficiently well equipped in terms of human capital to effectively execute its duties and responsibilities. There is therefore the need for capacity building.

Although dependent on training, heads of public institutions have become increasingly critical of the actual accomplishments of training. One criticism of training is that there is insufficient needs analysis to match the training with the performance requirements of the organizations concerned (Fisher & Tees, 1992). Although advocated in the literature as a critical element in the training process, needs assessments tend to be neglected in practice (Fisher & Tees, 1992). Thus, it appears that to improve capacity building in the Fisheries Commission and make the training more in line with the actual needs of the Commission, it is necessary to undertake a training needs assessment. In fact, this is required by the West Africa Regional Fisheries programme and Ministry of Food and Agriculture (MoFA 2010).

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<sup>1</sup> This may be an overestimate. If 2.2 million depend on fishing for their livelihood, then total revenue per capita is only about 4-500 US\$/year far below the average income in Ghana before the payment of costs. The total catch of 440 thousand tons is only about 200 kg. per person per year which is barely sufficient for survival.

<sup>2</sup> 2011 estimates revised on April 11, 2012

<sup>3</sup> The Commission was later accorded a status of a Ministry called Ministry of Fisheries and Aquaculture Development in the course of the study

The specific objectives of this project are to:

1. analyse training needs of Fisheries Commission of Ghana,
2. outline training/education programmes to meet the most pressing of these needs,
3. evaluate of post training conditions at the Commission,
4. provide key policy recommendations in the field of fisheries training and education for Ghana.

The report is structured in accordance with the objectives as follows: Chapter two provides background information including a summary of the main geographical, demographic, economic, political facts about Ghana as well as review on capacity building in the Civil Service. Chapter three provides, review of the theoretical foundation of the study including Swanson's model on industrial training and various theories on training needs assessment. Chapter four presents an assessment of training needs in the Fisheries Commission including perceived and actual training needs as well as review of existing training programmes. Chapter five provides outline of short run and long term training programmes to meet the most pressing training needs and attempts to assess the associated costs. Chapter six examines the evaluation of post training conditions at the Commission. Finally, chapter seven provides some key policy recommendations.

## **2 BACKGROUND**

### **2.1 Profile of Ghana**

Ghana is located on the northern shore of the Gulf of Guinea in West Africa. The country has an area of 238,530 square kilometres and lies between latitudes 4°44' and 11°11'N and longitudes 01°12' and 03°11'W. It is bordered on the east, west and north by the Republics of Togo, Cote d'Ivoire and Burkina Faso respectively (Figure 1). The ocean shoreline is 550 km long (Leipzig, 1996) and the EEZ is approximately 235,349 km<sup>2</sup> (CIA, 2012). The climate is tropical; warm and comparatively dry along southeast coast; hot and humid in southwest and hot and dry in the north (CIA, 2012).

The population of Ghana in 2010 is about 24.7 million according to a census in 2012, representing an increase of 30.4 percent over the 2000 census of about 18.9 million (GSS, 2012a). The annual average intercensal growth rate is reported to be 2.5 percent. The population density per square kilometre increased from 79 in 2000 to 103 in 2010.

The country has a relatively young population consisting of a large proportion of children under 15 years and a small proportion of elderly persons (65 years and older). This age structure is changing, however. The proportion of children under 15 years declined from 41.3 percent in 2000 to 38.3 percent in 2010. That of 65 years and older has also seen a decline from 5.3 percent to 4.7 percent in 2010. Gradual urbanization is taking place also. The proportion of the population living in urban areas was 50.9 percent in 2012 compared to 43.8 percent in 2000 (GSS, 2012a).



Figure 1: Map of Ghana (Maps of World, 2012)

Ghana's population is comprised of a number of tribes. Almost half of the population are from the Akan tribe (47.5%), followed by the Mole Dagbani (16.6%), the Ewes (13.9%) and the Ga-Dangme (7.4%). The Mandes form 1.1% of the population. In terms of religion, majority of the populace are Christian (71.2%) followed by Moslems (17.6%). The rest are either traditionalist or are not affiliated to any religion. Almost three quarters of the population (11 years and older) (74.1%) are literate whilst 67.1% can both read and write (GSS, 2012a). Maternal mortality rate was 350 deaths per 100,000 live births while infant mortality rate was 41 deaths per 1,000 live births based on 2010 and 2012 estimates. Life expectancy at birth is about 61.5 years.

Ghana is a republic with a parliamentary type of Government. The country is divided into 10 Administrative regions and 170 Metropolitan, Municipal and District administrative units. The most important industry in the country is agriculture contributing some 25-30% of the national gross domestic product (GDP). The agricultural sector comprises general crops, livestock, cocoa and fisheries sectors. According to Ghana Statistical Service (2012), fisheries sector generated 2.3% and 1.7% of the national GDP in 2010 and 2011, respectively.

## 2.2 Ghana's fisheries sector

The fisheries sector is divided into two major components: marine (sea and lagoons) and inland (lakes, rivers and reservoirs). Both sectors may be divided into capture fisheries and aqua-/mariculture. Inland fisheries are primarily small scale, while the marine fisheries are a combination of small scale (and mostly artisanal) and large scale industrial fisheries.

### 2.2.1 Marine capture fisheries

During the decade 2000-10, the marine fishery landed on average about 310,000 tonnes of fish a year, with total landings showing a slight and not statistically significant declining trend of some 0.8% per year (FC, 2010). This evolution is illustrated in Figure 2. The decline of total fish production in 2002 and 2007 is mainly due to a fall in catches by artisanal fleet from 236,355mt (2001) to 200,769 (2002) and from 231,681 (2006) to 187,088 (2007) respectively.

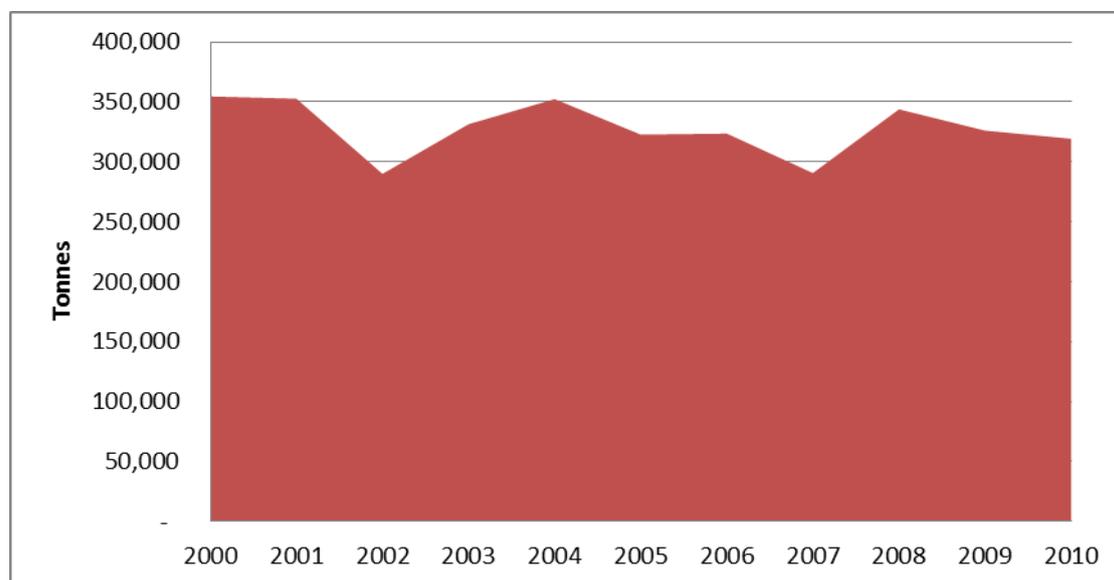


Figure 2: Total marine fish production (mt) from 2001-2010 (FC, 2011)

Demersal stocks are heavily exploited and probably overexploited. Tuna stocks are a regional resource with species like skipjack tuna underexploited while bigeye and yellowfin tunas are fully exploited (ICCAT, 2007). There are also signs of very intensive exploitation of fish stocks in lagoons.

The marine capture fisheries consist of four main fleet types; (i) artisanal, (ii) semi-industrial, (iii) industrial trawlers/shrimpers and (iv) tuna vessels. In 2011, the artisanal sector contributed 69.8% of the total marine catch in terms of volume followed by the tuna fleet with 21.3%. The industrial fleet contributed 6.1% and inshore or semi-industrial fleet contributing to nearly 2.9% (FC, 2012).

### 2.2.2 Inland capture fisheries

The Volta Lake, as well as other inland water bodies inland lagoons, reservoirs, irrigation dams and dugouts are the main sources of inland capture fisheries production. Lake Volta, which has a surface area of 8,482km<sup>2</sup> and a shoreline of 250 miles (Visual Earth, 2002), contributes about 90% of the total inland fishery production.

Inland fisheries are estimated to land about 150,000 tonnes of fish per year, even though official landing statistics record a considerably lower volume (DoF, 2007). The official records are widely believed to considerably underestimate the actual production. There are signs of overexploitation of Lake Volta fishery resources in the form of a fewer number of species being caught and of the increasing predominance of relatively small sized fish in the catch (IDAF, 1993 and 1999; Braimah, 1995; DoF, 2003). Rivers and reservoirs are thought to be less heavily exploited.

### 2.2.3 *Small-Scale Sector*

The small scale fishing industry traces its origins at least to the 1700s and 1800s (Lawson & Kwei, 1974) when it used dugout canoes and a range of fishing gear to exploit fish in coastal waters, lagoons, estuaries, rivers and lakes. Fish caught was initially for domestic consumption. These small-scale artisanal fishery has now evolved into a vibrant industry with a mix of traditional and modern fishing fleets. According to Amador *et al.* (2006), marine fishery resources are exploited by among other vessel types a fleet of 11,213 dugout canoes, 57 percent of which are motorized. The fleet has increased significantly since the 1990s and now operates from 334 landing centres and lands about 70 percent of the total marine fish production. A significant proportion of Ghanaian small scale marine fishers also operate in neighbouring countries along the coast.

