Ministry for Foreign Affairs of Finland

FINAL REPORT

End of Project Evaluation of Concessional Credit Scheme Project: "Vessel Traffic Management and Information System (VTMIS) for Coastal Surveillance in the Republic of Ghana and Automatic Identification System (AIS) for Lake Volta"

August 2018

FCG International Ltd

Contents

Figures

ACRONYMS AND ABBREVIATIONS

ACC	Area Control Center
AIS	Automatic Identification System
AtoN	Aid to Navigation
CARE	A Global humanitarian organization
CCS	Concessional Credit Scheme
CCTV	Closed-Circuit TV
CRESMAC	Regional Coordination Center for Maritime Security in Central Africa
CRC	Coastal Resource Center
DG	Director General
DSC	Digital Selective Calling
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EEZ	Economic Exclusive Zone
EJF	Environmental Justice Foundation
Eltel	Eltel Networks Corporation
EMQ	Evaluation matrix questions
EPA	Environmental Protection Agency
EU	European Union
FAT	Factory Acceptance Test
FCWC	Fishery Committee for the West Central Gulf of Guinea
FEU	Fisheries Enforcement Unit
FGD	Focus Group Discussion
FoN	Friends of Nation
GDP	Gross Domestic Product
GEF	Global Environment Facility
GESI	Gender Equality and Social Inclusion
GGC	Gulf of Guinea Commission
GIS	Ghana Immigration Service
GMA	Ghana Maritime Authority
GMDSS	Global Maritime Distress and Safety System
GNCFC	Ghana National Canoe Fishermen Council
GNFA	Ghana National Fishermen Association
GNPC	Ghana National Petroleum Company
GOG	Gulf of Guinea
GoGIN	Gulf of Guinea Interregional Network
GPHA	Ghana Ports & Harbor Authority
GPRS	Ghana Poverty Reduction Strategy
GRA	Ghana Revenue Authority
GSGDA	Ghana Shared Growth and Development Agenda
HF	High frequency
HRBA	Human rights-based approach
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ICC	International Chamber of Commerce
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICT	Information and Telecommunication Technology
IDA	International Development Association
IEZ	Inshore Exclusive Zone

IMF	International Monetary Fund
ISMS	Incorporated Strategy for Maritime Security
IT	Information technology
ITU	International Telecommunication Union
IUCN	Union for Conservation of Nature
IUU	Illegal, unreported and unregulated
IMO	International Maritime Organization
KII	Key Informant Interview
LRIT	Long Range Identification and Tracking system
MARPOL	International Convention for the Prevention of Pollution from Ships
MCS	Monitoring, control and surveillance
MDG	Millennium Development Goal
M&E	Monitoring and evaluation
MFA	Ministry for Foreign Affairs of Finland
MFEP	Ministry of Finance and Economic Planning of the Republic of Ghana
MMCC	Multinational Maritime Coordination Centre
MOFAD	Ministry of Fisheries and Aquaculture Development
MRCC	Maritime Rescue and Coordination Centre
MS	Monitoring station
Mscf/d	Thousand standard cubic feet per day
NACOB	Narcotics Control Board
NAFPTA	Ghana National Fish Processors and Traders Association
NCC	National Control Center
NGO	Non-governmental organization
NSA	National Security Agency
OECD/DAC	Organization for Economic Co-operation and Development's /Development Assistance Committee
OXFAM	A world-wide development organization that mobilizes the power of people against poverty
PIF	The Public -Sector Investment Facility
PCS	Port Control System
RBM	Result-based management
RBS	Remote Base Station
RMU	Regional Maritime University
RSS	Remote Sensor Site
SAT	Site Acceptance Test
SDGs	Sustainable Development Goals
SFMP	Sustainable Fisheries Management Project
SNV	Netherlands Development Organization
SOLAS	International Convention for the Safety of Life at Sea
SOP	Standard Operation Procedures
TOR	Terms of Reference
TMT	Trygg Mat Tracking – Fisheries intelligence analysis and support to combat illegal fisheries
UN	United Nations
UNOCD	United Nations Office on Drugs and Crime
US	United States
USAID	United States Agency for International Development
USD	United States Dollar
VHF	Very High Frequency

VLTC	Volta Lake Transportation Company
VMS	Vessel Monitoring System
VTMIS	Vessel Traffic Management and Information System
WARFP	West Africa Regional Fisheries Program
WB	World Bank
WCWF	Fishery Committee for the West Central Gulf of Guinea
VTS	Vessel Traffic Service
ZMT	Zeni Maritime Technology Oy

Executive summary

The Ministry for Foreign Affairs (MFA) of Finland commissioned FCG International Ltd (FCG) to conduct the End of Project Evaluation of Concessional Credit Scheme Project: *Vessel Traffic Management and Information System (VTMIS) for Coastal Surveillance in the Republic of Ghana and Automatic Identification System (AIS) for Lake Volta*.

The evaluation was made according to OECD-DAC evaluation criteria of relevance, effectiveness, efficiency, impact, sustainability and coordination/complementarity/coherence/aid effectiveness. The objectives of the end of project evaluation were to:

- ✓ Evaluate whether the project was implemented in an appropriate and efficient way;
- ✓ How well it achieved the targets and goals;
- ✓ How sustainable the results of the project are;
- ✓ Generate information on sustainability of development impacts/results of the project;
- ✓ Provide lessons learned to support programming of PIF funding instrument.

Approach and methodology

The evaluation was conducted between June-August 2018 by a team of four experts and it included a two-week field mission to Ghana. The evaluation was guided by an ex-post results framework (Annex 3) and Evaluation Matrix (Annex 2) that were prepared in the beginning of the evaluation based on information available in the feasibility study. Altogether 82 stakeholders were interviewed from different organizations, including the project owner and key stakeholder in Ghana, as well as private companies and financiers in Finland. Limitations to the evaluation included the absence of a project Results Framework, challenges in reaching some stakeholders in Ghana and limited availability of archived materials.

Context and evaluated project

The evaluated project is part of Ghana´s response to the security threats in the whole Gulf of Guinea, where crucial economic activities such as the construction of the West Africa Pipeline and the discovery of oil on the coast needed guarding in the worsening security situation of mid-2000s. Ghana is part of the ECOWAS Maritime Security Architecture and 2013 Yaoundé Code of Conduct Concerning the Repression of Piracy, Armed Robbery Against Ships, and Illicit Maritime Activity in West and Central Africa. Maritime sector in Ghana is currently supported by several development partners, including the World Bank, the European Union, the Government of Denmark, USAID and the US Navy.

The owner and the main agency implementing the project is the Ghana Maritime Agency (GMA). The project consists of an integrated Vessel Traffic Management Information System (VTMIS), aiming at improving safety of navigation, control and monitoring of the traffic within waterways, protection of the environment, simplifying port planning and overall surveillance in Ghana. The technology is designed and installed by a Finnish company Navielektro Ky, which acted as a sub-contractor to the main project contractor, Eltel Networks Corporation.

VTMIS consisted of the establishment of one National Control Center (NCC) operated by GMA and three Area Control Centers (ACC) operated by GMA and the Navy. The basic infrastructure managed by GMA includes eight Remote Sensor Sites (RSS) and three Remote Base Stations (RBS), which function as telecommunication towers. The RSSs and RBSs were equipped with various sensors for detecting vessels and boats. RSSs are located along the marine coast and cover the whole coastline. RBSs are by the Lake Volta, which is inland lake and cover only some areas of lake.

The project also provided ten Monitoring Stations (MS) operated by different stakeholders, such as the Navy, Fisheries Commission, the Customs Division of Ghana Revenue Authority, National Security Agency, Narcotics Control Board, Marine Police Unit and Ghana Immigration Service. The project included several training courses for VTMIS monitoring both in Finland and in Ghana.

The VTMIS project started in June 2011 and the construction ended in December 2013. The last trainings were held in March 2015. The project was financed through the Finnish Concessional Credit Scheme (CCS). The total credit for the project was EUR 17,7 million including the full contract price of EUR 16,6 million.

Findings & conclusions

Relevance. The VTMIS system was needed in Ghana in marine areas, and the technology is appropriate and easy to operate. However, the same technology was not relevant in Lake Volta area. The project responded directly to the Ghana national growth agenda and indirectly to the Finnish 2007 development policy priorities but not to the cross-cutting themes. It is the foundation for the maritime security in Ghana and therefore it is relevant also for the security agenda of the Finnish 2007 development policy.

Effectiveness. The project set up a functioning VTMIS system in a timely manner, facilitated by the high-level support in Ghana and the strong experience of the contractor. The necessary basic operational skills and capacity were provided but maintenance training was not adequate. Eltel, Navielektro and GMA all played their part well and the project was implemented successfully apart from some delays.

Efficiency. The project implementation was relatively efficient, and it achieved most of its outputs. The VTMIS Control Centres work well, and the staff is motivated. The system is, however, only partially operational mostly due to inadequate maintenance and periodical break downs. The needs assessment and more intensive cooperation already in the establishment phase between GMA and other stakeholders might have contributed to better and more functional working relations and cooperation later. The project can be ranked as gender and social inclusion (GESI) blind.

Impact. VTMIS has increased maritime security and safety in Ghana and as a foundation for monitoring, it provides a platform for further technological improvements. At present the system is not fully working and Ghana does not entirely comply with the IMO requirements. The VTMIS data is not shared with stakeholders outside the government. The main environmental impact of the system is the avoidance of incidents on the gas pipeline and around the gas fields but there is no evidence of impact on fisheries, drug and human trafficking or human rights, gender equality and the reduction of inequalities.

Sustainability. Sustainability of the system is moderate and the VTMIS is the platform for improving the system by more advanced ways of monitoring. Bureaucratic relationship between the GMA and other organizations slows down the work. Several other development partners provide further technical support for Ghana on maritime security.

Coordination, Complementarity, Coherence, Aid effectiveness. GMA has a strong ownership of the project and the stakeholder organizations meet in the GMA board. The Government of Ghana has been able to service the VTMIS loan received and there has not been any indication that it had negative impacts on the debt sustainability of Ghana. During the planning phase, there was no proper description of the context or other development interventions nor did the project include any management system for development results. The MFA monitoring through reports and audits has not taken place.

Other. There are prospects for VTMIS export to other countries although the project has not yet generated further business for the Finnish companies. VTMIS project in Ghana was in line with the strategies of Eltel Networks Corporation and Navielektro Ky and the project has been used by the Finnish Embassy and Business Finland as a successful example of Finnish products in West Africa. In the future, VTMIS in Ghana would be a better project reference for the companies, if the maintenance of the system worked properly.

Recommendations

1. More attention is to be paid to aligning concessional credit projects better with the Finnish development policy priorities and cross cutting themes as well as securing the relevance of all the parts of the project.
2. The appraisal process must have enough resources and the appraisal report recommendations should be properly analyzed and consequent decisions justified and documented.
3. Result indicators must be prepared already in the feasibility study stage of the project to facilitate the monitoring of the project implementation. Alternatively, based on the feasibility study, a project document should be prepared with appropriate indicators
4. Implementation of the CCS/PIF projects must be monitored during the implementation phase.
5. The project plan will have an inbuilt project component to establish a cooperation and coordination body between organizations, if a precondition for a successful project is a good cooperation between stakeholder organizations. The appraisal process must ensure that such a component exists.
6. More resources are needed to the appraisal to properly assess the context and to prepare a project document or an improved feasibility study with targets on tailor-made training for each stakeholder organization as well as on gender and human rights.
7. Assess better the context when designing a CCS project avoiding too optimistic description of expected impacts.
8. MFA shall continue discussions with the recipient government and its institutions in the implementation phase to emphasize sustainability. Make sure there is a system or a contract for maintenance and a plan for continuous training. Coordinate with other development partners for the organization of training.
9. MFA through its embassies, regional department and the PIF unit must keep contact with the government receiving concessional credit and emphasize the need for maintaining the investment.