In the inland capture fisheries, artisanal fishermen operating in Lake Volta in the years before 2000 were using 24,000 planked canoes of which only 4 percent were motorized (DoF, 2000). Inland fisheries are reported to be carried out from 1,232 fishing villages. In addition to actual fishing, the small-scale fisheries sector also includes a thriving post-harvest sector involving many female fish processors, wholesalers and retailers.

### 2.2.4 *Industrial fisheries*

These fisheries are currently based on 126 licensed vessels made up of 81 trawlers, 2 shrimpers and 43 tuna vessels (FC, 2012). The tuna vessels target tuna, primarily for local canneries and export. With the exception of the tuna vessels that are generally joint ventures with foreigners, all fishing vessels are fully owned by Ghanaians (Fisheries Act 625). Tuna vessels land 21.3 percent of total marine fish catch, about 3 percent is accounted for by the inshore vessels and 6 percent is landed by the industrial vessels (FC, 2012).

### 2.2.5 *Aquaculture*

The fish farming sub-sector is exclusively inland-based and dominated by non-commercial initiatives, small-scale, subsistence aquaculture often using earthen ponds. Tilapia species represent 80 percent of yields with catfish making up the remainder (FC, 2012).

More recently commercial aquaculture enterprises have been established and these have provided an increase in production and employment opportunities. These commercial enterprises focus on the culture of tilapia and catfish, generally for the urban upscale market. The aquaculture sector seems to be growing fast at the moment. Reported production was about 19,000 mt in 2011 as compared to 10,200 tonnes in 2010. The potential to increase production from aquaculture is high and in the future, aquaculture will have to bridge the gap of increasing fish demand.

### 2.3 Fisheries administrative structure

The organizational structure of the Fisheries Commission is outlined in Figure 3. The main administrative body for fisheries is the Fisheries Commission. This was established in 1993 when the then Ministry of Fisheries was changed into the Fisheries Commission. The Fisheries Commission is charged with the responsibility of regulating and managing the utilization of the fishery resources of Ghana and co-ordinating policies relating to them. The Commission operates under the Ministry of Food and Agriculture (MoFA 2009). The minister responsible for the fisheries has ministerial responsibility for the Commission. In addition, the Commission includes the chairperson of the Commission and 9 other members including the Director of Fisheries. Under the Fisheries Act 625 of 2002, the Commission currently works through the Secretariat as an implementing agency headed by the Director of Fisheries (Figure 3). The mandate of the Fisheries Secretariat includes management, development and regulatory functions, such as the development of technical regulations and the implementation of Monitoring, Control and Surveillance (MCS) through its MCS Division, which is mandated to enforce fisheries laws (MoF, 2008). The figure shows that the Secretariat of the Commission is made up of Marine Fisheries Research, Finance and Administration, Monitoring, Control and Surveillance, Marine Fisheries Management and Inland Fisheries management divisions. These divisions contain a number of departments including monitoring and evaluation, fish health and procurement. All these complement in the management of the fisheries resources. The commission has a manpower level of 383 staff (FC, 2012).

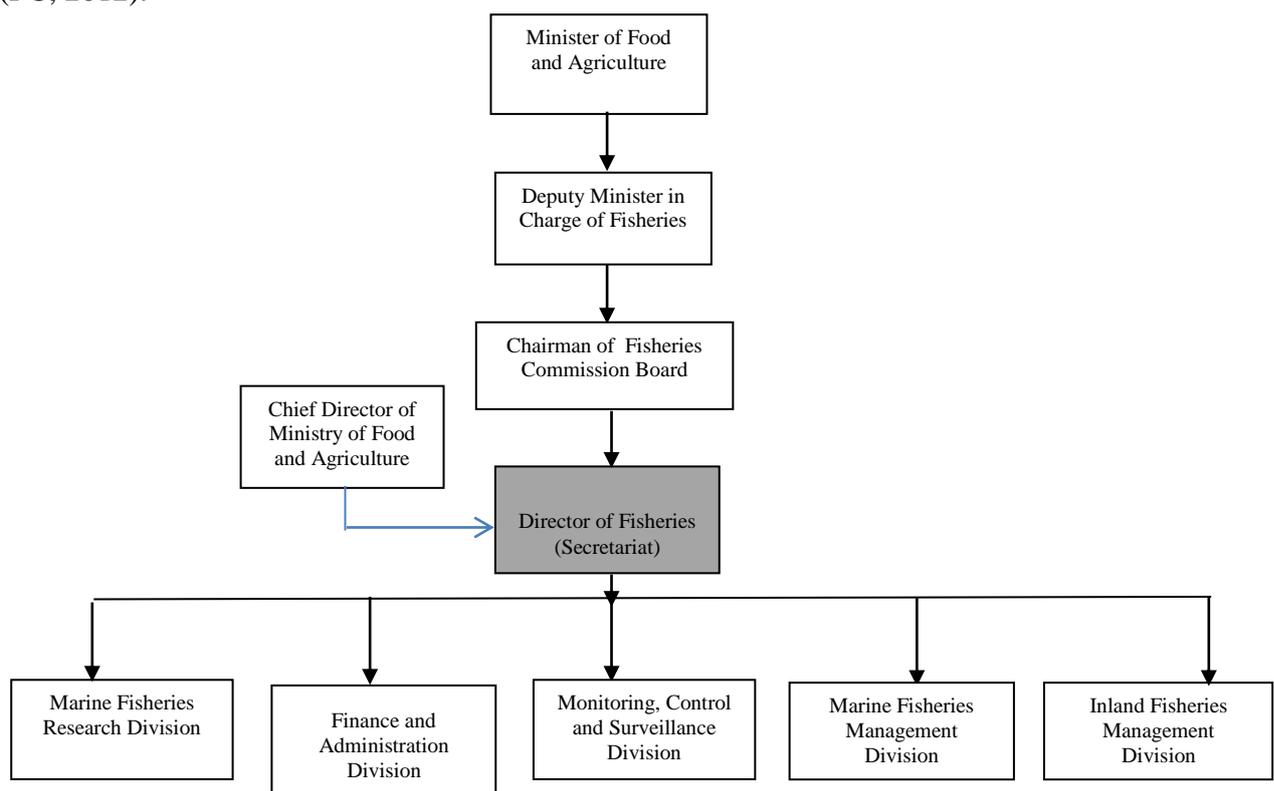


Figure 3: Summary Structure of Fisheries Commission<sup>4</sup> (FC, 2012).

<sup>4</sup> The Commission currently operates in 10 regional and 33 districts offices

## **2.4 Fisheries Management System**

The Fisheries Act provides for the regulation and management of fisheries, development of the fisheries industry, sustainable exploitation of the fisheries resources and related matters. On the basis of this Act, the Fisheries Commission has implemented a set of control measures for the marine and inland capture fisheries. Regulations range from limiting inputs, in particular through minimum mesh sizes, to restricting the use of non-selective gears and imposing closed seasons and protected areas. There is the embargo on the importation of new vessels, and industrial vessels are excluded from the Inshore Exclusive Zone (IEZ) of 30 nautical miles reserved for artisanal fisheries. Industrial vessels are subject to a licencing scheme. These regulations are enforced by MCS, in collaboration with the Ghana Navy through at sea observer missions and quayside inspection at the larger landing sites such as Tema, Sekondi and Takoradi (MoF, 2008). The artisanal vessels are not subject to licencing.

The Government of Ghana and the Fisheries Commission are concerned about the high degree of poaching and other forms of Illegal, Unregulated and Unreported (IUU) fishing within the Exclusive Economic Zone (EEZ) and the resultant negative impacts on the economy. The government's implementation of a Vessel Monitoring System (VMS) as a measure to combat IUU fishing has seen a setback because the VMS has broken down and was out of commission at the time this project was undertaken. This means that vessels (foreign and local) engaged in IUU other offences could not be tracked. Recently, four patrol vessels were procured to strengthen surveillance in Ghanaian territorial waters. This will hopefully reduce illegal fishing as well as poaching by foreign vessels (MoF, 2008).

The two national fisheries management plans for marine and inland capture fisheries are broadly compatible with international management conventions, drawing heavily on the FAO Code of Conduct for Responsible Fisheries, as well as on integrated rural development and coastal area management models. The Fisheries Secretariat is currently reviewing the licensing and permit policy with an aim of extracting higher fees to recover costs of some of its activities as well as regulating fishing activities.

The Fisheries Commission has been collaborating with Ministry of Justice and Attorney General in prosecuting vessels engaged in IUU and other related cases. Even though Community Based Fisheries Management Committees have been established to support fisheries co-management, there appear to be problems establishing representative structures at the local level and of effectively resolving conflicts (MoF, 2008).

## **2.5 Capacity building in the civil service of Ghana**

The Office of the Head of Civil Service (OHCS) reporting directly to the Presidency is the centre for Human Resource Management for the entire Ghana Civil Service including the Fisheries Commission. The mission of OHCS is to promote and ensure continues renewal and professional development of the Human Resource of the Civil Service by ensuring that the Ministries, Departments and Agencies are optimally structured, adequately staffed with the right skills to provide policy advice to Ghana's political leadership to facilitate good governance and accelerated national development (GCS, 2011). According to Aryee (2001), to strengthen capacity, a comprehensive strategy rather than ad hoc training and loosely administered staff training policy is required. A new and formal training policy was introduced in 1991 and a task force was established to ensure the development of training

policies and the strengthening of training delivery capacity throughout the civil service in Ghana (Aryee, 2001).

It is the policy of the government of Ghana that staff, including those at the Fisheries Commission, are permitted to undergo training after three years of service with or without pay. Selection for training is based on years of experience and opportunities available. The policy specifies that the field of training/study must be relevant to the needs and goals of the ministries. MoFA in addition to conforming to Civil Servant Training Policy in long-term training, arranges short-term training programmes ranging from 1 week to 3 months through local and foreign institutions. The Ghana Civil Service Training Policy (GCSTP) remains a comprehensive approach to staff development in the government yet the turn over of staff remains very high in several ministries including MoFA (Babu & Mensah, 2007). As outlined in the 2010 Medium Term Development Framework (METASIP) of the MoFA, key issues under institutional strengthening and intra-ministerial coordination are currently being addressed. Some of the issues involve upgrading of capacity of staff of all directorates of MoFA and relevant Ministry Departments and Agencies (MDAs). Also, it has been suggested that there is a need to undertake a training needs assessment of the human resource requirement and train staff accordingly (MoFA, 2010).