Findings	Conclusions	Recommendations
Relevance		
VTMIS technology is relevant in marine areas to increase safety in ship traffic and for oil and gas infrastructure, but until now it has not shown to be relevant in Lake Volta area, as emphasized in the appraisal report. The technology is appropriate. The project responded to the Ghana national growth agenda, but it is not directly in line with the 2007 Finnish development policy priorities of poverty reduction. However, indirectly the project contributes to them. The alignment with the cross-cutting themes is weak, but it promotes security, which is emphasized in the development policy as an important foundation of sustainable development.	The VTMIS system is the foundation for the maritime security in Ghana and therefore it is relevant also for the security agenda of the Finnish development policy. The VTMIS investment in Lake Volta is not relevant and it was apparently driven by an agenda not mentioned in project documents.	1. More attention should be paid to aligning concessional credit projects better with the Finnish development policy and to the relevance of all the parts of the project. 2. The appraisal process should have more resources and appraisal report recommendations should be seriously considered. There should be a reporting procedure during the implementation, where the decisions to deviate from the recommendations of the Appraisal Report are clearly justified and documented.
Effectiveness		
The immediate objective of the project of setting up a functioning VTMIS system was met. High-level support in Ghana and the strong experience of the contractor facilitated the timely implementation of the project. The project managed to provide the necessary basic operational skills and capacity for GMA and other stakeholders but VTMIS hardware and software maintenance training was not adequate. The project faced some problems with bureaucracy and therefore some features were not included in the system.	Eltel, Navielektro and GMA all played their part well and the project was implemented successfully apart from some delays. The adequate assessment of training needs in the Ghanaian context was missing.	3. Proper indicators should be prepared already in the Feasibility study stage of the project to facilitate the monitoring of the project implementation. Alternatively, based on the feasibility study, a project document should be prepared with proper indicators. 4. Implementation of the CCS/PIF projects should be monitored during the implementation phase.
Efficiency		
There were several delays, mostly due to bureaucracy, during the implementation phase. The VTMIS Control Centres work well, and the staff is motivated. VTMIS in Lake Volta was not taken into use and there have not been any monitoring activities since the establishment. The maintenance service provided by GMA is slow and the system is only partially operational due to inadequate maintenance and periodically unreliable and slow internet connection. The assessment of project´s gender and social inclusion (GESI) shows that in the planning phase the project was	The project implementation was relatively efficient and it achieved most of its outputs. The capacity to monitor the vessel traffic and to protect the gas and oil infrastructure was achieved, but the same did not happen regarding fisheries and illegalities monitoring. The VTMIS is a one operator system: one organization owns the system and provides services for the stakeholder organizations. Needs assessment and more intensive cooperation already in the establishment phase between GMA and other stakeholders might have contributed to better and	5. The project plan should have an inbuilt project component to establish a cooperation and coordination body between organizations, if a precondition for a successful project is a good cooperation between stakeholder organizations. The appraisal process should ensure that such a component exists. 6. More resources are needed to the appraisal to properly assess the context and to prepare a project document or an improved feasibility study

still gender aware although not sufficiently to be gender sensitive.	more functional working relations and cooperation later. Issues concerning human rights and gender have been neglected in project implementation and the project can be ranked as gender and social inclusion (GESI) blind.	with targets on tailor-made training for each stakeholder organization as well as on gender and human rights.
Impact		
The VTMIS has an impact on creating a safer and more secure marine environment in the Ghanaian coast and it forms the platform on which other, more advanced monitoring systems and programs can be added. The VTMIS technology, if it worked as expected, would fulfill all the requirements set by IMO for monitoring of the coastal waters. However, at the present state the system is not working as it should be, and the information provided by the system is not fully used, and therefore Ghana does not fully comply with the IMO requirements. The increased safety and better coordination may have contributed to the growth of traffic and efficiency in Tema and Takoradi ports. The main environmental impact of the system is the avoidance of incidents on the gas pipeline and around the gas fields. There is no evidence on impact on fisheries, drug and human trafficking nor on human rights, gender equality and the reduction of inequalities.	VTMIS has increased maritime security and safety in Ghana and as a foundation for monitoring, it provides a platform for further technological improvements. The expected positive impacts on fisheries, illicit trade and livelihoods were not realistic. The VTMIS data is not shared with stakeholders outside the government.	7. Assess better the context when designing a CCS project avoiding unrealistic description of expected impacts.
Sustainability		
There are frequent breaks in the VTMIS operations due to technical problems. The maintenance is lacking, and reparations are often delayed. The GMA has discussed making a maintenance contract with Navielektro, but it has not been finalized as it is considered too expensive. GMA has been able to keep most of its employees and they are motivated and satisfied for their work. Additional and advanced training is, however, missing, and new staff is not trained in a structured manner. Many of the VTMIS users have also other monitoring systems.	Sustainability of the system is moderate even if it is hindered by slow or missing maintenance and reparations, as well as comprehensive plans for continuous staff training. Also, bureaucratic relationship between the GMA and other organizations slows down the work. Other monitoring systems in stakeholder organizations complement each other and increase the sustainability of monitoring activities.	8. MFA should continue discussions with the recipient government and its institutions in the implementation phase to emphasize sustainability. Make sure there is a system or a contract for maintenance and a plan for continuous training. Coordinate with other development partners for the organization of training.

Coordination, Complementarity, Coherence, Aid effectiveness		
During the planning phase of the project the other programmes and cooperation were not described and considered. The project did not contradict with other policy areas in Ghana. GMA has a strong ownership of the project and contacts the MSs daily. The stakeholder organizations meet in the GMA board. The project did not have a management system for development results and no result-based framework was used. MFA has not monitored the project and the installed equipment, or the project in general, has not been audited. Government of Ghana has been able to service the VTMIS loan received and there has not been any indication that it had negative impacts on the debt sustainability of Ghana.	GMA runs the VTMIS and has exclusive rights to it while the coordination is done at higher levels in the GMA board. After signing the contract with the GoG, MFA has not been in regular contact with the Ghanaian authorities regarding the VTMIS to monitor the sustainability of the investment.	9. Context should be better considered in order to get the wider coordination working as early as possible and the activities of other development partners could be considered better.
Other		
The VTMIS system has not yet generated further business for Finnish companies. However, there are prospects for VTMIS export projects in other countries. VTMIS project in Ghana was in line with the strategies of Eltel Networks Corporation and Navielektro Ky. However, Eltel does not continue implementing projects abroad. Navielektro Ky and possibly the Finnish subsidiary of Zeni Lite Group are interested in continuing VTMIS business abroad. The project has been used by the Finnish Embassy and Business Finland as a successful example of Finnish products in West Africa. The evaluation team did not find any further synergies between the VTMIS project and other Finnish cooperation in the region.	In the future, VTMIS in Ghana would be a better project reference for the companies, if the maintenance of the system worked.	10. MFA through its embassies and the PIF unit should keep contact with the government receiving concessional credit and emphasize the need for maintaining the investment.

1. Introduction

1.1. The evaluation´s rationale and objectives

The Ministry for Foreign Affairs (MFA) of Finland has commissioned FCG International Ltd to conduct the End of Project Evaluation of Concessional Credit Scheme Project: Vessel Traffic Management and Information System (VTMIS) for Coastal Surveillance in the Republic of Ghana and Automatic Identification System (AIS) for Lake Volta. This Final Report presents the findings of the evaluation.

The objectives of the end of project evaluation are to (see Annex 1 for complete Terms of Reference):

- ✓ Evaluate whether the project was implemented in an appropriate and efficient way;
- ✓ How well it achieved the targets and goals;
- ✓ How sustainable the results of the project are;
- ✓ Generate information on sustainability of development impacts/results of the project;
- ✓ Provide lessons learned to support programming of PIF funding instrument.

The scope of the evaluation covers:

- ✓ Planning and implementation phases of the project;
- ✓ Actions to ensure sustainability after the completion of the project, including the project owner Ghana Maritime Authority (GMA), key stakeholders in Ghana, implementing companies (Eltel Networks Corporation and Navielektro Ky), stakeholders facilitating the concessional credit scheme (CCS);
- ✓ Development strategies of Ghana and development policies of Finland in the context of CCS instrument;
- ✓ Aspects related to gender and social equality, human rights, equal participation of marginalized groups and environmental sustainability. Outcomes of the project for the ultimate project beneficiaries (result framework and indicators);
- ✓ Contribution of the project on the long-term operations of the Finnish companies involved in the development country markets.

The Evaluation Team consisted of four experts: Mr. Erkki Ikäheimo (Team Leader/Development expert), Ms. Merja Mäkelä (Development expert), Mr. Adom Ghartey (Local expert) and Mr. Aleksi Uttula (VTMIS-expert). The Evaluation started on June 4th with a two-week Inception Phase, followed by a field mission to Accra and project areas in the coastal and Lake Volta areas on 25.6. – 7.7. The team would like to express their gratitude to the stakeholders for sharing information and insights with the team.

1.2. The approach and methodology

1.2.1 Approach

The general approach of the evaluation is based on collecting and analyzing information about the planning and implementation phases of the project in 2008-18. In this context the “project” is equivalent to the establishment of the VTMIS infrastructure and system in Ghana through construction and training; as well as the implementation of the monitoring system in 2014-18 by different institutions and stakeholders. The approach of the evaluation is structured around the six OECD-DAC question categories (relevance, effectiveness, efficiency, results, sustainability and coordination/complementarity/aid efficiency), which form the basis for more detailed issues for data collection (evaluation matrix, Annex 2).

For the inception report, a tentative ex-post Results Framework was drafted according to the feasibility study (GMA, 2008). The framework was then used to assess whether the project had been effective and efficient

in achieving the planned outputs, outcome and impact. Also, the assumptions emerging from the feasibility study and appraisal report were described in the Results Framework.

1.2.2. Methodology

Evaluation questions

The terms of reference (TOR) for the assignment listed several evaluation questions based on the OECD-DAC criteria of relevance, effectiveness, efficiency, impact, sustainability and coordination/complementarity/ coherence/aid effectiveness. The team elaborated an evaluation matrix (Annex 2) which also includes indicators / judgement criteria for each question, data collection methods and the possible source of data for each question. The following table summarizes the evaluation questions and the actual data collection method used.

Relevance	**Main data collection methods**
EMQ1. Was the project relevant, including technology provided, particularly for the GMA and other stakeholders involved in the surveillance and management of the maritime vessel traffic?	Desk review Key informant interview Focus group discussions
EMQ2. Did the project contribute to Ghana's development plans and sector strategies?	Desk review Key informant interviews
EMQ3. Was the project in line with Finland's development policy objectives and global development goals?	Desk review
Effectiveness	
EMQ4. To what extent did the project achieve its immediate objective of implementing a VTMIS and AIS and providing the necessary skills/capacity to GMA and other stakeholders to operate and use the systems effectively? *Was the quality and quantity in accordance with plans?*	Desk review In-depth interviews
EMQ5. What were the key success factors or bottle necks that contributed to the project either achieving or falling short of its objectives? *What was the role/contribution of the different actors (project owner, contactor and other stakeholders including the MFA)?*	Desk review Outcome harvesting In-depth interviews
Efficiency	
EMQ6. How efficiently were available resources transformed into intended results in terms of quantity, quality and time - i.e. can the project be deemed to have been good value for money?	Key informant interviews Analysis of financial information Desk review
EMQ7. What were the key success factors/bottle necks that contributed/constrained implementation? What was the role/contribution of the different actors?	Key informant interviews Focus group discussions
Impact	**Main data collection method**
EMQ8. How well did the project succeed in achieving its overall objective to improve surveillance and management of maritime vessel traffic in Ghana? *How did the project contribute towards longer term objectives of improved safety of navigation; increased port efficiency; better environmental protection; less disturbance of wildlife; deterrence of illicit trade; improved fish stocks and livelihoods in the fishing industry?*	Key informant interviews Desk review Focus group discussion
EMQ9. What other noticeable impact did the project have (intended/unintended, positive/negative), particular in terms of human rights, gender equality, inequalities and environmental sustainability?	Key informant interviews Desk review
Sustainability	
EMQ10. How sustainable are the results achieved in the project? *Have stakeholders in Ghana taken steps to ensure sustainability e.g. in budgeting or other processes?* *Are the project results still relevant and are the systems installed/other outputs of the project still in efficient and effective use?*	Desk review Key informant interviews Focus group discussions
Coordination, complementarity, coherence, aid effectiveness	
EMQ11. How were other programs and cooperation relevant to the project considered?	Desk review
EMQ12. How well did the project promote ownership, alignment, harmonization, management for development results and mutual accountability?	Key informant interviews
EMQ13. Were there contradictions with other policy areas and how were they handled? *How did the project impact debt sustainability in Ghana?*	Desk review Key informant interviews
Other	

EMQ14. Did the project open up new business for the Finnish companies in Ghana/developing countries? Was the project part of a strategy by the companies to expand operations in developing countries?	Key informant interviews Written questionnaires (email) Desk review
EMQ15. How did the project contribute more broadly to cooperation and relations between Finland and Ghana? Were there synergies with other Finnish cooperation in the region?	Key informant interviews Written questionnaires (email) Desk review

Scope and sample

As instructed in the TOR, the evaluation focuses on the VTMIS project implemented in Ghana as specified in the feasibility study. Both the planning and implementation phases of the project as well as actions taken to ensure sustainability of results after the completion of the project are analyzed. The data collection covered the project owner (Ghana Maritime Authority) and key stakeholders in Ghana as well as the private sector companies involved in implementing the project in Finland and Ghana (Eltel and Navielektro) and the institute responsible for organizing the training to operate the system (Aboa Mare). Also, the key stakeholders facilitating the CCS-instrument including the MFA, Finnvera and the bank involved in providing the credit (BNP Paribas Fortis SA/NV), were included.

The project is analyzed in the context of relevant development strategies of Ghana and the development policy of the Government of Finland, including the CCS instrument, at the time of the feasibility study and the appraisal. Attention is paid to gender and social equality, human rights including equal participation of marginalized groups and environmental sustainability. The evaluation matrix contains questions on outcomes of the project for the ultimate beneficiaries. The evaluation was to provide information on how the project contributed to the longer-term operations of the participating Finnish companies in developing country markets.

The team visited as many National Control Centers (NCC), Area Control Centers (ACC), Monitoring Stations (MS), Remote Sensor Sites (RSS) and Remote Base Stations (RBS) as possible during the field visit to collect up-to-date information. It was important to verify that the equipment described in the feasibility study, Government of Ghana – Eltel Networks Corporation contract and in the Eltel report (Eltel Networks Corporation, 2013) was in place and effectively functioning. The following table shows that the team visited the National Control Center (NCC) and all Area Control Centers (ACC), seven out of ten Monitoring Stations (MS), four out of eight Remote Sensor Sites (RSS) on Atlantic coast and one out of three Remote Base Stations (RBS) in Lake Volta.

Table 1: NCC, ACCs, MSs, RSSs and RBS visited.

National and Area Control Centers (4 out of 4 visited)	✓ GMA Head quarters, Accra ✓ GMA Tema ✓ GMA Takoradi ✓ Navy Head Quarters, Accra
Monitoring Stations (7 out of 10)	✓ Fisheries Commission (FC), Monitoring, Control and Surveillance Unit, Tema ✓ Navy Command West ✓ Narcotics Control Board (NACOB) ✓ Customs Division of Ghana Revenue Authority (GRA) ✓ Ghana Ports and Harbours Authority (GPHA), Tema ✓ National Security Agency (NSA) ✓ Lake Volta Transportation Company (LVTC), Akosombo
Remote sensor sites (4 out of 8) and Remote Base Station (1 out of 3)	✓ Tema ✓ Anum ✓ Winniba ✓ Cape Coast ✓ Takoradi

Data collection, validation and analysis

Desk review: Background documents for desk review were gathered from different stakeholders during the Inception and Field Mission phases; the list of documents consulted is provided in Annex 6. MFA was able to provide a file of documents, including some correspondence between the Government of Ghana and MFA, the contract between Eltel and Ministry of Finance in Ghana, some internal memoranda etc. Eltel could provide the team GMA VTMIS Commissioning Report 12.6.2013, calculation of the Finnish origin of goods and services purchased, Intermediate report (September 2013) and an unofficial intermediate audit report conducted in Ghana in November 2012. GMA provided only calculation of their costs of Internet, electricity and fuel. GMA did not provide any other documents or reports for the evaluation despite agreed on in meetings and requested several times by email.

In Ghana, some government stakeholders, Non-Governmental Organizations (NGOs), projects and development partners provided studies, reports and documents to inform the evaluation especially about the possible impacts of the project.

Interviews: The interviewees were selected based on their participation in project planning and implementation, as well as their knowledge about the project context in Ghana. Table 2 shows the number of individuals interviewed under each stakeholder category; full list of people and organizations consulted is provided in Annex 5.

Table 2: Number of stakeholders and persons interviewed

Stakeholder category	Number of stakeholders interviewed
Financing partners (MFA, Finnvera, Valtiokonttori, Baribas)	6
Contractors and technology providers (Navielektro, Eltel, Aboa Mare, Zeni Lite Group)	5
Ghana Maritime Authority and Ministry of Transport	19
Other ministries and beneficiaries among government in Ghana	21
Non-governmental organizations and Final beneficiaries (fisheries: fishermen, fish mongers, trawlers)	13
Development partners	10
Other	8
TOTAL	**82**

Most focus group discussions (FGD) and key informant interviews (KII) followed the preliminary check list prepared for the inception report (Annex 7). Some KIIs were conducted through Skype and some questions sent and answered through email.

Data analysis and triangulation: The team went through the interview and discussion notes to find out about misunderstandings and contrasting views. A short presentation for the wrap-up meeting with the Deputy Director General of the GMA and the VTMIS coordinator was prepared for the last day of the visit in Ghana. Some of the findings were contrasted by the GMA and were thereafter rechecked by the team. In particular, the management of GMA did not agree on technical problems with e.g. radars, CCTVs and Internet connections the evaluation team presented. They also disagreed about the coordination problems between GMA and the stakeholders with Monitoring Stations, which resulted in delays in maintenance services and lack of a coordinating body for vessel traffic surveillance and monitoring issues. The evaluation team received additional information in GMA that surveillance and monitoring issues are discussed in the board of GMA, which should be seen as a coordinating body. Another issue, which GMA management did not agree on, were delays in receiving information on monitors on vessel position and movements via VTMIS. This problem was described in one of the control centres. The problem is most likely caused by delays in telecommunication connections between towers and the control centres.

For triangulation purposes, the information was cross checked through several interviews and written material. The aim was to avoid anecdotal information and present only findings that are supported by more than one informant. When the information is based only on the views of only one interview, it is mentioned in the text.

Limitations and deviations from TOR

Absence of a project document and a result- based framework to guide in assessing the project achievements: The feasibility study offered a technical solution to the problem of limited safety and lack of surveillance in the Ghanaian cost and offered a solution, which was composed of hardware, software and training of GMA staff. The list of equipment, which were planned to be installed was given in the Feasibility Study (Ghana Maritime Authority (2009) and the Government of Ghana – Eltel Contract (Ghana Maritime Authority (2010). There was, however, no document that would have provided a final set of equipment and the contents of training to be offered by the Finnish companies. The Commissioning Report (GMA 2013) listed only the deficiencies found during the commissioning. Also, it was not completely clear what was to be the outcome of the project (apart from the VTMIS system in place) and what were all the expected impacts. The baseline situation, including the set-up in the stakeholder organizations who received monitoring stations, was not described and there was no certainty of assumptions behind the expected results.

Challenges in reaching stakeholders in Ghana. The hierarchy and bureaucracy in GMA made it complicated to arrange meetings with stakeholders in other government organizations. The direct contact of MFA with the Ministry of Finance and Ministry of Transport in Ghana, well before the evaluation started, would have eased the access of team to other stakeholders in the country.

Limited availability of archived materials from MFA, Eltel, Navielektro and GMA: No final report was prepared, which would have listed all the provided material and equipment, the kind and duration of training and the names of trained personnel. To assess the number of trainees, Aboa Mare could only provide two lists of people who participated in the training in October 2014. The MFA files contained very few documents and little support to understand the differences between the feasibility study and the actual project implementation. MFA had not ordered an audit of the project. Despite promises, GMA was not able to send the team any documentation, reports or statistics about VTMIS project implementation or impact.

Triangulation: The team tried to triangulate all the data but sometimes it was impossible to find other references than the opinions and anecdotes given by GMA or other government staff. In these cases, the team has tried to approach the issues from different angles and express the differing ideas.

2. Description of the Context and the Evaluated Project

2.1. Description of the broader context

General context

The VTMIS project is part of Ghana´s response to the security threats in the whole Gulf of Guinea (GOG), where crucial economic activities needed guarding in the worsening security situation of mid-2000s. The construction of the West Africa Pipeline, providing Ghana gas from Nigeria, was completed in 2008 while the development of Ghana´s own offshore oil fields started during the same period. Also, the fisheries sector was increasingly affected by illegal, unreported and unregulated (IUU) fishing, and drug trafficking was becoming a big issue in West Africa.

Ghana is widely regarded as the most stable state in West Africa and it is often the first step in the West African market for companies entering the African market[1]. Country´s location, natural resources and a relatively functional regulatory environment attract foreign companies. Potential for economic growth is significant, particularly in the shipping, logistics and offshore services sectors. Ghana has focused on improving the transport infrastructure from ports to border regions (and from there to Burkina Faso, Mali and Niger) by upgrading Tema and Takoradi ports, the road network, railway system and transport on Lake Volta. The idea of transforming Ghana into a maritime hub of West Africa was introduced in mid-2000s with the idea of making the country's territorial waters friendly to vessels moving in and out of its domain, reducing congestion and cost of operations at the nation's sea ports and ensuring that the security and safety of people and cargo moving in and out of Ghana's maritime territory is guaranteed[2].

Ghana's Gross Domestic Product (GDP) per capita is about double that of the poorest West African countries, but the country still receives wide international financial and technical support. Ghana's high economic growth has deteriorated significantly in the past few years: the deterioration of fiscal and monetary discipline has resulted in a rebound of debt, a deterioration of the external balance, and a decrease in public investment[3]. In 2015 Ghana had to rely on the International Monetary Fund (IMF) USD 918 million loan program.

Energy sector

The construction of the West African Pipeline had been proposed by the Economic Community of West African States (ECOWAS) in 1982 to supply Nigerian gas to West African countries. The construction began in 2005 and the supply of gas in Ghana started in 2008. There are altogether four regulating and metering stations at Cotonou (Benin), Lome (Togo) and Tema and Takoradi (Ghana). The pipeline has been important for Ghana, which until 2008 relied mostly on hydroelectricity. During the construction phase in 2006-07, the submerged pipeline was badly damaged off the coast of Benin by a vessel's anchor. Fortunately, at the time of the accident, the pipeline was not in operation, which prevented a major environmental catastrophe[4].

In June and August 2007, the UK-based firm Tullow Oil, and its US partners Kosmos Energy and Anadarko Petroleum, announced two significant oil discoveries off Ghana's coast, containing up to three billion barrels of oil. The site is known as Jubilee Field and the first production of oil began in 2010 by the Texan firm Kosmos in collaboration with Tullow, Anadarko and the state-owned Ghana National Petroleum Company (GNPC). In September 2010, Tullow Oil announced its discovery of between 70 million and 550 million barrels in the Owo field, located nearby the Jubilee Field[5]. In 2017 the production amounted to around 100,000 barrels of oil and 80 000 cubic feet per day of natural gas. In addition to the Jubilee Field, the GNPC has allowed rights to develop an additional 16 potential oilfields in Ghana. Domestic companies have a limited experience in the field of oil and gas, and the technical services to the offshore operators are lacking.

Maritime security

The security threats in the Gulf of Guinea are multiple and diverse, ranging from piracy, kidnappings and armed robbery at sea; to the trafficking in drugs, human beings, timber, arms and waste; as well as wide-spread illegal, unreported and unregulated (IUU) fishing and oil theft. Reliable data are hard to come by. The World Bank, for example, estimates that USD 350 million in the region is lost to illegal fishery each year[6]. The ocean economy — which includes shipping, fisheries and aquaculture, oil and gas production — is a major

[1] https://www.marketopportunities.fi/maailman-markkinat-20172018-ghana
[2] http://ghanatrade.com.gh/Trade-News/ghanas-maritime-hub-concept-gets-us35m-boost.html
[3] Bawumia and Halland, 2017
[4] GMA, 2008
[5] http://www.commerceghana.com/investment/oil-gas
[6] https://GoGIN.eu/index.php/news/?lang=en

source of value, employment and economic development for coastal nations. Around 90 % of Ghana´s trade transport takes place through the Atlantic ports of Tema (Accra) in the east and Takoradi in the west.

Piracy increased considerably in the GOG area after the oil development in Nigeria and the resulting economic, social, and environmental conditions in the Niger Delta. The citizens of this region depend mainly on oil income, yet – due to government perversion and profiteering – only a small percentage of the revenue reaches the local residents. Unemployment and the lack of economic opportunities encourage many to turn to piracy as a means of livelihood[7]. The usual modus operandi for pirates is taking control of the ship late at night, disconnecting the ship's communication and AIS, steering the vessel towards an isolated area to sell the cargo and then abandon the ship, without harming the crew members. In response to the rising maritime threat, the Economic Community of Central African States (ECCAS) developed an incorporated Strategy for Maritime Security (ISMS) in 2008, which called for a common regional framework for regulating maritime activities of Central Africa. In 2009, it stimulated the Regional Coordination Centre for Maritime Security in Central Africa (CRESMAC) in Pointe-Noire, Republic of Congo.

Currently a draft Maritime Security Strategy exists in Ghana and the Gulf of Guinea Interregional Network (GoGIN) initiative, supported by European Union and Denmark, is facilitating it finalization. GoGIN was launched in December 2016 by the EU[8]. The framework for cooperation on maritime matters in West and Central Africa rests on the Code of Conduct on the repression of piracy, armed robbery against ships, and illicit maritime activity in West and Central Africa, adopted at the June 2013 Summit of Heads of State in Yaoundé, Cameroon.

Participants in GoGIN involve the national administrations of maritime matters and the maritime crisis response organisations of the 19 coastal countries, as well as the Gulf of Guinea Commission (GGC) and two regional institutions that together also include six landlocked countries: the ECOWAS and ECCAS. GoGIN aims to improve safety and maritime security in the GOG by supporting the establishment of an effective and technically efficient regional information sharing network. The focus is on developing joint planning, coordination, communication and information technology (IT) infrastructure among national and regional officials and institutions.

Ghana is part of the ECOWAS Maritime Security Architecture, which has grouped the countries from Cape Verde down to Angola in Maritime Cooperation Zones (Figure 1) as a result of 2013 Yaoundé Code of Conduct Concerning the Repression of Piracy, Armed Robbery Against Ships, and Illicit Maritime Activity in West and Central Africa. The Multinational Maritime Coordination Centre (MMCC) of Zone F is in the Christiansborg castle in Accra, where officers from Ghana, Ivory Coast, Liberia, Sierra Leone and Guinea will share data sent from maritime authorities of each county and coordinate their actions. The technical / communication equipment (Sea Vision, HF, VHF, satellite phone etc) has been delivered by Germany in 2018[9].