### **3 METHODOLOGY**

#### **3.1 Theoretical background**

Training and education have of course been subject to research in the past (Swanson, 1987). In this essay, it is not possible to review or even summarize this volume of work and its main conclusions. This review will rather briefly outline one well-known procedure for training development that has guided the current study. This is the Swanson model for training in institutions and businesses (Swanson, 1987).

The Swanson model covers all the steps of training from the initial assessment of training needs to the actual implementation of training and review of its effectiveness. Only a few of these steps are dealt with in this essay.

#### **3.2 Swanson's theoretical model for training**

According to Swanson (1987), to solve training problems in industry and business, involves five phases (a) analysis, (b) design, (c) development, (d) implementation, and (e) control (Figure 4).

**Analysis** focuses on (a) separating training from non-training problems in an organization and (b) defining precisely what people need to know to be able to work effectively. The model considers (i) types of needs assessment, (b) causes of performance, and (c) data collection methods (Swanson, 1982).

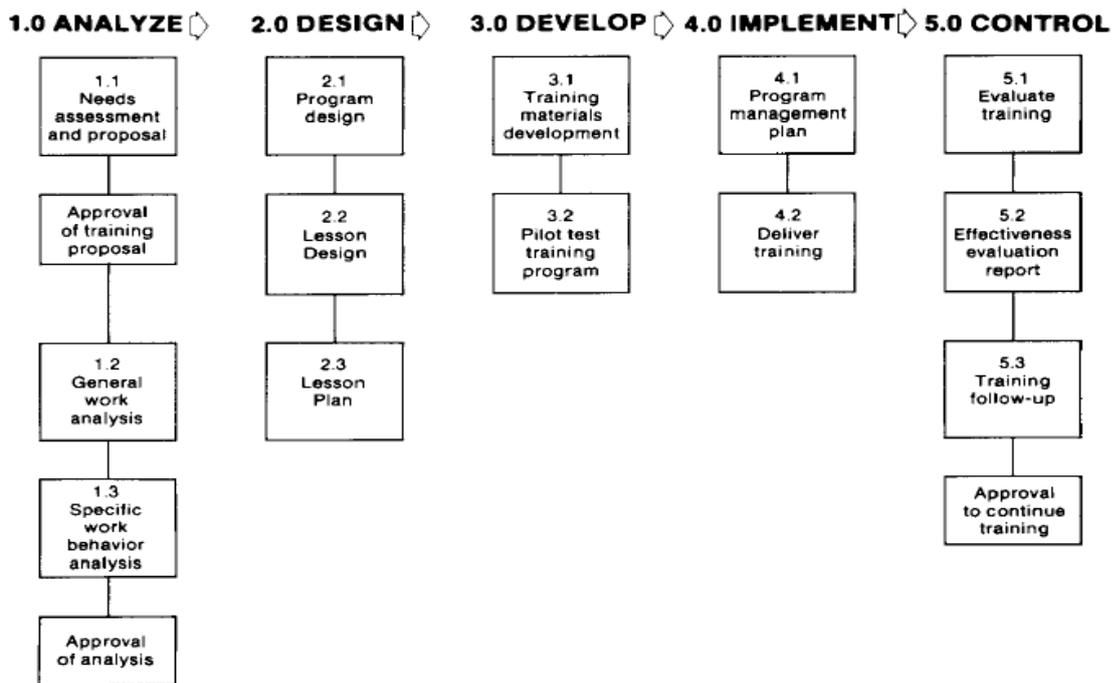


Figure 4: Training Technology System (Swanson, 1987)

**Design** includes training programme design and lesson design. The programme design is focused on matching the training programme to the needs and constraint of the organization. While programme design includes a breakdown of individual lessons that make up the programme, lesson design is more directly linked to the psychology/education foundations of the training profession.

**Development** is concerned with actually preparing teaching material, lessons and training sessions. Design revisions are made as development takes place. Development also includes pilot testing of training material on the first group of trainees.

**Implementation** includes the training programme management plan and the actual delivery of training. The following are considered under the training management: course schedule, promotion and management. There are specific methods for organizing the tasks required to implement a training programme, such as when the task must be completed, who completes it, and what specifications are for the task. In managing actual instruction, a method for incorporating media, notebook materials, and hand-outs into the formal lesson plan and into training materials are specified

**Control:** This phase includes (a) evaluating and reporting the effectiveness of the training undertaken, (b) revising training procedures and delivery, and (c) maintaining trainee behaviour once trainers are back on the job. Evaluation consists of an effectiveness evaluation plan, tools for measuring training effectiveness, and the evaluation report. Important measures of success are (a) satisfaction, (b) the amount of learning, and (c) performance that result from the training (Swanson, 1987).

This essay does not cover all the steps of the Swanson training blueprint. It is primarily concerned with the first two steps, 1 (Analysis) and 2 (Design), but will have a few things to say about the fifth step, namely the follow up to training and the post-training conditions of staff.

### 3.3 Training Needs Assessment (TNA)

The most widely accepted definition of training needs assessment (TNA) is to identify the training needed to achieve specific organizational objective (Gilly & Egglund, 1989). Training needs assessment involves employees and management and training experts. A well-executed needs assessment increases credibility and support for the design of the subsequent training program among those who participated (Gilly & Egglund, 1989).

Daniel (2003) suggests that a high proportion of investments in training failed to produce a return and that this was often due to a failure to connect the training effort with the needs and goals of the organizations in question. Mistakes of this kind could be minimized if training practitioners were aware of the importance of TNA.

Brown (2002) took the view that "TNA is an on-going process of gathering data to determine training needs so that training can be developed to help the organization accomplish its objectives. Conducting needs assessment is fundamental to the success of a training programme." Often, organizations will develop and implement training without first conducting a training needs analysis. This runs the risk of providing inappropriate training usually at considerable cost, doing too little or too much training or missing the point completely.

According to Tao *et al.* (2006), training resources like other resources in organizations, are limited. To utilize training resources in the best possible way, companies or organizations must put substantial effort into TNA.

Barbazette (2006) claimed TNA "is the process of collecting information about an expressed or implied organizational need that could be met by conducting training." The need can be a desire to improve current performance or to correct a deficiency. The needs assessment processes help the trainer and the person requesting training to specify the training need or performance deficiency.

TNAs have been documented to "help curriculum planning, diagnose individual problems, assess student learning, demonstrate accountability, improve practice and safety, or offer individual feedback and educational intervention" (Grant, 2002).

## 4 ANALYSIS OF TRAINING NEEDS OF FISHERIES COMMISSION

A central focus of this study is to examine the training needs at the Fisheries Commission in Ghana (hereafter referred to as the Commission) and how these can be met by setting up short and long term training programmes. One opportunity to do so in the short run is through the World Bank/IDA and Global Environment facilities sponsored regional programme called the West Africa Regional Fisheries Programme (WARFP). In the long run, when the project expires, the necessary training and educational programmes can be run in the teaching institutions especially the universities in the country.

### 4.1 Procedure

The methodological basis for this TNA was set out in chapter 3. In particular it is based on Brown (1992). Even though the reviewed authors gave their opinion on TNA in the

methodology which is equally important, Brown seems to elaborate more on the basis for such a study which encompasses that of the others.

Different methods were employed in gathering information for the TNA at the Commission. These included (i) review of training strategies already in place, (ii) identification of the skills needed to conduct the necessary tasks and (iii) eliciting employee's own assessment of their training needs with the help of questionnaires and phone interviews. Additional information was gathered through personal interviews with some fisheries specialists at the Institute of Economics Studies (IoES) at the University of Iceland.

The study targeted the staff of the Commission from the head office down to the regional and district offices. A semi-structured questionnaire was designed and sent through the Director of Fisheries and to the divisional heads (Figure 6) and 10 regional heads for staff to have filled in by the staff and returned directly to the researcher by e-mail. The questionnaire covered (i) personal data, (ii) present duties, (iii) perceived training needs and (iv) evaluation of post training conditions in the Commission. Before it was sent out, the questionnaire was pre-tested on 5 staff of the Commission in order to identify and correct deficiencies. The full questionnaire can be found in Appendix B.

The divisional and unit heads also submitted training needs assessments for their respective divisions and units to the researcher through the coordinator of the WARFP-Ghana. Since most of the divisional heads play an important role in the planning of projects and future strategic plans of their division, they usually have a firm opinion of what is needed in terms of training to achieve their goals. It should be realized, of course, that their assessment of this can be flawed because their knowledge and understanding of the basic issues may be limited.

The researcher employed simple random sampling instead of stratified sampling because it was difficult getting responses from such groupings. Hence the researcher depended on whoever was willing to answer the questionnaires for the analysis.

A sample size of 193 staff was randomly sampled from a population size of 383 staff. Provided the sample is truly random, simple statistical theory (Gill & Johnson, 2010) suggests this sample size should yield 95 percent confidence interval for the averages at 5 percent margin of error (Appendix C). The response rate, however, was about 32 percent representing a total of 62 staff even though several reminders were issued to the respondents through their superiors. One reason for this low response rate was that at the time of the study, the country (Ghana) was faced with power rationing which caused frequent breakdown in internet services. Therefore, the statistical properties of the data as descriptive of the staff as a whole are probably poor. Data was analysed using statistical package for social science (SPSS).

## 4.2 Attributes of respondents

### Locations

The breakdown of the 62 questionnaires that were retrieved is listed in Table 1.

Table 1: Response by location

	Frequency	Percentage of total returns
Greater Accra Region	17	27.4
Northern Region	11	17.7
Ashanti Region	11	17.7
Head Office	9	14.5
Volta Region	5	8.1
Western Region	4	6.5
Central Region	2	3.2
Research	1	1.6
Upper West Region	1	1.6
Brong-Ahafo Region	1	1.6
<b>Total</b>	<b>62</b>	<b>100.0</b>

Most of the staff who responded to the questionnaires came from the Greater Accra region (27.4%) followed by equal percentage (17.7%) of staff from the Northern and Ashanti regions. Additionally, about 15 and 8 percent of staff from the head office and Volta region returned their completed questionnaires respectively. Furthermore, about 7 percent of the staff from Western region also returned their questionnaires. The response rate from some of the regions was very low either because there were few staff in these areas or they selected not to participate in the study. Finally, there are staff in districts with poor or no internet connections and will therefore find it difficult either to access the questionnaire or send it by electronic mail.