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[7] Fattah, 2017

[8] https://criticalmaritimeroutes.eu/projects/GoGIN/

[9] Dieng, 2016; www.ecowas.int › News › ECOWAS Info

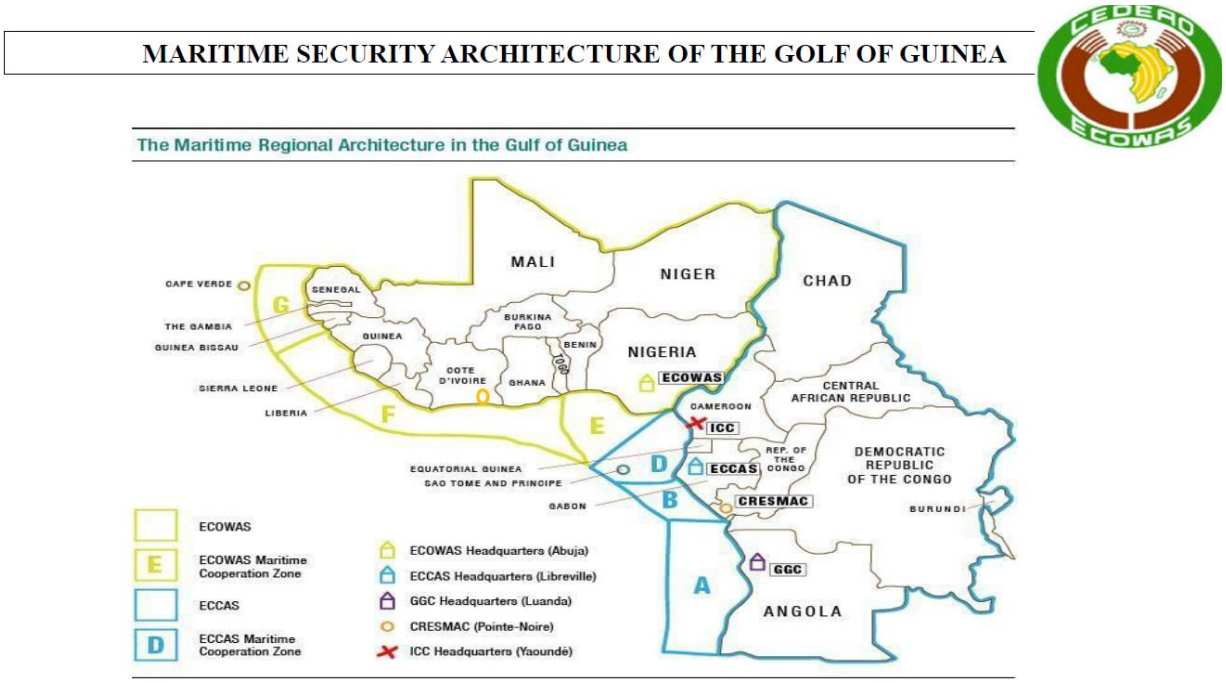


Figure 1: ECOWAS Maritime Security Architecture/cooperation zones, Gulf of Guinea (Dieng 2016)

The following key Ghanaian government agencies are involved in the maritime security management:

- ✓ Ministry of Transport (Ghana Maritime Authority)
- ✓ Ghana Port & Harbours Authority
- ✓ Ghana Shippers Authority
- ✓ Volta Lake Transport
- ✓ Environmental Protection Agency
- ✓ Ghana Institute of Freight Forwarders
- ✓ Ghana Association of Marine Surveyors
- ✓ Ghana Navy
- ✓ Fisheries Commission
- ✓ Regional Maritime University

The main agency which oversees maritime security issues in Ghana is GMA. The main strategies for mitigation of the threats as defined by the Centre for strategic and defence studies of Ghana are the following[10]:

- ✓ Preparedness and capacity, including the Vessel Traffic Management Information System (VTMIS) for continuous electronic surveillance of Ghana's maritime space with remote sensors built with the capacity to detect and identify ships and boats on the high seas.
- ✓ Enhancing inter- agency cooperation.
- ✓ The Adoption of an Automatic Identification System (AIS) for vessels/ crafts operating on the shores of Ghana. This strategy also involves the adoption of a Long Range Identification and Tracking system (LRIT).
- ✓ The adoption of a deliberate and comprehensive security architecture that involves the Navy, Marine Police, Maritime Authority, the Army, the Interior Ministry and other allied institutions.
- ✓ Strengthening the capability of the security forces to increase patrols and surveillance on regular basis using the right equipment and tools in the right measure.

[10] Appiah, Ayiku, Dickson and Appiah-Denkyira, 2017

- ✓ The adoption of a Master Security Plan containing onboard defensive measures; which includes a compulsory presence of armed security aboard vessels, mandatory modern technology tracking and monitory devices.
- ✓ Discipline within the forces and a resolve to stump out corruption.

Fisheries

Marine fisheries play a significant role in the economies of West African countries. However, most of resources are under threat and the potential for growth, employment and budget revenues in the countries are far from being realized. These are the results of weaknesses in the governance system, including weak monitoring, control and surveillance (MCS) and enforcement capacities, and high incidences of IUU fishing, particularly within industrial fishing operations. Industrial fishing operations in West Africa involve tuna vessels, trawlers and artisanal fishermen targeting small pelagic fish[11]. Almost all of Ghana´s marine fish stocks and many inland fisheries have been severely over-fished, and the country is now forced to import almost half of all fish consumed[12]. Population growth, competition of artisanal fisheries with foreign trawling vessels and unsustainable fishing practices are all factors behind this development.

Most of IUU fishing within industrial fishing operations relates to vessels operating with false or forged documents (e.g. vessel registration certificates, fishing licenses, catch certificates), vessels practicing the whitewashing of illegal fish through transshipments (saiko), and vessels operating in inshore zones (Inshore Exclusion Zone, IEZ, depth less than 30 meters) reserved for artisanal fisheries.

Data from the United States Agency for International Development (USAID) shows that Ghana's fisheries sector generates over USD 1 billion in revenue each year and contributes significantly to national GDP, which a decade and half ago stood at 4.5 percent. The economic losses resulting from IUU fishing could be close to USD 1.3 billion per year in West Africa. Originally "saiko" was an informal trading system, where unwanted bycatch would be exchanged at sea for fruit and livestock brought by canoes. Now industrial trawlers are deliberately, and illegally, catching fish that coastal communities rely on, and selling it through "saiko" for an increased price. Due to declining fish populations and competition from trawlers, small-scale fishers are increasingly driven to illegal measures to compete.

The specific MCS tools used in Ghana are VMS and AIS monitoring (24/7), sea patrols, sea observer programs, land and beach patrols, port inspection, vessel register, catch declaration, catch certification, entry and exit declarations by foreign vessels, designated ports and aerial surveillance. There is an inter-agency collaboration in MCS activities and the agencies involved include the Fisheries Commission, Ghana Navy, Ghana Policy, Ghana Air-force, National Security, Ghana Ports and Harbor Authority, Ghana Maritime Authority and Ghana Customs. In 2014 EU presented a yellow card on Ghana fisheries and threatened to ban the importation of Ghanaian fish to the EU. Ghana then developed a National Plan of Action to combat IUU (2014), and together with a Fisheries Management Plan (2015 – 2019) and Fisheries Inspection Plan (2015) it was able to convince EU to lift the ban.

Boat and canoe owners are organized into associations including: boat owners associations, canoe owners´ associations, inshore fishing association, Ghana National Canoe Fishermen Council (GNCFC) and the Ghana National Fishermen Association (GNFA). The Ghana National Fish Processors and Traders Association (NAFPTA) has generated momentum to strengthen community level organizations. The national association's goal is to improve the voice of women fishmongers and processors. The hope is to allow women to contribute to the management of the fisheries sector.

[11] Seraphin, Copeland, Bjoru, 2017
[12] Environmental Justice Foundation, 2017

In June 2018 the Ghana National Canoe Fishermen Council and the National Fish Processors and Traders Association, representing the fishers, presented a ten-point communiqué to the Ministry of Fisheries and Aquaculture Development[13] to call for a number of measures which will help the country's struggling fishing industry: stricter penalties for fishing with light, chemicals and explosives; mitigation of impacts from offshore oil development; an end to the damaging "saiko"; empowering local communities to enforce fisheries law at the local level; compensation for damage to fishing gear due to trawler activity; and consultation of fishing communities in management decisions.

Development partners active in maritime security and fisheries sector

European Union (EU) has funded the *GoGIN* initiative since 2016. The long-term aim of the four-year, EUR 9.3 million program is to support peace, stability and economic and human development throughout West and Central Africa. The project supports 19 countries across the Gulf of Guinea in the implementation of the Yaoundé Code of Conduct and process. To that end, GoGIN works to improve regional capacity for dialogue and coordination in the maritime domain. The objectives will be achieved through concrete activities to support inter-sectorial coordination, as well as inter-regional maritime steering and dialogue.

EU is also supporting the *Far Ban Bo* project which is a four-year fisheries governance project being implemented by a consortium of three NGOs —CARE (the lead), Friends of the Nation (FoN) and OXFAM— in collaboration with key fishery stakeholders, smallholder fishery associations and Fishery Commission. The project is designed to address the challenges of overfishing and unsustainable fishing, including IUU fishing, low compliance and weak capacity for law enforcement within the sector. It targets coastal fishing communities in 30 districts in the Western, Central, and Greater Accra Regions, focusing on tenure rights security for fish landing sites and pilot mechanism for grievance and dispute resolution among the fisher groups. The overall objective of the project is to contribute to sustainable fisheries management and to improve food security and nutrition, and the livelihood of smallholder fishers and other users of fisheries resources— with emphasis on improved fisheries governance.

Environmental Justice Foundation (EJF), with funding from the European Union, produces reports, films and investigations on Ghanaian fisheries sector gathering evidence on illegal fishing.

USAID funds the five-year Ghana *Sustainable Fisheries Management Project* (SFMP - October 2014 -October 2019). The project has the objective of rebuilding marine fisheries stocks and catches through the adoption of responsible fishing practices. It works closely with Ghana's Ministry of Fisheries and Aquaculture Development (MOFAD) and the Fisheries Commission. It aims at the following intermediate results:

- ✓ Improved legal enabling conditions for co-management, use rights;
- ✓ Strengthened information systems and science-informed decision-making;
- ✓ Increased constituencies that provide the support needed to rebuild fish stocks;
- ✓ Implementation of applied management initiatives for targeted fisheries ecosystems.

The Coastal Resources Center (CRC) at the University of Rhode Island's Graduate School of Oceanography is the lead implementer of the SFMP and it works in consortium with other international and local partners, such as SNV. The project includes actions to reduce child labor and trafficking in the Central Region of Ghana, a main source area for child labor and trafficked children.

US Navy continues to support Ghana Navy through equipment and training. For example, in 2015 training in tactical intelligence was conducted to improve the capabilities of the Ghanaian Maritime Law Enforcement and Naval Intelligence to combat narcotics smuggling and terrorist activity. Ghana Navy and Fisheries

[13] GNCFC & NAFPTA 2018

Commission have provided software and hardware to operate SeaVision, a Google Maps based marine vessel visualization tool.

World Bank supports the government of Ghana through the first phase of the *West Africa Regional Fisheries Program* (WARFP) in (i) strengthening country's capacity to sustainably govern and manage the fisheries; (ii) reducing illegal fishing; (iii) increasing the value and profitability generated by the fish resources and the proportion of that value captured by the country; and (iv) developing aquaculture. There are five components to the project: good governance and sustainable management of the fisheries; reduction of illegal fishing; increasing the contribution of the fish resources to the national economy; aquaculture development; and regional coordination, monitoring and evaluation and project management. The funding of WARFP is through the IDA credit of USD 50,3 Million and Global Environment Facility (GEF) Trust Fund Grant of USD 3.5 Million. The program has supported MCS in Tema to improve monitoring with VMS equipment and training together with high number of AIS and transponders that were initially purchased with WB loan and grant.

Norway has supported Ghana through the "TMT Fisheries Intelligence and MCS Support in West Africa". Also, Norway supports the marine research vessel Fridjoft Nansen, which conducts marine surveys. The result of the 2016 survey was the estimate of declining biomass for small pelagic stocks, noting a possible collapse of the sardinella stocks (Nansen 2016). Norad supported project 'Fisheries Intelligence and MCS Support in West Africa', in cooperation with relevant organizations and the countries themselves. The approach underpinning the project rests on the sharing of intelligence and information between fisheries enforcement officers, technical experts, regional organizations and other regional and global players, supported by practical tools, to spur enforcement actions against illegal fishing operators to help reducing illegal fishing in West African coastal waters. The project is implemented by TMT, in close cooperation with and support from Stop Illegal Fishing and the Fishery Committee for the West Central Gulf of Guinea (FCWC). The target 'Task Force' countries are Ghana, Cote d'Ivoire, Nigeria, Liberia, Togo and Benin.

2.2. Intervention being evaluated

Project set-up and technology

The project consists of an integrated Vessel Traffic Management Information System (VTMIS), which aims at improving safety of navigation, control and monitoring of the traffic within waterways, protection of the environment, simplifying of port traffic planning and overall surveillance in Ghana. The technology is designed and installed by Navielektro Ky, which acted as a sub-contractor to the main project contractor Eltel Networks Corporation.

Ghana Maritime Authority (GMA) is the project owner and responsible for the operation and maintenance of the system. GMA was established under Act 630 of 2002. It is charged with the responsibility of monitoring, regulating and coordinating activities in the maritime industry, headed by a Director-General (DG) with a thirteen (13) member Governing Board made up of mainly institutional representatives from the key maritime agencies. The vision of the GMA is to become a premier maritime administrator in West and Central Africa, promoting national and international maritime development; while the mission is to create a harmonious and enabling environment within the maritime industry which will ensure the provision of safe, secure and efficient shipping operations in the seas and inland waters of the country. GMA is also aiming to protect the marine environment from vessel and other sources of pollution and it oversees the training, engagement and welfare of Ghanaian Seafarers. To finance its operations, GMA imposes of maritime safety fees and charges on installations, ships, pipelines, cables and other assets employed in the maritime domain.

The technology provided under the VTMIS project consists of eight Remote Sensor Sites (RSS), three Remote Base Stations (RBS), one manned National Control Centers and three manned Area Control Centers (ACC) and ten Monitoring Stations (MS).

The RSSs are equipped with various sensors for detecting vessels and boats. The sensors are radars, an Automatic Identification Systems (AIS), and Closed Circuit TVs (CCTV). RBSs are equipped with AISs. The project includes also systems for the reception of both AIS and LRIT messages. This data, with added information from coastal radar, will enable Ghana to track and monitor all vessels in its waters, and to a considerable distance out to sea.

The project established eight RSSs along the Ghanaian marine coast-line aiming at full coverage of the marine coastal area, and three RBSs by Lake Volta. Meteorological sensors were installed at the RSSs, to provide local weather data from the sites to the control centers. Table 3 provides a description of facilities and technology and their use:

Table 3: Description of project technologies and faciliites, and their use

Technology	**Use**
VTMIS National Control Centre (NCC)	VTMIS control station, which is coordinating VTMIS operations in Ghana.
VTMIS Area Control Centers (ACC)	Ghana is divided to two VTMIS areas, which are responsible of the VTMIS actions in dedicated sectors.
Monitoring Station (MS)	Workplace where information provided by VTMIS can be used.
Remote Sensor Station (RSS)	Tower for Coastal Surveillance where all the necessary VTMIS equipment are installed.
Remote Base Station (RBS)	Tower at Lake Volta area where all the necessary VTMIS equipment are installed.
Automatic Identification System (AIS)	Both a transmitter and receiver at the same time. You can see other AISs and they can see your AIS. AIS-signal can be received also by antenna and it can be shown in a monitor – like it is done in VTMIS centers. According to IMO's rules all ships of 300 gross tonnage and upwards engaged on international voyages and cargo ships of 500 gross tonnage and upwards not engaged on international voyages and passenger ships irrespective of size shall be fitted with AIS.
AIS for AtoN (Aid to Navigation)	A transmitter, which sends messages that can be received by AIS e.g. in a beacon that is designed to be installed on navigational hazards, offshore wind farms, oil and gas platforms/pipelines etc. as well as fixed or floating aids to navigation such as buoys and markers, further enhancing their operation by alerting any AIS equipped vessels that are within range.
Long Range Identification and Tracking system (LRIT)	A transmitter in a ship, which is used only in security related maters. It not for discussions, but only to send automated information. LRIT is a mandatory requirement for the following ships on international voyages: passenger ships, including high-speed craft; cargo ships, including high-speed craft, of 300 gross tonnage and upwards; and mobile offshore drilling units. According to the SOLAS regulation LRIT establishes a multilateral agreement for sharing LRIT information for security and search and rescue purposes, amongst SOLAS Contracting Governments, to meet the maritime security needs and other concerns of such Governments.
Very high frequency radio (VHF)	Commonly used at ships for ship to ship and ship to shore communication, when operating near coastline (max. 60 miles from coast). VHF is regulated by ITU and IMO
Digital selective calling (DSC)	Standard for sending pre-defined digital messages via the medium-frequency (MF), high-frequency (HF) and very-high-frequency (VHF) maritime radio systems
VHF with DSC Base Station	A VHF receiver, which is capable to receive VHF DSC signal.

Medium frequency radio (MF)	Commonly used at ships when operating outside the coastline (between 60-200 miles from the coast). MF is regulated by ITU and IMO
MF with DSC Base Station	MF receiver, which is capable to receive MF DSC signal.
The Global Maritime Distress and Safety System (GMDSS)	An international system which uses improved terrestrial and satellite technology and ship-board radio systems. It ensures rapid alerting of shore-based rescue and communications authorities in the event of an emergency.
GMDSS Control Centre	The center where all the operations related to GMDSS is performed.
MRCC	A rescue co-ordination center is a primary search and rescue facility in a country that is staffed by supervisory personnel and equipped for co-ordinating and controlling search and rescue operations. Regulated by IMO.
Meteorological Sensors	Usually provide information about wind speed and direction, and temperature to VTMIS centers and other bodies needing the information. This information can be utilized and shown by using AtoN.
Hydrological Sensors	Usually measures the height of the sea level, which is an important information when ships are coming to a harbor – whether there is deep enough. This information can be utilized and shown by using AtoN.
Close Circuit Television Camera (CCTV):	Also known as video surveillance, is the use of video cameras to transmit a signal to a specific place, on a limited set of monitors.
AIS Class A and B transponders	Ship installed transponders, which are sending AIS information. Type A is IMO approved. Type B transponders are typically used by pleasure crafts.
Microwave Link	Telecommunication equipment, which is used in the VTMIS in Ghana to supplement the Internet link. Microwave link is used, if the internet link is not working. This should ensure continuous communication between VTMIS towers and centers.

Training

Originally the training was planned only for GMA staff but as the design of the project changed to give more importance to other stakeholders operating in monitoring stations, also their personnel was able to participate in the courses organized in Ghana.

According to the feasibility study, the project was to provide overseas training to eight GMA staff for 15 days at Navielektro facilities in Finland and four local training sessions were to be organized in Ghana for 16 staff for 20 working days (four weeks). In addition, Navielektro was to supply GMA with manuals on installation of VTMIS Network, installation of AIS Base Station, using the AIS Base Station and installation of Radar Antenna and Transceiver and AIS for AtoN unit.

According to the feasibility study, the training was to be organized in five different phases:

- ✓ Training in Finland for 15 days to 8 GMA staff
- ✓ Training in Ghana in four stages:
  - Stage 1 – Immediately after SAT and Project Commissioning;
  - Stage 2 – Undertaken 4 months after Site Acceptance Test (SAT);
  - Stage 3 – Undertaken 10 months after SAT
  - Stage 4 – Undertaken 15 months after SAT

Timeline

In 2006, Zeni Lite Group and Navielektro Ky installed a complete Port Control System (PCS) system for the Ghana Ports and Harbour Authority (GPHA) at the Port of Tema and the Port of Takoradi. In 2008, Ministry of Transport of Ghana submitted a proposal for the Government of Ghana about a wider system, which would make it possible to survey and monitor the whole marine coastline of Ghana.

In September 2008, Finnvera received a Guarantee Application and VTMIS Feasibility Study from BNP Paribas (Belgian bank) on behalf of Zeni Maritime Technology Oy, which is a Finnish company and owned by Zeni Lite Group in Japan (see Figure 2).

In October 2008, a Memorandum of Understanding (MoU) was signed between the Ministry of Finance and Economic Planning of the Republic of Ghana (MFEP) and Ministry for Foreign Affairs of Finland (MFA) and during the same month a Preliminary Assessment for the project was made by Ramboll Finnconsult Oy. Based on the results of the Preliminary Assessment, in July 2009, a revised Feasibility Study (FS) was delivered. Ramboll Finnconsult Oy appraised the FS in November 2009 and recommended that the project should receive Finnish CSS financing.

In April 2010, Zeni Maritime Technology, which was expected to be the contractor in the project, informed the MFA that it is not able to execute the "Anti-bribery declaration and subcontracting undertaking of the Exporter". The project, without changes, was transferred to Eltel Networks Corporation in August 2010 and in January 2011 the contract between the Government of Ghana and Eltel Networks Corporation was signed. The MFA approval for the interest subsidy was received in March 2011.

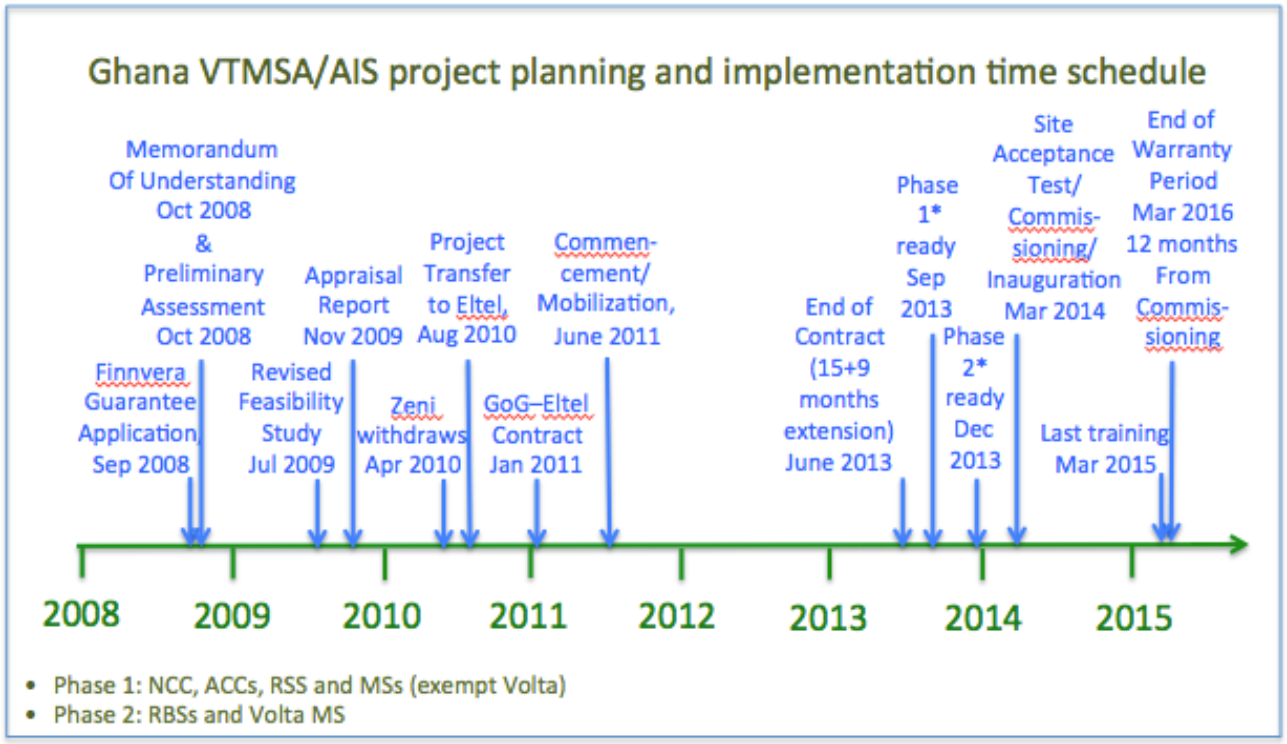


Figure 2: Planning and implementation timeline of the VTMIS/AIS project

The commence date of the project was June 27th 2011. The construction and installation of the project was implemented in two phases:

- ✓ Phase 1
  - Establishment of National Control Center (NCC)
  - Establishment of Area Control Centers (ACC)
  - Remote Sensor Sites (RSS)
  - Technology
  - Factory Acceptance Test (FAT)
  - Design and engineering
  - Installation & Commissioning per site
  - Shipping & Transportation
  - Monitoring Stations (MS)

- ✓ Phase 2
  - Monitoring Center in Lake Volta
  - Remote Base Stations for Lake Volta
  - Installation & Commissioning per site

The contract time was 15 months. Due to some delays the contract was extended first by six months and later by three months. Hence, the total contract time was two years (24 months). Based on the contract and the extensions the contract ended officially in June 2013. However, the work continued and the customer accepted payments until all the works stated in the contract were finalized. The financing contract (GRA - BNP Paribas Fortis SA/NV and Finnvera) required extension twice during the project – this is usually a simple and routine procedure.

Phase 1 was finalized in September 2013 and the Phase 2 in December 2013. Eltel and Navielektro carried out the contract based on official commissioning in June 2013, where a list of deficiencies was made. GMA organized another commissioning, Site acceptance test (SAT) and inauguration in March 2014. This day was the basis for the warranty period. The President of Ghana John Dramani Mahama was the main speaker in the inauguration and the event received a lot of attention in the Ghanaian and regional media.

The last training was organized in March 2015, as per contract: based on the contract between GoG and Eltel all the training was to take place within 15 months from the SAT.

Based on the contract, the warranty period of Eltel products and services was 12 months, which ended in March 2015.

Financing

The project was financed through the Finnish Concessional Credit (15 year loan, guaranteed by Finnvera and interest subsidy by the MFA), see Table 4. The total credit for the project was EUR 17,7 million including 100% of the contract price EUR 16,6 million and EUR 1,1 million Guarantee Premium, which was 6% of the credit, for Finnvera. Finnvera guarantees the loan repayment for the lending bank. The borrower was the Ministry of Finance & Economic Planning (MFEP) of Ghana and the buyer was the GMA while the lending bank was the Belgian bank BNP Paribas Fortis SA/NV. The loan payments were made in seven installments by BNP Paribas between the years 2011 and 2014 as a payment of the contract for the contractor/exporter Eltel Networks Corporation and the 6% guarantee premium for Finnvera. The loan repayments by MFEP started in the end of 2015 and they have since continued semiannually. The latest repayment was made on 1st June 2018. The last repayment is scheduled for the end of the year 2027. The MFA pays the interest for the loan outstanding for the lending bank. The interest rate is six months Euribor + 1,3% margin. The MFA pays also the 1,82% per annum Guarantee Premium to Finnvera.

Originally the loan had a three-year (36 months) grace period, but due to delays in the project implementation, the grace period was shortened into one year.

Table 4: Financing of the VTMIS/AIS project

Realized loan related payments and repayments untill mid 2018, estimated payments there after																		
Payment	**Year / thousand EUR**																	
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**Sum**
Loan payment (inlc. 6% g.p.)	2 653	11 589	1 266	2 178														17 687
6% guarantee premium (g.p.)	159	695	76	131														1 061
Contract Price (loan - g.p.)																		16 626
Loan repayments					707	1 415	1 415	1 415	1 415	1 415	1 415	1 415	1 415	1 415	1 415	1 415	1 415	17 687
Loan outstanding	**2 653**	**14 243**	**15 509**	**17 687**	**16 980**	**15 565**	**14 150**	**12 735**	**11 320**	**9 905**	**8 490**	**7 075**	**5 660**	**4 245**	**2 830**	**1 415**	**0**	
Interest						204	164	208	248	219	191	163	134	106	78	50	21	1 785
Guarantee premium 1,82% PA						308	281	253	225	200	174	148	122	97	71	45	19	1 942
Source: Valtiokonttori																		

Non-revenue generation and the origin of the technology

The project does not generate revenues directly for GMA or any other body. However, there are several benefits the project is expected to generate (see Annex 3: Result Framework):

- ✓ Increased revenues from sea, shipping, cargo, etc. related fees for GMA, Ghana Shippers Council and GPHA;
- ✓ Increased revenues for customs;
- ✓ Better controlled fisheries and safety of fishing boats and vessels;
- ✓ Better protected natural gas pipeline and oil facilities;
- ✓ Decreased piracy, smuggling, transshipment and other illegal activities.