### Educational level

Table 2 summarizes the highest educational level of the respondents<sup>5</sup>. A good number of the respondents (29.0%) have attained the Bachelor of Science (BSc) degree followed by the basic educational level (MSLC/JHS) with a percentage of about 23%. Additionally, about 18% of the respondents have attained postgraduate degrees such as Master of Art (MA), Master of Science (MSc) and Master of Philosophy (MPhil) degrees.

The rest of the respondents (30.6%) also completed different levels of education as specified in Table 2. The high number of BSc is attributed to the fact that it is the minimum entry requirement for the senior staff to the Commission.

<sup>5</sup> There are currently 3 Veterinary doctors working at the Commission.

Table 2: Highest education of respondents sampled

	Frequency	Percent
MA/MSc/MPhil	11	17.7
BSc/Bedu/BA	18	29.0
LLB	1	1.6
Diploma	3	4.8
Certificate	7	11.3
SHS/GCE A level/Voc.	8	12.9
MSLC/JHS (basic level)	14	22.6
<b>Total</b>	<b>62</b>	<b>100.0</b>

*BSc/Bedu/BA denotes Bachelor of Science/Education/Arts, MSLC/JHS denotes Middle School leaving certificate/junior high school, MA/MSc/MPhil denotes Master of Art/ Master of Science/ Master of Philosophy, SHS/GCE/Voc. denotes Senior High School/General Certificate of Education Advance level/Vocational, LLB denotes postgraduate certificate in Law degree*

These results give a fair idea about the educational strength of staff at the Commission.

### Grades of staff

Table 3 describes the current grade status of the sampled fisheries staff at the Commission. The grades are made up of the various levels of technical officers (technical class), assistant fisheries officers, fisheries officers and senior fisheries officers. In addition are the assistant directors and deputy directors. These groupings exclude the director of fisheries grade.

Table 3: Current grade of sampled respondents

Grades	Frequency	Percent
Technical Class	29	50.0
Assistant Fisheries Officers	10	17.2
Assistant Directors	6	10.3
Fisheries Officers	5	8.6
Deputy Directors	4	6.9
Senior Fisheries Officers	2	3.4
Administrators	6	3.4
<b>Total</b>	<b>62</b>	<b>100.0</b>

The results suggest that half of the respondents who answered the questionnaire were from the Technical class (50.0%) followed by Assistant Fisheries Officers (17.2%). In addition to the responses were Fisheries Officers and Assistant Deputy Directors who formed about 10 and 9 percent respectively. Most of the deputy and assistant directors are regional directors of the Fisheries Commission responsible for the administration and development of fisheries and aquaculture in the regions.

### Highest education and grades of respondents

Table 4 provides cross tabulation of education level and current grades of sampled staff. The table shows that although there is quite a number of staff with BSc and MSc degrees, they are primarily found in a few specialised high graded positions. In reviewing the professional background of the sampled staff, most of the BSc staff have degrees in the field of economics, natural resource management, aquaculture and fisheries science.

Table 4: Cross tabulation between highest educational level and current grade of sampled respondents

Educational level	Grades							Total
	TC	Admin	AFO	FO	SFO	ASD	DD	
MA/MSc/MPhil	-	-	2	1	-	5	3	11
BSc/Bedu/BA	2	1	8	4	2	1		18
LLB	-	-	-	-	-	-	1	1
Diploma	2	1	-	-	-	-	-	3
Certificate	4	3	-	-	-	-	-	7
SHS/GCE A level/Voc.	7	1	-	-	-	-	-	8
MSLC/JHS	14	-	-	-	-	-	-	14
<b>Total</b>	<b>29</b>	<b>6</b>	<b>10</b>	<b>5</b>	<b>2</b>	<b>6</b>	<b>4</b>	<b>62</b>

*TC denotes Technical Class (different levels of technical Officers), Admin denotes Administrators, AFO denotes Assistant Fisheries Officers, FO denotes Fisheries Officer, SFO denotes Senior Fisheries Officers, ASD denotes Assistant Director, DD denotes Deputy Directors.*

As the table shows, those with a first university degree (B.Sc., B.edu and B.A) are generally in the higher positions. Those with master's degrees were fairly widely spread over the grade positions. Those without specialization or only certificates and diploma are generally in the lower positions. Majority of the technical class (72.4%) did not complete any specialized studies at school.

Those with MSc had majored in development planning, human resource management, aquaculture, inland fisheries management and fisheries project appraisal, fisheries science, natural resource management, zoology/botany and purchasing, procurement and supply chain management. The diploma included business studies, natural resource management and marine biology, and statistics while the certificates are in agriculture and administrative related courses. The above results should provide a fair idea about the educational strength and gaps of staff at the Commission and hence the need for training.

#### 4.3 Perceived training needs

Information was extracted from the questionnaires on the kind of training the respondents felt they needed. To meet these needs, the respondents suggested a number of educational programmes both for short and long term. The suggested programmes have been ranked based on levels of priority. Below (Table 5 and 6) are the various training areas mentioned by the respondents as ones they would benefit from. The programmes could be handled locally with foreign support at the public universities or be undertaken in any of the external institutions (foreign/externally).

## 4.3.1 Long term programmes

Table 5: Long term programmes (Perceived training)

Priority levels: 1 denotes not a priority, 2 denotes low priority, 3 denotes medium priority, 4 denotes high priority, 5 denotes essential

NEEDS						
	Topics/issues	Grades				Comments (provision)
		Deputy Directors / Assistant Director	SFO/FO /AFO	Technical class	Admin	
<b>Long term</b>						
I	Marine protected areas	5	4			Externally
Ii	Ecosystem approach to fisheries	4	4			Externally
Iii	Hatchery management	4	4	3		Locally/externally
Iv	Fish farm management	3	4			Locally/externally
V	Fisheries development and management	5				Locally/externally
Vi	Coastal zone and planning	4				Locally/externally
Vii	Resource management application	5				Externally
Viii	Project management and development	4				Locally/externally
Ix	Fisheries and Aquaculture		4			Locally/externally
X	Fisheries management and governance		5	4		Locally/externally
Xii	Marine governance		5			Locally/externally
Xiii	Agriculture economics		4			Locally
Xiv	Fisheries economics		5			Externally
Xv	Procurement	3	5			Locally
Xvi	Nutrition (specialisation in fisheries)		5			Externally
Xvii	Natural resource management		4			Locally/externally
Xviii	Development studies		4			Locally
Xix	Fish taxonomy		4	4		Locally/externally
Xx	Fisheries policy and planning		4			Externally
Xxi	Post-harvest handling		5	4		Externally
Xxii	Fish quality management	5	5			Externally
Xxiii	Modern aquaculture practice			4		Locally/externally
Xxiv	Fish production programmes			4		Locally/externally
Xxv	Fish gear technology	1	5	5		Externally
Xxvi	Public administration				4	Locally
Xxvii	HRM				4	Locally

## 4.3.2 Short term programmes

Table 6: Short term programmes (Perceived training)

Short term	topics/issues	Grades				Comments (provision)
		Deputy director/ assistant director	SFO/FO/ AFO	Technical class	Admin	
I	Fisheries management	4	4	3		Locally/externally
Ii	Feed formulation and management	4	3			Locally/externally
Iii	Human dimension of fisheries management	5				Locally/externally
Iv	Fisheries management and governance	5	4	1		Locally/externally
V	Child labour in fisheries and aquaculture	5	4	3		Locally
Vi	Fisheries entrepreneurship	4	2			Locally/externally
Vii	Fish taxonomy	2	4	4		Locally
Viii	Mari-culture development	5	4	3		Locally/externally
Ix	Convention on the law of the sea	4	4	2		Locally/externally
X	Gender in fisheries	4	4	3		Locally/externally
Xii	Sustainable aquaculture	3	4			Locally/externally
Xiii	Statistical package for analysing data	4	4	3		Locally
Xiv	Fisheries technology	4	4	3		Locally/externally
Xv	Marine fisheries management	4	4	3		Locally/externally
Xvi	Monitoring and evaluation programmes	4	4	2		Locally/externally
Xvii	Fish cage farming	3	3	3		Locally/externally
Xviii	Policy and planning	4	4			Locally
Xix	Hatchery management	4	4			Locally/externally
Xx	Fish processing and quality handling	5	4	3		Locally/externally
Xxi	Stock assessment	4	4			Externally
Xxii	Practical training on aquaculture			4		Locally
Xxiii	Data collection/management	2	4	4	3	Locally
Xxiv	Geographic information system	4	4	4		Locally
Xxv	Report writing	3	4	4	4	Locally
Xxvi	Child labour in fisheries	4	4	4		Locally
Xxvii	Recording techniques			4		Locally
Xxix	Project management	4	3			Locally
Xxx	Labour management	3				Locally
Xxxi	Office management and administration	3		2	4	Locally

(Table 6: Short term programmes (Perceived training) *continued*)  
 Priority levels: 1 denotes not a priority, 2 denotes low priority, 3 denotes medium priority, 4 denotes high priority, 5 denotes essential

Short term	topics/issues	Grades				Comments (provision)
		Deputy director/ assistant director	SFO/FO/ AFO	Technical class	Admin	
Xxxii	Human relations and communication	3			4	Locally
Xxxiii	Introductory to management	3			4	Locally
Xxxiv	Performance management	4	2	2	4	Locally
Xxxv	Managing life after formal employment	3		3	3	Locally
Xxxvi	Administrative management skill	3				Locally
Xxxvii	Information and communication technology related programmes	2	2	4	4	Locally
Xxxviii	Report writing and presentation skills	3	4	4		Locally
Xxxix	Leadership programmes	4	3	2	2	Locally

#### 4.4 Actual training needs

Perceived training needs are one thing. Actual training needs can be deduced from an analysis of the nature of the problem, in this case fisheries administration, whose solution requires certain knowledge, abilities and skills. Comparing these requirements with the existing ability defines actual training needs.