There is not yet evidence that these benefits have been realized. However, it is very likely that increased safety and better control of sea traffic generates benefits. Even one avoided major accident for the West African Gas Pipeline or oil infrastructure is likely to generate the benefits to justify the VTMIS project.

In this respect the project complies with the OECD "non-profit generating" requirement.

Based on the calculation made by Eltel after the project, the Finnish content was 55 % (see Table 5). Before the project, Finnvera made the calculation "Description of the origins in the export contract" and ended up with a Finnish content of 62,6%.

Table 5: Finnish content calculation by Eltel after implementation of the project (July 2018)

Projects costs by country of origin	Amount in thousand EUR	%
Cost from Finland	7,3	55
Local costs	4,1	31
Costs from the EU area	0,6	5
Costs from other countries	1,2	9
Total	13,20	100,00

Finnish content is high enough to meet the Finnish content requirement of CCS financing, which is more than 50% of the project costs.

Project Results Framework

The evaluation team constructed an ex-post results framework of the project, in accordance with the MFA's Results-based management (RBM) Guidelines[14]. The framework is presented in Annex 3.

The team thinks that the impact statement could be formulated as *Improved surveillance and management of maritime vessel traffic in the coastal areas and navigable waters in Ghana*, while the outcome statement (the likely or achieved short-term and medium-term effects of an intervention´s outputs) is *VTMIS surveillance system in place in Ghana.* This is the result of three outputs (the products, capital goods and services which result from a development intervention):

- ✓ Output 1. Infrastructure constructed in Atlantic coastal area and in Lake Volta in Ghana
- ✓ Output 2. Technology installed in Atlantic coastal area and in Lake Volta in Ghana
- ✓ Output 3. Capacity of GMA and stakeholder organizations´ personnel improved.

The assumption for the impact of the project is defined as "*Strong commitment by government leaders and other stakeholders"* while the assumptions behind the stated outcome are "*sufficient commitment and funds to maintain and improve the surveillance and management of the maritime vessel traffic"* and *"active stakeholder participation (other government agencies, navy, civil society, private sector)".*

2.3. Stakeholders and their role

This chapter presents the most important stakeholders benefiting of the VTMIS/AIS system.

Ministry of Transport (MoT)	MoT is responsible for the infrastructural development and service delivery in Ghana's transport industry. MoT is the implementing ministry of the VTMIS project, system and operations.
Ministry of Finance & Economic Planning (MFEP)	MFEP promotes the sustainable economic growth and development of the country. It is the signatory of the credit agreement and responsible for servicing the concessional credit provided by the MFA.
Ghana Maritime Association (GMA)	GMA is the implementing agency of the VTMIS/AIS project, system and operations. GMA is operating the National Coordination Center (NCC) and the two Area Coordinating Centers (ACC) – one in Tema and the other one in Takoradi. The main task of the NCC is to coordinate the VTMIS activities. ACCs in Tema and Takoradi are surveying and monitoring the vessel traffic in their areas – Tema in the eastern part of the marine coast and Takoradi in the western part of the marine coast. In the ACCs the operators saw their main task to be to monitor vessel traffic close to the West African Gas Pipeline and the oil facilities in the west and hence protect the pipeline and the oil facilities against accidents and damage.
The Ghana Navy	Navy is responsible for naval warfare within the Ghana Armed Forces and their roles include i.e. the monitoring, control and surveillance of fishing activities; maritime presence in the West African waters and naval support in the region and crises areas when requested; surveillance, effective patrol and control of Ghana's Territorial Waters and Economic Zone; and fighting and checking criminal activities such as piracy/armed robbery at sea, smuggling of illicit drugs, stowaways and dissident activities. Navy Command HQ has VTMIS ACC in Accra. Navy Command West and Navy Command East both have VTMIS/AIS Monitoring Stations (MS).
Ghana Ports and Harbors Authority (GPHA)	GPHA is a statutory corporation to build, plan, develop, manage, maintain, operate and control ports in Ghana. GPHA in Tema harbor has VTMIS/AIS MS to monitor the movement of vessels in the harbor. GPHA in Takoradi does not have

[14] MFA, Results Based Management (RBM) in Finland's Development Cooperation – Concepts and Guidance Principles

	a VTMIS MS, but they have in use the PCS supplied by Navielektro and Zeni Lite Group in 2006.
Fisheries Commission (FC)	FC is responsible for all monitoring, control, surveillance, evaluation, and compliance functions in all areas of fisheries development and management in Ghana. FC has VTMIS MS in Tema, in the monitoring, control and surveillance (MCS) unit. Fisheries Commission in Takoradi does not have a VTMIS MS but instead they operate several similar monitoring systems (Transview, SeaVision).
Ghana Revenue Authority (GRA), the Customs Division.	Customs division is responsible for the collection of import duty, import VAT, export duty, petroleum tax, import excise and other taxes. The division also ensures the protection of revenue by preventing smuggling. This is done by physically patrolling the borders and other strategic points, examination of goods, and search of premises, as well as documents relating to the goods. As a frontline institution at the country's borders, Customs Division also plays a key role in surmounting external aggression and maintains the territorial integrity of Ghana. Customs Division is part of the country's security network. The Customs Division has a VTMIS MS in Accra.
National Security Agency (NSA)	NSA is responsible for security in Ghana. They have a VTMIS MS in Accra Head Quarters. However, the MS has not been operational for about two years.
Narcotics Control Board (NACOB)	NACOB is the agency concerned with the formulation and enforcement of narcotics laws in the country. The board's work is aimed at preventing the use, import, and export of narcotics. NACOB has a VTMIS MS in Accra to monitor the movement and origin of vessels and to detect suspicious behavior.
Volta Lake Transportation Company Ltd (VLTC).	VLTC operates river transportation for passengers, bulk haulage of petroleum products and significant quantities of cement, and cross-lake ferry services along the Volta Lake. VLTC has a VTMIS MS in Akosombo. However, the MS has never been operational, as there have never been transponders in boats and ferries in Lake Volta
Marine Police Unit (MPU)	MPU handles issues that arise from the country's offshore oil and gas industry. The Marine Police Unit has a VTMIS MS, originally meant for the Regional Maritime University.
Ghana Immigration Service (GIS)	GIS advises on and ensures the effective implementation of all laws and regulations pertaining to immigration and related issues. GIS has a VTMIS MS to monitor the movement of suspicious vessels.
Regional Maritime University (RMU)	RMU in Accra is an international tertiary institution. The overall objective of the establishment of RMA was to promote regional co-operation in the maritime industry focusing on the training to ensure the sustained growth and development of the industry. RMU was expected to receive VTMIS/AIS MS for teaching purposes but instead, another similar type system was established for the university and the MS was transferred to the Marine Police Unit.
West African Gas Pipeline Company (WAPCO)	WAPCO benefits from increased safety and security around the pipeline. Monitoring of the safety of the pipeline has improved significantly with the VTMIS. The Company does not have a connection to the VTMIS but they have expressed the interest to have their own MS.
Private oil and gas companies in Ghana	Safety and security are the necessary conditions for the operations of private oil and gas companies in Ghanaian costs. The oil companies do not have direct connections to the VTMIS/AIS system, but Navy HQ runs another monitoring system for the Tullow oil company and for the safety of their oil facilities, based on monitoring boats.
Shipping industry in Ghana	Shipping industry benefits of the increased monitoring and safety in sea traffic.
Fishing industry, fishermen and fishmongers in Ghana	Fishing folks will benefit from improved monitoring which is expected to reduce illegal fishing activities and increase the safety of especially small fishing boats and canoes.
Navielektro ky	Navielektro was the main supplier of the VTMIS technology to Ghana.
Eltel Networks Corporation (Eltel)	Eltel is a European company, which builds and maintains infrastructure networks. It was the contractor for the VTMIS between Navielektro and GMA. They handled

	the transport of equipment and materials and they were responsible for building the RSS and RBS in coastal locations.
Zeni Lite/Zeni Maritime Technology Oy	Zeni Lite was the originator of the project. They conducted the feasibility study with Ghanaian colleagues with the idea of being the contractor for the project. Later they had to withdraw from the project.
Aboa Mare	Aboa Mare is a Finnish training institute, which trains maritime operators. They trained the Ghanaian staff operating VTMIS.
Finnvera	Finnvera is a specialised financing company owned by the State of Finland and it is the official Export Credit Agency (ECA) of Finland. Finnvera gives guarantees against political or commercial risks associated with the financing of exports. The company provided the guarantee for the VTMIS project credit.
Ministry for Foreign Affairs of Finland (MFA)	MFA is responsible for the government development cooperation in Finland. MFA is the responsible organization of the CCS financing programme in Finland. MFA financed/finances the interest and the annual guarantee premium of the VTMIS loan for the Government of Ghana.
BNP Paribas Fortis SA/NV	BNB Paribas is the lending bank, which gave the credit for the Government of Ghana.

3. Key Findings and conclusions

3.1. Relevance

EMQ1. Was the project relevant, including technology provided, particularly for the GMA and other stakeholders involved in the surveillance and management of the maritime vessel traffic?

The vessel traffic monitoring system was very relevant for the needs of Ghana in marine coast, as per the country context described in chapter 2.1. The most important reasons to improve the monitoring of the marine traffic in the coastal waters of Ghana were:

- ✓ to ensure safety of the West African Gas Pipeline;
- ✓ to ensure safety of the newly established oil infrastructure in the western part of the marine coast of Ghana;
- ✓ Government of Ghana wanted to develop maritime traffic and become a maritime trading hub for the whole sub-region of Gulf of Guinea and Western Africa;
- ✓ increased number of foreign fishing vessels and illegal fishing, both of which contributed to overfishing;
- ✓ Government of Ghana wanted to comply with the IMO requirements for surveying and monitoring;
- ✓ development plans to develop Lake Volta transport corridor;
- ✓ safety at the sea required up-to-date meteorological and hydrological data.

However, in Lake Volta area there are very small numbers of larger vessels, which can afford to have a transponder. Transponders are expensive and cannot be afforded by small fishing boats and canoes. Transponder needs also a power source. The AIS transponder-based monitoring system is therefore not justified in Lake Volta area. It is also questionable whether the Lake Volta corridor can be developed in the future into such a transportation corridor that the technology would be justified. The relevance of the investment was questioned already in the appraisal report.

The Finnish VTMIS technology developed by Navielektro Ky is relatively robust and does not need intensive maintenance. In this respect, the level of technology is relevant in Ghana. However, as shown by frequent breaks in the visited sites and stations, regular maintenance is needed to keep the system operational.

The use of the system is easy to learn, which was confirmed by the VTMIS/AIS system operators in Ghana. After the training programme provided by the project the operators were well able to do the basic monitoring.

The monitoring of the vessel traffic for safety of the gas pipeline and oil infrastructure safety can be done relatively effectively with the VTMIS system. However, the monitoring and controlling of illegal fishing, smuggling, transhipment and other illegal activities is different type of activity and would require different approach and different set of skills.

The system was needed in Ghana in marine areas, and the technology is appropriate as it is easy to learn. However, the same technology was not relevant in Lake Volta area. Also the expectations to be able to monitor effectively illegal activities has not realized, as it would have required different approach and set of skills.

EMQ2. Did the project contribute to Ghana's development plans and sector strategies?

While the Ghana Poverty Reduction Strategy (GPRS I), issued in 2003, reflected a policy framework that was directed primarily towards the attainment of the anti-poverty objectives of the UN's Millennium Development Goals (MDGs), the GPRS II (2006-09) was intended to introduce a shift of strategic focus. The central goal of the policy was to accelerate the growth of the economy so that Ghana could achieve middle-income status. During the "Structural Adjustment" policies of 1980s, Ghana´s composition of internal production and external trade remained largely unchanged and for twenty years no new industrial enterprise of any size was established in Ghana. Neither did the farming community adopt any new major crop to add to the list of exports or the staples of domestic consumption (Republic of Ghana, 2005).

The emphasis of GPRS II was on human resources and rural development but there was yet no mention about oil and gas. In 2012, the West Africa Pipeline was severely damaged by the anchor of pirates, who had tried to board an oil tanker to escape the Togolese Navy. For nearly a year, the supply of gas to Ghana, Togo and Benin ceased, causing major power supply problems to the affected countries. Nigerian gas is of significant importance for Ghanaian electricity production although recently, due to increased domestic consumption, Nigeria has not been able to provide all the gas required by Ghana.

In the 2010 Ghana Shared Growth and Development Agenda (GSGDA, 2010) oil and gas development are mentioned as an important thematic area and an area of strategic focus for industrialization. The oil and gas were to provide opportunity for diversification of the economy, as well as capacity development to support the needs of a modern industrial society. Priority policies were focusing on increasing access to petroleum products to support the development objectives of the nation, paying attention to protecting the environment and implementing a transparent revenue management policy to ensure the oil and gas resources benefit Ghanaians.