##### 4.4.1 The nature of the problem: the basic knowledge needed

Since fisheries are based on extraction from a common resource, the fish stocks and, more fundamentally, the aquatic ecosystem, they are subject to the common property or common pool problem. It is well-established that this problem, if unchecked, leads to the dissipation of all attainable net benefits from the fishery. Therefore, to obtain positive net benefits from the fishery, not to mention maximum net benefits, on a sustainable basis an appropriate fisheries management regime is needed.

This raises the question of what knowledge and abilities are needed by the management institute/ organization to implement and run such a fisheries management regime (FMR) in Ghana. The answer to this question is a key step toward identifying the need for fisheries education and training in Ghana.

It should be noted that two distinct kinds of knowledge and ability are needed to successfully operate a fishery; (i) the knowledge and ability to run fishing companies, (ii) knowledge and ability to manage the fishery. This essay is only concerned with the latter, i.e. the ability to manage the fishery. It is important to realize that this is absolutely necessary for fisheries success. Even with a highly capable fishing industry, the flow of net benefits from the fishery will be close to zero irrespective of the richness of the underlying resources unless a

sufficiently strong fisheries management regime to counteract the common property problem is in place. On the other hand, even with a highly inefficient fishing industry, if the underlying marine resources are productive enough, the flow of net benefits from the fishery may well be positive if the fisheries management regime is strong. Moreover, if the fisheries management regime is strong, the fishing industry will most likely develop relatively rapidly toward greater efficiency over time. Thus, fisheries management is both necessary for a successful fishery and probably close to being sufficient as well.

#### *4.4.1 More specific knowledge needs*

The fisheries management regime (FMR) consists of (i) the fisheries management system (FMS), (ii) the monitoring, control and surveillance (MCS) and (iii) the fisheries judicial system (FJS). The FMS sets the rules under which the fishery must operate. The MCS enforces these rules and collects data for setting the rules under the FMS. The FJS processes alleged violations of FMS rules and imposes sanctions. To operate the FMR, thus requires various types of expertise

To set the FMS-rules and measures, some form of a bio-economic fisheries model must be available. This model needs biological, ecological, economic and social data. It immediately follows that some knowledge of bio-economic modelling and model manipulation as well as the ability to collect and process the relevant data is needed. The specialized expertise that this requires include (i) stock assessment and population dynamics expertise, (ii) economic and bio-economic modelling expertise, (iii) model manipulation expertise, (iv) statistical estimation expertise.

To run the MCS-system, an understanding of the basic theory of enforcement is needed. In addition expertise in the various aspects of MCS technology and the efficient allocation of enforcement effort along the various enforcement tools is required. Furthermore, of course, qualified operators of the MCS equipment and on-site enforcement are needed.

To run the Fisheries Judicial System (FJS) effectively requires an understanding of the basic theory of enforcement as well as a thorough understanding of the basic law and legal practices. The design of the FJS should reflect this knowledge and the staff operating the system should be in sufficient command of it.

In addition to the particular specialized expertise needed to design the fisheries management regime, a certain degree of general administrative expertise is needed to run the system and its various parts. This refers especially to positions at the top of the various administrative hierarchies and units, which are more concerned with the general running of the fisheries management regime than the technical aspects of what they do.

There are many other related administrative activities requiring expertise. Among them are

- (i) International fisheries relations relying heavily on international law and diplomacy
- (ii) Infrastructure provision and operation including ports, communications (roads, rails, air, internet etc.) and energy provision.

In order to support the above management functions a range of supporting activities all requiring their own specialized knowledge, abilities and skills are required. This includes (i)

the creation and operation of data bases, (ii) the setup of data collection mechanisms and statistical analysis, (iii) the organization of publications and so on.

#### 4.4.2 Targeted training

Everyone running parts of the system needs to have a reasonable grasp of the basic fisheries problem and understanding of the fisheries management regime. Without this understanding, their activities are not likely to be appropriately focussed and may easily go astray.

When it comes to the knowledge, skills and abilities to conduct specific tasks, primarily the people actually performing these duties will need to have the detailed knowledge. An important aspect of any system is development, i.e. adjustment, improvements and innovations. In fisheries administration, those developing the system will need to have a very strong understanding of the basic problem and the systemic aspects of dealing with it, that is, how the various parts of the system contribute to its overall success or lack thereof.

#### 4.5 Comparing perceived with actual training needs

There is a considerable gap between the perceived training needs and the actual needs. The explanations, of course, are that the current staff do not have (i) the wide perspective on the basic problem (ii) sufficient knowledge to understand what is needed and (iii) are primarily focussed on their particular tasks. It follows that the TNA through the eyes of the people to be trained is primarily useful to identify specific training needs for specific tasks. It is much less useful for identifying the general knowledge and understanding about the basic fisheries problem and the operation of the fisheries management regime.

#### 4.6 What is needed in Ghana

In order to manage the fisheries resources in Ghana, there is the need to identify and implement what is needed in the country to strengthen the sector. The researcher was able to identify various positions and number of staff based on interaction with experts. Most of the necessary administrative positions are already in place at the Fisheries Commission and filled with reasonably trained people. However, experts and expertise are sorely lacking at some of the levels. The following specifies the positions and experts that are needed at the minimum.

Positions, numbers

- (i) Administrators
  - Director of fisheries
  - Sub-director of FMS
  - Sub-director of MCS
  - Sub-director of Research
  - Sub-director of FJS
  - Sub-director of MFM
  - Regional directors/officers

The educational requirement of these people should surely not be less than a BSc level as the entry requirement is a BSc. In addition, the following areas of education could be recommended for such positions; fisheries law, stock assessment, fisheries development and management, MCS strategy policy, donor programmes, management skills, personnel supervision to mention a few.

- (ii) Top level experts

- Two high level (M.Sc. Ph.D.) fisheries economists
  - Two high level marine biologists with expertise in population dynamics (M.Sc. Ph.D.)
  - One Legal expert
  - One high level MCS-expert
  - One high level statistician
  - One high level data-base expert
- (iii) Lower levels experts
- 5-10 fisheries economists, economists, econometricians (M.Sc. BSc)
  - 5-10 marine biologists, ecologists, modellers (M.Sc. BSc)
  - 1-3 statisticians
  - 2-4 data base specialists
- (iv) Operators
- Regional managers
  - MCS-operators and Observers
  - Biological and economic data collectors

In addition to an undergraduate level of education, operators could benefit from fisheries management, data collection techniques, fish technology, stock assessment, project management, fisheries law among others for their operations.

#### **4.7 Review of existing training programmes in fisheries**

There are various training options available for the staff of the Fisheries Commission. These programmes are considered in two parts; national training programmes (Domestic) and foreign training programmes.

##### *4.6.1 National training programmes*

##### **(i) Ghana Institute of Management and Public Administration (GIMPA)**

The Institute was established in 1961 as a joint Ghana Government/United Nations (UN) special fund project to develop the public administrative system, to produce civil servants with administrative and professional competence, and to plan and administer national, regional and local services. In 1966, the joint sponsorship ended and the UN formally handed over the Institute to the Government of Ghana. The Institute was then re-designated Ghana Institute of Management and Public Administration (GIMPA) in 1969 to reflect its expanded functions.

GIMPA now offer courses leading to the award of certificates, diplomas and degrees up to the doctoral level in its areas of competence. The area of competence is defined to include training and education in the areas of leadership, management, public administration and technology (GIMPA, 2013). Though GIMPA for now does not offer any courses in Fisheries and Aquaculture, it handles other courses in agricultural sciences and management. Some staff from the Fisheries Commission have benefited from training in the field of administrative and management as well as procurement. Some of the day time bachelor's degree programme are:

- Project management
- Procurement management
- Operations and supply chain management
- Finance
- Human resource management
- Business administration

The school offers several Master Degree Programmes on a modular basis including:

- Executive Master of Public Administration (EMPA)
- Master of Development Management (MDM)
- Master of Public Sector Management (PSM)
- Executive Master of Governance and Leadership (EMGL)
- Executive Master of Public Administration (EMPA)
- Master of Public Administration (MPA)
- Master of Public Sector Management (PSM)

## (ii) **University of Ghana**

The University was founded in 1948 as the University College of the Gold Coast. The purpose of the University was to provide for and promote university education, learning and research. It became a full-fledged university in 1961 by an Act of Parliament (Act 79).

The university is organized in colleges, faculties, schools, and research facilities. Among these are the College of Agriculture and Consumer Sciences which undertakes agriculture related courses such as Agricultural Economics and Agribusiness, Agricultural Extension, Animal Science, Crop Science, Home Science and Soil Science. The college has research centres that undertake various researches in the field of agriculture. The Fisheries and Oceanography Department under the university of Ghana, Legon runs a B.Sc. combined-major in Oceanography and Fisheries which is designed to provide students with the requisite knowledge and skills that will enable them to avail themselves of employment opportunities in the fishing industry, conservation, education, environmental protection, food and agriculture or embark on individual initiatives. There is also the opportunity for them to further their studies at the graduate level where the department runs both M.Phil. and Ph.D. programmes in Fisheries and Oceanography. The Oceanography programmes specialize in Biological, Physical and Chemical Oceanography and Marine Geoscience. The Department also runs short courses for stakeholders in fisheries, aquaculture, coastal resource management, environmental health among others (UoG, 2007).

Currently, the department of Animal Science is undertaking aquaculture and veterinary programmes which include fish health. The first batches of student are yet to graduate. There is also the sciences which include Fisheries and Oceanography (UoG, 2007).

### **(iii) Kwame Nkrumah University of Science and Technology**

This University was established under an Act of Parliament in 1961 as Kwame Nkrumah University of Science and Technology (UST) which also succeeded Kumasi College of Technology.

The College of Agriculture and Natural Resources is one of the six Colleges of the University, with a mandate to train, research and disseminate knowledge in sustainable agriculture, renewable natural resources management and rural development. The College is mandated to train and equip graduates with the requisite academic and entrepreneurial skills in the areas of agricultural production and natural resource management for sustainable national development, in addition to carrying out research and extension services in these areas.