Ministry of Transport was created in January 2009 and as already then over ninety percent of Ghana's international trade depended on the country's sea ports (Tema in Greater Accra Region and Takoradi in the Western Region), their safety was of primary importance for the ministry. The key objectives of the GSGDA transport sector policies over the medium term were to establish Ghana as a transportation hub for the West African Sub-Region and to transform the Volta Lake Transport system into an effective transport hub. The

Fisheries Act of 2002 had established the Fisheries Commission and entrusting it the task to ensure the monitoring, controlling and surveillance of fishery waters.

The development of oil sector, growing awareness of precarious maritime security in the Gulf of Guinea and the increasing transport from Ghanaian Atlantic ports toward land-locked West African countries such as Mali and Burkina Faso, made the VTMIS project very relevant to the development of Ghana. VTMIS may have also contributed to the GMA to develop safety management on the lake Volta in the future, when the Medium-term Master plan for transportation on the Volta Lake and its surrounding region (2014) will be implemented.

The project contributed to build the foundation of Ghana´s maritime security and paved the way for initiatives such as GoGIN. It responded to the national growth agenda by setting the basis for safety in oil industry and facilitated the expansion of transport in the ports in Tema and Takoradi.

EMQ3. Was the project in line with Finland's development policy objectives and global development goals?

At the time of the VTMIS project design, the main goal of Finland´s development policy (MFA, 2007) was to eradicate poverty and to promote sustainable development in accordance with the UN Millennium Development Goals set in 2000. The eight MDGs were:

Table 6: Millennium Development Goals

The Millenium Development Goals
Goal 1: Eradicate extreme poverty and hunger
Goal 2: Achieve universal primary education
Goal 3: Promote gender equality and empower women
Goal 4: Reduce child mortality
Goal 5: Improve maternal health
Goal 6: Combat HIV/AIDS, malaria and other diseases
Goal 7: Ensure environmental sustainability
Goal 8: Develop a global partnership for development

The importance of economic, environmental and social sustainability, as well as coherence, complementarity and effectiveness are emphasized in the development policy document.

The cross-cutting themes of the 2007 development policy were:

- ✓ promotion of the rights and the status of women and girls, and promotion of gender and social equality;
- ✓ promotion of the rights of groups that are easily excluded, particularly children, persons with disabilities, indigenous people and ethnic minorities, and the promotion of equal opportunities for participants;
- ✓ combating HIV/AIDS; HIV/AIDS as a health problem and as social problem.

According to the Policy Guidelines concerning the Concessional Credit Scheme (MFA 2005), "due to the special nature of the Concessional Credit, it is normally used to support project that, through favourable impact on the economy, social development or the environment, only indirectly contribute to poverty alleviation".

The VTMIS project is hardly in line with the Finnish development policy priorities of poverty reduction, and the feasibility study states that "The project will not have major direct effect on poverty, but its contribution to fisheries protection, vessel safety, avoidance of pollution, and interdiction of drug trafficking will have a beneficial effect on society as a whole and the increase of Ghana's GDP". According to the Appraisal Report "The most direct poverty reduction impact is the improved safety of the fishing industry and its consequent economic benefits." Poverty reduction was not the main objective of the project and its impact on fishing industry has not yet materialized.

Similarly, the alignment with the cross-cutting themes is weak. The project does, however, position itself well by focusing on an area with special Finnish expertise and by promoting security, which is emphasized in the development policy as an important foundation of sustainable development and by stressing "a wider security concept which strengthens the link between security, development and human rights."

The VTMIS project is not directly in line with the Finnish development policy priorities of poverty reduction, nor with the MDGs. However, indirectly the project contributes to them. The alignment with the cross-cutting themes is weak, but it promotes security, which is emphasized in the development policy as an important foundation of sustainable development.

3.2. Effectiveness

EMQ4. To what extent did the project achieve its immediate objective of implementing a VTMIS and AIS and providing the necessary skills/capacity to GMA and other stakeholders to operate and use the systems effectively? Was the quality and quantity in accordance with plans?

Technical capacity

The immediate objective of the project was to set up a VTMIS system and provide the necessary skills and capacity for GMA and other stakeholders to operate the system efficiently.

Table 7 presents all the equipment and stations, which the Government of Ghana – Eltel contract[15] defines to be established and installed. During the project all the listed items were constructed and delivered and nearly all were installed and put into operation.

[15] Ghana Maritime Authority 2010

Table 7: List of facilities, technology and equipment and their costs (Government of Ghana – Eltel contract)

Description	Qty	Unit cost	Total cost
Remote Sensor Site (RSS), marine coast	8	703 700	5 629 600
Remote Base Station (RSS), Lake Volta	3	475 565	1 426 695
GMDSS (VHF DSC)	8	49 076	392 608
GMDSS (MF DSC)	2	205 633	411 266
GMDSS (Control Center)	3	285 698	857 094
LRIT (Data User)	1	138 241	138 241
AIS to AtoN	8	9 364	74 912
Meteorological Sensors	8	14 562	116 496
CCTV	8	101 952	815 616
Hydrological Sensors	8	22 327	178 616
Central Processing Equipment	4	632 714	2 530 856
Workstation & Presentation Equipment	5	165 888	829 440
Monitoring Station	8	29 376	235 008
Class A Transponders	5	6 674	33 370
Class B Transponders	50	1 730	86 500
Training in Ghana	4	155 520	622 080
Training in Finland	1	196 301	196 301
Factory Acceptance Test in Finland	1	55 296	55 296
Design&Engineering	1	190 080	190 080
Installation & Commissioning per site	11	129 600	1 425 600
Shipping & Transposition	11	34 560	380 160
			16 625 835

The pieces of equipment, which were not installed or put into operation were:

- ✓ Hydrological sensors; they were not installed, because GMA was expected to provide the buoys, but never purchased them;
- ✓ Microwave telecommunication links are not working. Allocation of microwave frequency was delayed in the Ministry of Communications. The delay caused problems with overlapping use of the same frequencies by other users and possibly in programming of the microwave devices. The system is not operational. Micro wave link was built to be the reserve communication link in the case the Internet link is not working.

The change of the contractor from Zeni Maritime Technology Oy to Eltel did not change the content of the project. The facilities and equipment supplied and installed were the top technology in the world for vessel traffic surveillance and monitoring. The quality and the quantity were according to the FC and the GoG – Eltel contract. All the interviewed parties were satisfied with the activities of Eltel Networks Corporation and Navielektro Ky.

Training

Navielektro sub-contracted the 13-week training to Aboa Mare Academy and Training Centre, which is a subsidiary owned by the Polytechnic Novia and upper vocational education school Axxell in Turku. Aboa Mare has a lot of course activities related to maritime skills and they have practically trained almost all Finnish VTS operators, as well as many of the Norwegian and Swedish operators. The shipping language is usually English and therefore there were no language barriers.

The training was adapted from the Manual of International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) for VTS training (fifth edition 2012). IALA is a non- profit, international technical association and it accredits international education centres to provide VTS training; Aboa Mare is the only accredited Finnish training institution. Most trainees came from GMA.

Towards the end of 2012 altogether nine Ghanaians (all men) were trained at Aboa Mare for a week in November 2012 and in May 2013 for two weeks. Eight trainees came from GMA and one from Ghana Navy.

The following three one-week trainings were organized in Ghana in May and October 2014 and the final one in March 2015. The total number of GMA trained staff was 19 men, six in each centre (Takoradi and Tema ACC and NCC) plus the Maintenance officer / coordinator. Currently, GMA is recruiting new officers to guarantee the 24/7 presence in all the centres.

According to the trainers, the trained personnel were well motivated, and their basic knowledge was sufficiently good although the diversity of trainees did not make the training easy; for the same reason, some trainees were not able to embrace all the contents of the course. The interviewed Ghanaian personnel were satisfied with the training. Almost everybody complained, however, that the training did not have any content on maintenance.

No women were trained in the use of VTMIS in Finland or in Ghana. In GMA centers no women are employed for the monitoring purpose but in NACOB two of seven officers are women while in Fisheries Commission, Tema, three out of 12 staff monitoring and analyzing data are women.

It was foreseen that software maintenance will require specialist skills, and GMA would identify a suitable employee for the purpose and the candidate would be sent for training in Finland. Also, the feasibility study mentions that some training will be required on maintenance of the radar scanners but no hardware or software maintenance training was organized.

The immediate objective of setting up a functioning VTMIS system was met. The pieces of equipment, which were not installed or put into operation are a relatively small part of the project. The client and other parties were satisfied for the Finnish companies and quality of the installed VTMIS.

The project managed to provide the necessary basic skills and capacity for GMA and other stakeholders to operate and use the systems effectively. The participants were satisfied for the quality of the training but considered it to be too short. However, VTMIS hardware and software maintenance training was not adequate.

EMQ5. What were the key success factors or bottle necks that contributed to the project either achieving or falling short of its objectives?

What was the role/contribution of the different actors (project owner, contractor and other stakeholders including the MFA)?

There was an interest in Ghana to set up VTMIS system. The by-then President of Ghana John Dramani Mahama was the former Minister of Transportation and he had supported the project from the beginning. Zeni Lite Group was behind the project planning and had a committed person doing the planning and Feasibility Study with Ghanaian colleagues.

Eltel Networks Corporation, who was finally the contractor in the project, was experienced in implementing electricity projects in Ghana. They had implemented already seven electricity projects in Ghana before the VTMIS/AIS project.

The VTMIS technology was developed by Navielektro and their system was in use in many areas in the Baltic Sea Region. The technology was tested and reliable.

All the comments about Eltel and Navielektro were positive and stakeholder interviews in Ghana confirmed that both companies did their part of the project well. The delays in the project were not due to them.

Due to bureaucracy in GMA the successful implementation of the project was not easy.

According to the GMA, the failure in installing the microwave technology was due to bureaucracy in the Ministry of Communication. The hydrological sensors were not installed, because the CCS financed contract did not include the infrastructure necessary to install the sensors, which was supposed to be provided by GMA. GMA had a contract with Zeli Lite Buoy Co Ltd. to purchase the buoys, but never paid for them and consequently the buoys were never delivered.

Aboa Mare is an educational institution accredited by IALA for VTMIS training. Their trainers are experienced and have practice in training international students. According to trainers, they did not have contact with the leadership of GMA to discuss the challenges and way forward in the training. Joint planning and understanding would have made it easier to tailor the training for the Ghanaian needs. This could have helped in determining further training needs to update the acquired know-how among the staff of GMA and other organizations.

Another issue reducing the effectiveness of training is the delayed recruitment of officers. Recruitment was conducted continuously in 2013-15 and some officers only benefitted of one course instead of all three organized in Ghana.

High-level support in Ghana facilitated the timely implementation of the project. The project faced some problems with bureaucracy and financing of their part of the project and therefore some important features such as microwave connection and hydrological data cannot be provided by the system. Slow recruitment of officers affected the effectiveness of the training while the lack of contact of project implementers with the GMA leadership limited determining the training needs.

3.3. Efficiency

EMQ6. How efficiently were available resources transformed into intended results in terms of quantity, quality and time - i.e. can the project be deemed to have been good value for money?

Presently the established NCC and three ACCs are working well and the staff is motivated. The MSs were also working well right after the implementation of the project – exempt the MS by the Lake Volta, which was never operating (even if technically the MS may have been operational), because transponders were never installed in ships or boats in Lake Volta. There has never been anything to monitor.

Investment in the VTMIS system on the marine coast has been a relatively good investment and it provides a good basis for monitoring the vessel traffic and to protect the gas and oil infrastructure. However, until now the system in Lake Volta area has not shown to be value for money.

After signing the Government of Ghana – Eltel contract, the project was supposed to commence in three months. However, due to the long negotiation process with the administration of Ghana there was a six months delay in the beginning. The project commenced in June 2011. Factory acceptance test (FAT) was delayed by two months. The monitoring equipment were assembled and ready for FAT in February 2012 (seven months from the commencement as stated in the contract) in Finland, but the delegation of Ghana participating in FAT only arrived in Finland in April 2012 causing the delay.

The customs procedures took six months, when they should have been cleared in a couple of days. GMA wanted to do the customs clearance instead of the Eltel's local partner. The bill of landing was sent to customs without annexes, which proved that the goods are exempted form customs duty. Consequently, the customs required customs duty payment for the goods. Clearing the situation took a long time.

One of the most critical delays was caused by the postponement of constructing the air conditioned NCC house, where the VTMIS computers and servers were expected to be installed. GMA was responsible for the construction. This delayed the project with several months.

Other delays in the project implementation were:

- ✓ Land procurement took longer than expected
- ✓ Receiving the microwave frequency rights took long time in the Ministry of Communication.

Extra works implemented by the contractor Eltel without compensation by request of GMA, included:

- ✓ The RBS towers in Lake Volta were constructed 55 m tall by Eltel instead of 30 m, which was stated in the contract.
- ✓ The houses or cabins for watchmen constructed by Eltel in the RSS and PBS sites were not part of Eltel's contract.

The VTMIS system in Ghana is in many respects a copy of the Finnish one operator system. One organization operates the system and the other organizations receive the services from the operating organization, which is GMA. The one operator system requires that the cooperation between organizations works well. The maintenance service between GMA and the other organizations using the system is not functional. The service is slow and results in interruptions in operations of the MSs.

There were also delays in training overseas (in Finland) because GMA was not able to nominate the training participants. The training was expected to take place immediately after FAT, which was in February 2012, but it was delayed until December 2012 and another training in May 2013. However, there is a positive side in the delay. The trained persons were able to start immediately practising the monitoring with the VTMIS equipment as the system was already installed into operation.

All the project phases were completed by the end of the year 2013 and the training early 2015.