Under this college, the School of Renewable Natural Resources includes Fisheries and Watershed Management which trains students and personnel for inland fisheries management, aquaculture, and watershed and wetlands management to facilitate sustainable utilization and management of fisheries and aquatic resources (KUNST, 2013).

Research activities in the School are focused in the following areas:

- Aquaculture and Environment
- Fish Nutrition in Aquaculture.
- Best Management Practices for Effluent control from fish farms
- Habitat modification and Fish Population dynamics
- Broodstock Management and Fingerling production
- Ecology of Cichlids in the Lake Bosumtwi.

### **(iv) University of Cape Coast**

This University was established in 1962 as a University College. It attained a full university status in 1971. It was established out of a dire need for highly qualified and skilled manpower in education. Its original mandate was therefore to train graduate professional teachers for Ghana's second cycle institutions and the Ministry of Education, in order to meet the manpower needs of the country's accelerated education programme at the time (UCC, 2012).

The Department of Fisheries and Aquatic Sciences is one of the seven departments in the School of Biological Sciences in this university. The Department's focus is conducting research and training of middle and high-level manpower in fields related to productivity, conservation and sustainable use of aquatic habitats and their resources. In this regard, it offered programmes leading to the award of a B.Sc. degree in Fisheries and Aquatic Sciences, M. Phil. and Ph. D. in one of the following specialized areas:

- Fisheries Science
- Aquaculture
- Integrated Coastal Zone Management
- Oceanography and Limnology

#### (v) **University of Development Studies**

The University for Development Studies (UDS) was established in May 1992 by Provisional National Defence Council (PNDC) Law 279 to blend the academic world with that of the community in order to provide constructive and meaningful interaction between the two for the development of Ghana and Northern Ghana, in particular (UDS, 2011). The university offers a Bachelor, Master and PhD degree programmes. Some of the full time post graduate (MSc/MPhil/PhD) programmes are: Postharvest technology, Animal sciences (options: Meat Science, nutrition, Breeding and Genetics, and Production), Biotechnology, Environment and Resource Management, Agricultural Economics and Mathematics/statistics related courses. Some of the BSc programmes are as follows: Agriculture technology, Renewable Natural Resources, Agribusiness, Applied Sciences and Mathematical Sciences.

The University includes a Department of Fisheries and Aquatic Resource under Faculty of Renewable Natural Resources (FRNR) aquaculture related courses.

#### **4.7 Summary of domestic training and educational options**

The above review shows that Ghana's public university system offers a number of programmes and courses in the biological aspects of fisheries and some in aquaculture. It also offers programmes and courses in general administration and management. What is missing are programmes and courses in the economics of fisheries, both from a social and individual fishing firm perspective, and fisheries management methods.

#### **4.8 Foreign (Donor country) training programmes**

In addition to the domestic education and training in fisheries related fields, Ghana has some access to various training programmes in fisheries provided by developed countries as a part of their development assistance. Some of these are stated as following:

##### **United Nations University (UNU)**

The United Nations University as a global research and teaching organization has 15 institutes and programmes in 13 countries worldwide including Ghana, as well as administrative and services units in Tokyo (headquarters), Bonn, Kuala Lumpur, New York and Paris.

##### **Academic Programme**

There are 5 five independent thematic clusters within the overarching thesis of sustainability as prescribed in the UNU strategic Plan 2011-2014 for its academic activities and one of them is **Global change and sustainable development** which offers a fisheries training programme. The UNU also undertake 3 complementary types of activities such as (i) research, and study, (ii) Teaching and capacity development, and (iii) knowledge sharing and transfer.

##### **United Nations University- Fisheries Training Programme (UNU-FTP)**

The UNU-Fisheries Training Programme offers intensive training in several topics in fisheries science. This is organized as a six month programme that starts from September to March each year. The programme begins with a five week introduction course that introduces different aspect of fisheries from catch to consumers, global development and international instruments affecting fisheries and aquaculture and includes several field trips and visits. The participating fellows then split into several areas of specialization that last for six weeks followed by 14 weeks individual project which is country specific. About 270 participants

from different countries all over the world have so far benefited from this programme from the year 1998 to 2012. The country with the highest patronage in the programme is Uganda (19) followed by Kenya (17) and then Mozambique (16). Ghana is ranked as the 7th country among the 13 African countries benefiting from the UNU-FTP programme for the period with 7 fellows for the 14 years of existence of the programme. The breakdown of programmes by participants from Ghana are Stock Assessment (2), Fisheries Policy and Planning (2), Quality Management of Fish Handling and Processing (1), Management of Fisheries Companies (1) and Sustainable Aquaculture (1)

(i) Fisheries Training Short Courses.

The UNU-FTP offers short-duration fisheries training courses in developing countries, in cooperation with local and international partners. Since 2003, 32 courses have been developed and run by UNU-FTP with partner countries, 16 in Africa. There has not been fisheries training short courses in Ghana at the time that this project was being undertaken (2012). Currently, short courses are being designed for Tanzania and Kenya with the collaboration of the Government of these countries and UNU-FTP (UNU, 2012).

**Japan International Cooperation Agency (JICA)**

Developing countries all over the World have been receiving support and assistance from JICA as the executing agency of Japan's Official Development Assistance (ODA) for more than half a century.

As the implementing agency of the Japanese ODA, JICA has helped foster human resources, technology transfer and infrastructure development through technical cooperation, ODA loans and grant aid based on bilateral assistance. JICA, operates in 150 countries and regions and has some 100 overseas offices including Ghana (JICA, 2012). JICA provides technical cooperation which include the dispatch of experts, provision of necessary equipment and training of personnel from developing countries in Japan and other countries. The following are some of the programmes that Fisheries Commission staff have benefited from in 2010:

Short courses<sup>6</sup>

- Leadership Training on Fisheries Resources Management organized in Japan
- Warm Water Fisheries Management for Developing Countries organized in Egypt

**Korea International Co-operation Agency (KOICA)**

The Korea International Cooperation Agency was founded as a government agency on April 1, 1991, to maximize the effectiveness of Korea's grant aid programs for developing countries such as Ghana by implementing the government's grant aid and technical cooperation programs (KOICA, 2008). One of the development efforts is extending capacity building to the Civil Service of developing nations including Ghana. Some of the programmes underlined in their development for the Commission are as specified below:

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<sup>6</sup> The researcher was constraint with lack of information

#### Short courses

- Fisheries Technology Policy for African Countries
- Rural Development and Leadership Training Course
- Marine Product Processing and Hazard Analysis of Critical Control Point (HACCP)
- Eco-System Approach to Fisheries Management
- Mari-culture Technology for Developing Countries
- Technician Capacity Development Training
- Fisheries Technology Policy for African Countries
- African fishery technology and policy
- Fisheries health and Sanitation

#### Post-graduate programmes

- Fisheries Science

#### **China Ministry of Commerce**

Ghana and China relationship dates back to 1960 just after independence. Since then there have been a many achievements in the field of training and capacity building. Under the framework of the Forum of China Africa Cooperation, the Chinese Government grants more scholarships, training courses and seminars of diverse forms for Ghanaians, which indicates the high premium China places on the cooperation in human development with Ghana (Embassy of China in Ghana, 2012). China organizes training courses and seminars through the Ministry of Commerce in collaboration with the various Provinces. These are some of the programmes that staff have benefited from:

- Tropical Ocean Industry for Developing Countries
- Marine Fisheries Management for Developing Countries
- Aquaculture for developing countries

#### **West Africa Regional Fisheries Programme (WARFP)**

Realizing the need to strengthen governance and management of the fisheries sector to control access and reduce overfishing, and, thereby, begin to restore profitability, the Government of Ghana is currently implementing a World Bank/IDA and Global Environment Facility (GEF) sponsored 5 year project named West Africa Regional Fisheries Programme (WARFP). This project aims to help secure the contribution of the fisheries sector to GDP, and lay the foundation for increased profitability and growth.

The development objective of the project is to improve the sustainable management of Ghana's fish and aquatic resources. This will be addressed by: (i) strengthening the country's capacity to sustainably govern and manage the fisheries; (ii) reducing illegal fishing; (iii) increasing the value and profitability generated by fish resources and their contribution to the national economy; and (iv) developing aquaculture.

The project accordingly consists of five components as follows:

**Component 1:** Good Governance and Sustainable Management of the Fisheries with aim of building the capacity of the Government and stakeholders to develop and implement policies through a shared approach that would ensure that the fish resources are used in a manner that is environmentally sustainable, socially equitable and economically profitable.

**Component 2: Reduction of Illegal Fishing.** The component aims to reduce the illegal fishing activities threatening the sustainable management of the country's fish resources by strengthening fisheries monitoring, control and surveillance (MCS) systems.

**Component 3: Increasing the Contribution of the Fish Resources to the National Economy.** The component aims to identify and implement measures to increase the benefits to Ghana from the fish resources, by increasing the share of the value-added captured in the country.

**Component 4: Aquaculture Development.** This component aims to set the framework for increased investment in inland aquaculture.

**Component 5: Project Management, Monitoring and Evaluation and Regional Coordination.** This component aims to support project implementation and regional coordination with the WARFP, ensuring that regular monitoring and evaluation is conducted, and the results are fed back into decision-making and project management (World Bank, 2011).

The project extends into an institutional capacity building of the staff of the Commission. The institution must improve the performance of the staff to achieve stated goals. There is a risk posed by low implementation capacity in the Secretariat of the Fisheries Commission within the Ministry of Food and Agriculture which will be addressed through significant technical assistance to the Secretariat through the project as well as training. Sorgenfrei and Wrigley (2005) indicated that emphasis in the last few years is being placed on organizational capacity to effectively manage individual capacity and also creating an enabling environment for more effective use of existing capacity. The WARF project will invest significantly in building the capacity of the Secretariat of the Fisheries Commission of the Ministry of Food and Agriculture (MoFA 2009) to sustainably govern and manage the country's fisheries.

Summary of the international programmes for Ghana Donor countries offer substantial opportunities for fisheries training for Ghanaians. There are various problems, however. First, the coverage of the courses offered, although more focused on the economics of fisheries than the domestic programmes, is insufficient to meet Ghanaian needs. Second, the number of places for Ghanaian citizens in these programs is quite limited. Thus, these programmes cannot be utilized for a large scale training of the staff of the Fisheries Commission. The possible exception here is the WARFP project. However, at this stage it is not clear, how much training will be offered within this project and what it will cover. Third, the donor country training programmes are at the discretion of the donor countries. Therefore they tend to be offered on a rather ad hoc and of limited permanence.

The above shows that, there are considerable training opportunities in fisheries already available to Ghanaian citizens and therefore to the employees of the Fisheries Commissions. These opportunities, however, are insufficient. This is primarily for the following reasons:

- (1) The domestic programs do not cover the economic and fisheries management aspects of fisheries administration which are crucial for successful fisheries.
- (2) The foreign (donor country) programs offer a bit more, although far from perfect coverage in this respect. In addition there are other drawbacks:
  - (i) The number of places in these programs are quite limited, therefore they cannot be used for a large scale training/retraining of the staff of the Fisheries Commission
  - (ii) The long-term availability of these programs is doubtful.
  - (iii) Training students abroad is very costly, even if the donor countries pay much of the cost.

So, it appears that in order to build up relatively rapidly adequate expertise in the various topics of fisheries for the Fisheries Commission, the most efficient procedure would be to develop programs and courses designed to fit the particular needs of the Fisheries Commission as well as that of the fisheries sector in general. The project would naturally be divided into (i) a set short term courses suitable for people already employed in the business and (ii) more permanent educational programs at universities and other institutes of higher learning for the purpose of generating a steady supply of well-trained graduates for the fisheries sector.

## **5 OUTLINING TRAINING PROGRAMMES**

Knowledge in fisheries can be conveyed through various means. For the purpose of this thesis, it seems practical to distinguish between conveying it by (i) a discrete series of relatively short courses and (ii) longer lasting continuous educational programmes. The latter is usually provided by universities or technical colleges resulting in formal degrees. The former can be provided on a much more ad hoc basis. The short courses are suitable for staff that are already employed and not in a position to leave their jobs for an extended period of time. The continuous educational programmes are more suitable for students that are in a position to devote themselves to study for an extended period of time often measured in years. Both methods of instruction attempt to provide essentially the same information and training. They, therefore, are complementary and can support each other in various ways, e.g. in terms of teaching material and teachers.

### **5.1 Short term courses<sup>7</sup>**

Intensive short-term courses have a significant role to play for training in the various topics of fisheries and fisheries management. This is because administrative staff, members of the fishing industry and employed researchers generally cannot take time off from their jobs for any significant length of time. Therefore, for them to obtain useful additional knowledge and training, intensive short course are ideal. Such supplement and complement to educational programmes. Such courses are good for people who already have significant levels of experience.

To manage and control fisheries effectively, several types of knowledge and skills are required. The necessary abilities vary somewhat between fields and levels of administration. However, certain core knowledge is common to all. This core is a workable understanding of the basic biological/economic/social laws driving the evolution of fisheries, the resulting fisheries problems and how to deal with them (fisheries management). All administrators of fisheries must understand these basics. Without this understanding they will have great difficulties in conducting their administrative duties successfully unless, of course, they are closely supervised and controlled by others.

This observation suggests a certain logical order and prioritization or of short term courses. In particular, it implies that before proceeding with other courses, this basic core knowledge should be provided and hopefully, absorbed by all staff with administrative responsibilities.

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<sup>7</sup> The period of the short courses will be determined during the designing and implementation of the programmes.

Table 7 describes short term courses by grades. The training programme as suggested by fisheries specialists could be provided either locally in any of the teaching institution such as the universities in collaboration with UNU-FTP or organised externally by UNU-FTP or any of the donor countries.

### 5.1.1 Possible topics of short specialised training programmes

Table 7: Specialist training programmes

		Grades				Provision
		Deputy Directors/ Assistant Director	SFO/FO/ AFO	Technical Class	Admin	
Ability	<b>Core topics</b>					
	Fundamental problem of fisheries					local or externally provided
	Basic principles of fisheries management					local or externally provided
	<b>Specialized topics</b>					
	Fish stock assessment methods					local or externally provided
	Marine ecology and oceanography					local or externally provided
	Data collection methods					local or externally provided
	Observer/inspector training					local or externally provided
	Developing bio-economic models					local or externally provided
	Setting fisheries management measures under limited information					local or externally provided
	Co-management and community management					local or externally provided
	Fisheries judiciary systems (ideal structure and practical problems)					local or externally provided
	International fisheries issues					local or externally provided

Table 7: Specialist training programmes (*continued*)

		Grades				Provision
		Deputy Directors/ Assistant Director	SFO/FO/ AFO	Technical Class	Admin	
Ability	<b>More specialized topics</b>					
	Fish biology and stock dynamics					local or externally provided
	Data collection, management, storage and analysis					local or externally provided
	Basic fisheries economics					local or externally provided
	Bio-economic modelling and the use of bio-economic models					local or externally provided
	Development of fisheries policy and management					local or externally provided
	Fisheries project: cost-benefit analysis					local or externally provided
	Monitoring, control and surveillance					local or externally provided
	Management of fisheries companies					local or externally provided
	Fishing technology					local or externally provided
	Quality management of fish handling and processing					local or externally provided
	Resources management (Stock Assessment)					externally provided
	Sustainable aquaculture					externally provided
	Boat building (fibre optics)					externally provided

### 5.1.2 Cost of training fisheries staff (Short term)

The cost component of training of staff (Table 8) is estimated when there is the need to fall on the expertise of consultants for the training of staff on short courses. The table shows a breakdown of cost items. The total cost for one instructor/consultant undertaking training/teaching of a short term course for a period of about half a week with a travel and per diem expenses will amount to US\$10,700. The total cost of training for 1 week, 2 weeks and 3 weeks employing the services of 2 instructors will amount to US\$26,000, US\$46,000 and US\$65,000 respectively. The total cost for running a programme in Ghana (local content) is estimated to be 20,000<sup>8</sup>USD for 30 staff for 5 days. A repeated programme will cost about 17,000 USD for the same number of staff given that teaching materials will be excluded from the total cost.

<sup>8</sup> Estimation include travel, accommodation, teaching materials, fuel/T&T costs and other related cost

Table 8: Cost component of short courses<sup>9</sup>

Course length	Instructors	Cost (US\$)		
		Teaching	Travel and per diem	Total
0.5 weeks	1	6,000	4,700	10,700
1 week	2	16,000	10,000	26,000
2 weeks	2	32,000	14,000	46,000
3 weeks	2	48,000	17,000	65,000

The calculation is based on the use of highly qualified foreign (European or American) experts.

## 5.2 Long Term Courses

A long term training process is important in order to achieve a high level of performance over a long period of time. This part attempts to bring into focus training programmes to provide competent and efficient employees in their respective occupational fields or to equip themselves with current or future fisheries related programmes. The identified programmes are based upon the responses of the the Commission. The maximum period of completion of the programme is 4 years. The programme is grouped into various categories. The following are some training programmes identified for the staff of the Commission.

### 5.2.1 Possible training programmes

- **Diploma:** Fisheries law, Processing and marketing, Procurement, Marine transport, Maritime science, Aquatic science, Boat building (fibre optic), Project Monitoring and Evaluation, Geographic Information System, Veterinary technician, human resource management, public administration.
- **Undergraduate:** Fisheries Resources, Fisheries and Aquaculture, Fisheries Science, Aquaculture, Food science (specialization in fisheries), Oceanography, Maritime Law, Human resource management, Public Administration.
- **Postgraduate:** Aquaculture, Marine Biology, Fisheries management, Policy and planning, Fisheries Economics, Agriculture Economics, Natural Resource Management, International trade and business management, Hatchery management, Food science (specialization in fisheries), Stock assessment, Fisheries Ecology, Oceanography, Public Administration.
- **PHD:** Aquaculture, Fisheries Economics, Agriculture Economics, Stock Assessment, Marine governance, Marine Biology, Maritime law.

It has become clear that government spends a significant share of its budget on capacity building of staff in the civil and public services. Upgrading the skills of staff requires high expenditure especially when seeking overseas training. Introducing some of these courses in the curricula of the public universities will reduce such expenditure on government. To provide long term staff training (going beyond the period of the WARFP), there is the need to incorporate some of these programmes into the public universities. Development of strategies to strengthen local content is the initial step. The fees for long term training of staff of the Commission in the local and foreign universities are as follows:

<sup>9</sup> Calculation includes teaching cost such as remuneration, preparation and teaching materials

### 5.2.2 Cost of training fisheries staff (Long-term)

#### Full fees for long term training programme in local universities per year

Diploma	500 - 600 USD
Under Graduate	2,500-3,000 USD
Post Graduate	5,000-6,000 USD
PHD	> 10,000 USD

#### Full fees for foreign universities per year

Under Graduate	40,000-50,000US\$/programme
Post Graduate	50,000-60,000US\$/programme
PhD	> 50,000 USD

The cost of training a staff of the Fisheries Commission in a public universities for a diploma programme ranges from US\$500 to US\$ 600 for a year while that of undergraduate is within the range of US\$ 2,500-US\$ 3,000. In addition, cost of post graduate training at the public universities ranges from US\$ 5,000 to US\$ 6,000 per year while that of a PhD will not be less than US\$ 10,000. The following calculations are based on university charges, university approved, other approved and residence.

The cost of training a staff in a foreign university for undergraduate programme in a year is between US\$ 40,000-50,000 while that for a post graduate programme will range between US\$ 50,000-60,000. The cost component of foreign programme is surely higher than that of the local training hence the need to encourage upgrading curricula in the public universities to reduce cost on training. It is a fact that government will have to train staff in foreign institutions but it is also advisable that some training should be encouraged locally. These cost components are based on estimation hence are subject to review.

## **6 EVALUATION OF POST TRAINING CONDITIONS AT THE COMMISSION**

Training involves acquiring new knowledge and skills that can be applied in one's environment. What is learnt should be applied on the job but the general impression created in the public service in Ghana on post-training is that staff who participate in training programmes, particularly foreign ones, are not allowed to utilize the knowledge they gain on their jobs. True or not, this is certainly a subject for investigation.

To throw some light on this issue, an inquiry was conducted, attempting to find out views on of the Fisheries Commission staff who have been beneficiaries of various training programmes. The objective of this inquiry was not to evaluate any particular training programme but rather gauge the easiness of transfer of knowledge and skill picked up in training to jobs in the Commission.

Mosel (1957) indicated that three conditions were important if transfer of knowledge and skill was to occur. These are that (i) the content of the training be useful, (2) the trainee has to learn the content and (3) the trainee has to be motivated to change his/her behaviour on the job in order to apply the new knowledge and skill. Motivation can be generated by formal and informal rewards at the workplace. Higher ranks, supervisors control the formal, while the

working group control the informal. This implies that for application of training to jobs, it is important that supervisors create enabling environment that supports the use of trained skills and knowledge on the job.

Results from this study show that contrary to the widely-held view in the civil service, almost all staff of the Commission interviewed (92.3%) make use of the knowledge they have gained in training in their respective jobs. According to them, they do apply the knowledge when there is the need to do so in their duties. This implies that supervisors of these trained staff do allow them to make use of knowledge gain from training.

The rest of the respondents (7.7%) had opposing views. They were of the view that sometimes one has to be at the senior level to be able to implement knowledge or skill gain from training. Additionally, they indicated that some supervisors find it difficult to appreciate contributions that the trainees make. This demoralizes the trainees and hence prevents them from making further contributions. They also suggested that some skills or knowledge are not transferable because they do not fall in the purview of staff to do so.

The successful application of training is not only determined by quality of training but also on the working environment (Clardy, 1984). The staff interviewed were in general agreement that the availability of resources is a significant factor in the application of their knowledge they have accumulated and its transfer to others. In particular, logistical problems were frequently mentioned, that staff find it difficult getting to stakeholders such as fish farmers, fishers and processors in the industry to disseminate knowledge and skills. Also, staff lack computers and accessories to undertake data processing. Where there are computers, there may be no statistical software programme for data entry and analysis. In such a situation, staff may not be able apply the knowledge they have acquired effectively.

## **7 KEY POLICY RECOMMENDATIONS**

This study clearly indicates that there is a need for staff training policies to overcome the knowledge and skill gaps prevailing in the Fisheries Commission. Considering the findings of this study, a number of policy recommendations are put forward. This is categorised into short, long term and other recommendations:

### **7.1 Short term recommendations**

- ❖ There is a need to establish and or strengthen a unit/division (e.g. HRM) responsible for capacity building of staff,
- ❖ A special committee should be formed to re-visit the identified training programmes from this study since both knowledge and tasks change over time,
- ❖ It is suggested that the training needs should be reviewed periodically,
- ❖ A mixture of training including workshops, e-learning, on-the-job training and case studies delivered by experts' practitioners should be adopted.
- ❖ There should be an introduction of tailor-made needs-based training to suit the particular needs of the Fisheries Commission
- ❖ There is a need to develop a means to collect TNA information, training plans and feed it into say, annual entity training plans. This will link demand and supply as it will manage a central database on training providers and training materials,

- ❖ There is a need to introduce a budget to fund the training of staff and performance monitoring system.

## **7.2 Long term recommendations**

- ❖ The identified needs could encourage the creation and/or splitting up of divisions (e.g. gear technology, fish inspection and quality assurance) and upgrading some units to divisional level for the sustainable management of the fisheries resources,
- ❖ A programme of local training should be designed by the Commission institutions in collaboration with the implementing agencies,
- ❖ The Commission is to collaborate with UNU-FTP (and other donor countries) to develop and support training programmes for the staff in the Commission and fisheries training programmes in the universities and other teaching institution's curricula. This will go a long way to boost the local content in training,
- ❖ Some of these training programmes can be included in the curricula of a fisheries college which is yet to take off in the Central Region of Ghana. Stakeholders such as fishers, fisheries companies could also benefit from these courses at the college in the short and long term,
- ❖ Such identified training needs can be shared with other countries in African to also improve upon their capacity building in the fisheries sector.

## **7.1 Other recommendations**

- ❖ The Commission should make use of recommendations from training programmes,
- ❖ Supervisors are to create enabling environment for the utilization of knowledge and skill gain from training,
- ❖ The institution need to equip the staff/offices with necessary tools/logistics to help utilize knowledge and skill gain from training.

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## APPENDIX

Appendix A: Core component of some specialized training programmes

### **Monitoring, Control and Surveillance (MCS)<sup>10</sup>**

- Purpose and scope of MCS
- Principles of law
- Court system
- Introduction to the fisheries laws-Acts and Regulations
- The support resources available to address the task
- Cooperation and linkages with other ministries necessary for successful MCS implementation
- Determining MCS priorities
- Planning MCS activities, data collection and surveillance patrols
- Determine the violation
- Apprehend violators
- Gathering evidence
- Charge alleged violators
- Court procedures
- Completion of final document
- Completion of final procedures
- Optimum enforcement

### **Quality management of fish**

- Quality/safety in raw materials and product
- Quality and safety in fisheries harbours
- Quality changes and shelf life of fishery products
- Fish inspection and quality control
- Microbiology of fish and fish product
- Traceability of fishery products
- Seafood safety assurance
- International legal framework  
WTO, Sanitary Phyto-Sanitary S/Technical Barriers to Trade, Codex Alimentarius, EU legal framework, USA Fisheries \regulations etc.
- Sampling for microbiological and chemical analysis
- Basic requirements (food safety hazards related to seafood products from catch and aquaculture)
- Cleaning and sanitation-safety of water and ice
- Food safety strategies for food safety assurance
- Chemical hazards related to seafood products wild and aquaculture
- Risk assessment of microbiological hazards in foods and related matters

### **Data collection and management**

- Data collection and analysis
- Maintenance and operation of a database on artisanal fisheries
- Fisheries statistics and stock assessment
- Use of statistical softwares for data entry and analysis

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<sup>10</sup> FAO Fisheries Technical Paper 415

**Company management**

- Accounting, finance and cost management
- Management and leadership
- Operations and management in fisheries
  - ❖ Fishing
  - ❖ Processing
  - ❖ Aquaculture
- Optimizing marketing value chain of seafood products
- Project cycle management
- Profitability assessment in fisheries and aquaculture enterprises

**Aquaculture and fish diseases**

- Sustainable aquaculture
- Geographic Information System(GIS)
- Biofloc technology (BFT)
- Marine ornamental species aquaculture
- Relationship between host, pathogen and environment
- Limnology & water quality assessment
- Infectious diseases of aquaculture species
- Non – Infectious Disease
- Integrated health management: health inspection, disease monitoring, treatment methods.
- Prevention techniques: prophylactic treatment and common therapeutics vaccinations and immunization
- Treatment of fish disease
- Economic and public health aspects of diseases in fish
- Risk management
- Training of laboratory technicians and officers

**Fishing technology**

- Gear materials and accessories
- Ropes and rope work
- Fishing gears
- Fishing methods
- Factors influencing choice of fishing gears and fishing methods
- Classification of fishing gears
- Fishing gear selectivity
- Principle use of fishing gears
- Electronic aids to fishing
- Fishing methods
- Fish behaviour

**Fish processing and marketing**

- Fish handling processes
- Production technology/techniques
- By-product
- Packaging and packaging materials
- Transport and logistics
- Price demand
- Type of processing (visit processing company (ies))

**Administration and Operation**

- Human resource development/management
- Computer skills
- Office management
- Target setting and performance
- Office management and administration
- Human relations and communication
- Administrative management skills
- Introduction to management

**Project management**

- Procurement cycle
- Planning procurement, designing tenders and managing contracts
- Procurement in project management
- Work, goods and services procurement management

**Other relevant courses**

- Supply/value chain analysis
- Policy analysis, formulation and implementation programme
- Project planning and monitoring & evaluation
- Bio/Economic modelling
- Assessing impact and evaluating programmes and project
- Managing capital project and public sector investment

Appendix B: Questionnaire

**STAFF QUESTIONNAIRE  
ANALYSIS OF TRAINING NEEDS FOR THE DEVELOPMENT OF POLICY  
AND PLANNING FOR FISHERIES COMMISSION, GHANA.**

- 1. Name .....
- 2. Division/unit .....
- 3. Highest educational level .....
- 4. Current Grade.....
- 5. Duties .....

6. Training needs (for staff)

**Long-term**

.....  
.....  
.....

**Short-term (for staff)**

.....  
.....  
.....

- 7. Do you utilize knowledge/skills gain from previous training(s) in your field of specialization when you came back from training?

Yes { }      No { }      N/a { }

- 8. If yes, explain.

.....  
.....  
.....

9. If **no** (Tick as applicable).

- (i) Leadership issues (My supervisor does not allow me to apply it) { }

**Please explain**

.....  
 .....  
 .....

- (ii) We are never allowed to practice what we learnt (Cultural issues) { }

**Please explain**

.....  
 .....  
 .....

- (iii) I only apply when training is related to my field { }

**Please explain**

.....  
 .....  
 .....

- (iv) Others please specify { }

.....  
 .....

**7.3 Appendix C: Sample size table**

Sample size based on desire accuracy at variance of the population P = 50%

Population Size	Confidence = 95%				Confidence = 99%			
	Margin of Error				Margin of Error			
	5.0%	3.5%	2.5%	1.0%	5.0%	3.5%	2.5%	1.0%
10	10	10	10	10	10	10	10	10
20	19	20	20	20	19	20	20	20
30	28	29	29	30	29	29	30	30
50	44	47	48	50	47	48	49	50
75	63	69	72	74	67	71	73	75
100	80	89	94	99	87	93	96	99
150	108	126	137	148	122	135	142	149
200	132	160	177	196	154	174	186	198
250	152	190	215	244	182	211	229	246
300	169	217	251	291	207	246	270	295
400	196	265	318	384	250	309	348	391
500	217	306	377	475	285	365	421	485

(Gill & Johnson, 2010)