The feasibility study determined that the operators of the systems would need training in the use of the operating work-stations and software and also in system maintenance. The required operator skills would include maritime skills and experience. The GMA and Navy have most staff trained in maritime skills and radio communications. In monitoring stations, the basic training of operators varies a lot; e.g. in NACOB, the staff have diplomas and degrees in most diverse subjects. Therefore, the staff may need quite different kind of training, varying in content and in pedagogics in order to be able to monitor efficiently fisheries and illegalities. The training to maintain the software and hardware of the system was not adequate. In case of frequent staff rotation, the staff in monitoring stations and control centres have mostly received introduction to the system from older colleagues, although GMA is now starting refresher / in-service trainings.

Training was given high importance in the project implementation but the same reasons that limited the effectiveness of training, are also responsible for insufficiency in the efficiency: delayed recruitment of officers with highly diverse skills and limited access to GMA leaders by the Aboa Mare trainers. The tailoring of course contents to respond better to the Ghanaian system was therefore not jointly discussed and developed. Some staff could easily grasp the training, but according to interviews, others were not able to manage IT issues in the same way.

Despite several delays the project implementation it was implemented in a relatively efficient way. Delays in some degree are common in CCS projects. There were no exceptional delays.

Even if the capacity to monitor the vessel traffic and to protect the gas and oil infrastructure was achieved, the ability to effectively monitor the fisheries and illegalities and the adequate capacity to maintain the system were not achieved.

EMQ7. What were the key success factors/bottle necks that contributed/constrained implementation?

Embedding human rights, gender and social inclusion

During the planning phase, the VTMIS project paid limited attention to human rights and gender. The stakeholders listed in the feasibility study cover only government agencies. The feasibility study has a chapter on human rights and social justice, which states that "GMA expects its staff and suppliers to have a natural respect for our ethical standards in the context of their own particular culture" and further describes the way the suppliers should respect these standards and comply with the GMA Ethical Procurement Policy. Gender is discussed only concerning the GMA equal opportunity employment and training policy. The appraisal report mentions gender twice while human rights are not discussed at all, although the Government of Finland 2007 development policy had a strong focus on human rights.

The human rights and gender issues that could have been considered during the planning of the project, include the process of purchasing land for remote sensor sites, closer assessment of how the implementation could have positive impact on gender equality in GMA and other beneficiary organizations and a proper analysis of the assumptions / conditions for a positive impact on human trafficking in Ghana waters.

In two interviews it was told, that the procurement of land and construction of the towers did not always follow the best practices. However, the evaluation team did not receive any evidence of these two cases. In Winniba, the local chief claimed that he was unaware of the process to build the remote sensor tower on the community land and possibly a rent is paid for a private business. In Axim, an interviewed NAFPT representative told that GMA jointly with the oil company Tullow informed the chief and the eldest about the benefits of VTMIS system to attract fish near to the shore. These two cases, although anecdotal, show that the communication during the land purchase process could have been better.

Participation, transparency and accountability are all related to human rights issues. Maybe because of limited institutional memory, there was no recollection in stakeholder agencies of the working group that according to the appraisal report had guided the project development. It was mentioned in several agencies, however, that there had not been any needs assessment before establishing the monitoring stations. This has also reduced the transparency of the project.

During the planning phase, women´s opportunities for employment were mentioned (feasibility study) and the livelihoods of both men and women were to benefit in the fisheries sector (appraisal report). Apparently, the GMA did not emphasize the importance of including both men and women in the training events. No women work at GMA and Navy control centers but other organizations, such as Fisheries Commission and NACOB have employed women in monitoring stations.

The assessment of project´s gender and social inclusion (GESI) shows that in the planning phase the project was still gender aware although not sufficiently to be gender sensitive but the project implementation is considered GESI blind as there is no evidence of paying attention to gender or social inclusion.

3.4. Impact

EMQ8. How well did the project succeed in achieving its overall objective to improve surveillance and management of maritime vessel traffic in Ghana?

A functioning system for monitoring and surveillance of vessel traffic, as well as for exchanging information between the vessels and country´s officials is the foundation for safe and secure marine traffic and trade. The VTMIS provides this system through its AIS, VHF and other functions, which can in the future be complemented by other tools such as satellite imagery and e-navigation tools.

The project did not have a result framework to start with; consequently, no M&E system was established even at the appraisal stage. Such a system would have assisted in monitoring the development impacts and in the evaluation of the project. The evaluation team drafted an ex-post Results Framework with functional impact and outcome statements as well as output descriptions and indicators for all levels. Probably the assumption behind the project impacts was that the VTMIS would assist in detecting any vessel movement on the coast as well as also help in monitoring the artisanal canoes. However, this proved to be more demanding than expected. More systematic analysis of the project with proper indicators, in the appraisal stage, is needed. However, this would require more time and resources for the appraisal process and the appraisal team must have wide and also subject specific expertise in the team.

The following table summarizes the impact indicators and the overall findings of their achievement, followed by a discussion on some of them and their importance and the context.

Impact indicators	Achievement of indicators
Ghana complies with the IMOs international conventions (Safety of Life at Sea, SOLAS and Global Maritime Distress and Safety System, GMDSS)	VTMIS technology, if it worked as expected, would meet the requirements set by IMO for monitoring of the coastal waters. However, at present the system is not working as it should and the information provided by the system is not fully used, and therefore Ghana is not fully complying with the IMO requirements. Before establishment of the VTMIS, Ghana did not have the technology necessary to comply with the requirements.
Improved safety of navigation, including piracy and threats to the gas pipeline	Safety of navigation has improved, and there have been no accidents threatening the gas pipeline since the start of the VTMIS. There has been degreasing trend in piracy cases in last years but in 2018 there has been a sudden rise. There is more inter-agency collaboration between stakeholders.
Increased traffic in Ghana´s Atlantic ports	Traffic has increased slightly in both of the major ports of Ghana. Number of vessel calls has increased in Tema port between 2013 and 2017 by 0,2% and in Takoradi port between 2013 and 2016 by 17%. However, it is not possible to say to what extent this is attributable to VTMIS.
Increased port efficiency	The efficiency of Tema and Takoradi ports has increased as they are now able to detect the movement of vessels from a distance and to get prepared for coming vessels.

Better environmental protection	GMA and others are able to monitor and warn ships operating near the gas pipeline. There has not been any incident on the pipeline since 2006. There is evidence that trawlers still operate in the IEZ possibly damaging the breeding grounds of fish.
Less illicit human and drug trafficking	There is no evidence of less trafficking. VTMIS is not very useful for detecting the small boats that operate in illicit trafficking.
Improved fish stocks	There is no evidence of improved fish stocks. On the contrary, fish stocks continue depleting.
Improved livelihoods in the fishing industry	It is difficult to establish a connection between the VTMIS and livelihoods in the fishing industry. The number of canoes and people involved in the fishing industry has considerably increased.
Impact on human rights, gender equality and inequalities	The project has had little impact on human rights, gender equality and inequalities. There is some openness in GMA towards stakeholders but data sharing is not open.

Increased traffic in Ghana´s Atlantic ports and increased port efficiency

The statistics by the GHPA show that in terms of vessel calls, total cargo traffic, export and import, transit and container traffic, there has been an increasing trend between 2014-17 in Tema port, since the establishment of VTMIS. Transit traffic is mostly toward the landlocked countries of Burkina Faso, Mali and Niger. The vessel monitoring system has made it possible for the GHPA to be aware of all approaching vessels and to communicate with them.

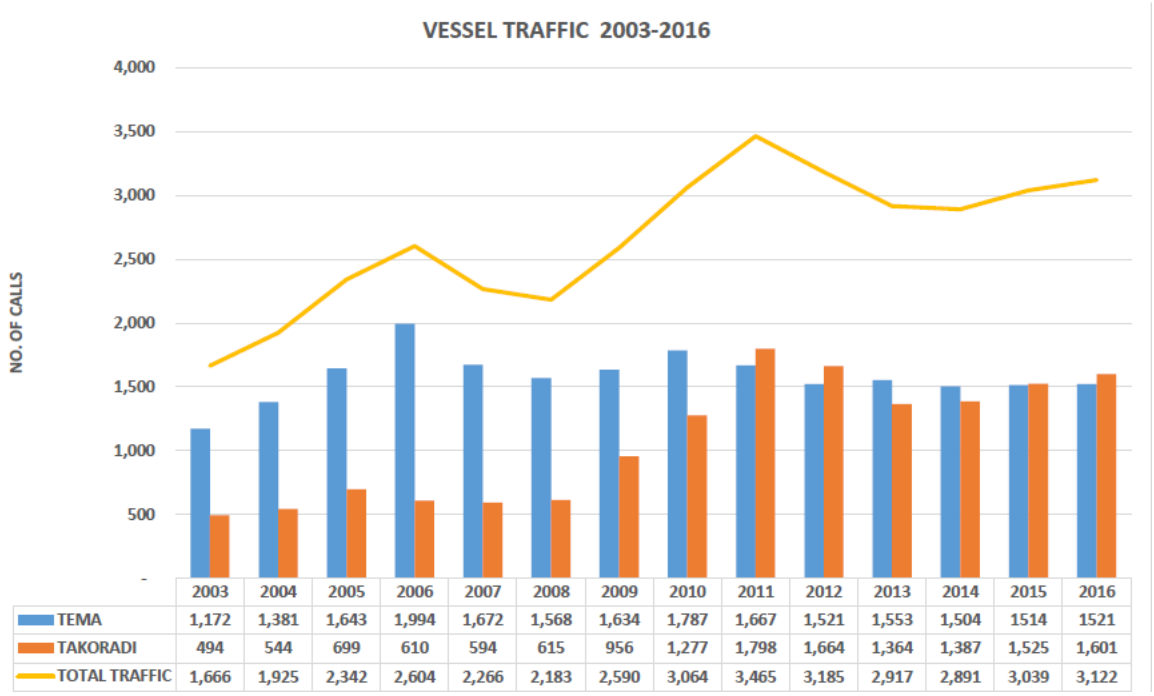
Figure 3 shows the vessel traffic in Tema and Takoradi ports in 2003-16. The traffic in Takoradi is currently higher than in Tema. There is, however, an indication that the traffic has increased from 2013.

Table 8: Tema port performance 2008-2017[16]

TEMA PORT PERFORMANCE 2008-2017

YEAR	VESSEL CALL (UNITS)	TOTAL CARGO TRAFFIC	EXPORT	IMPORT	TRANSIT	TRANSHIPMENT	CONTAINER TRAFFIC
		TONNES					TEUS
2008	1,568	8,727,049	1,305,451	6,259,412	864,307	195,326	555,009
2009	1,634	7,406,490	981,075	5,694,280	509,124	192,565	525,694
2010	1,787	8,696,951	1,154,826	6,823,488	447,071	236,615	590,147
2011	1667	10,748,943	1,532,139	8,431,531	614,078	171,195	756,899
2012	1,521	11,468,962	1,477,390	9,383,462	530,457	50,403	824,238
2013	1,553	12,180,615	1,493,956	10,014,243	620,668	51,748	841,989
2014	1,504	11,126,355	1,463,273	8,922,550	577,227	163,305	732,382
2015	1,514	12,145,496	1,303,090	10,043,146	722,508	76,752	782,502
2016	1,521	13,414,784	1,633,036	10,890,084	862,377	29,287	893,841
2017	1,557	14,045,787	1,646,253	11,327,502	1,043,771	28,261	956,374

[16] http://www.ghanaports.gov.gh/page/32/Port-Statistics



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
TEMA	1,172	1,381	1,643	1,994	1,672	1,568	1,634	1,787	1,667	1,521	1,553	1,504	1514	1521
TAKORADI	494	544	699	610	594	615	956	1,277	1,798	1,664	1,364	1,387	1,525	1,601
TOTAL TRAFFIC	1,666	1,925	2,342	2,604	2,266	2,183	2,590	3,064	3,465	3,185	2,917	2,891	3,039	3,122

Figure 3: Vessel traffic in Tema and Takoradi ports 2003-2016[17]

It was mentioned during the interviews in the Ministry of Transport and in the Customs Division of the Ghana Revenue Authority, that revenue collection from berthing fees in Ghana has increased because of major safety in Ghana waters compared to Togo or Nigeria. There is, however, no statistical data about this.

Better environmental protection

Although the feasibility study and appraisal report mention that the Environmental Protection Agency would receive a VTMIS monitoring station, no terminal was provided for them. The impact that VTMIS would have on environment is the avoidance of gas emissions due to damage to the pipe when GMA and Navy are able to warn the vessels about anchoring around the underwater gas pipeline. VTMIS is not effective for detecting oil spills while remote sensing through satellites could be used and integrated to the VTMIS. When interviewed, EPA officials mentioned that if a monitoring station had been provided to them, they could use the VTMIS radar for monitoring migrating sea mammals along the coastline "corridor" and thereby protect them better. They were also interested in detecting oil slicks and monitoring changes in weather conditions, both aiming at environmental protection.

Trawling is prohibited in the Inshore Exclusive Zone (IEZ) to avoid damaging the fish breeding sites and the MCS unit of the Fisheries Commission monitors it through the VTM systems. The movement of vessels can be detected through VTMIS but as the preliminary results of the Friends of Earth survey shows (Mullié, Friends of Earth, personal communication), trawler fishing has not completely stopped in the area. It has, however, been reduced. Even if the study indicates reduced fishing effort of trawlers in IEZ, this cannot be considered to be a result of the VTMIS, without doubt. There was a reducing trend already before the VTMIS

17 http://ghanaports.gov.gh/Files/TEMAPORT/Tema%20and%20Takoradi%20PORT%20PERFORMANCE%202003%202016-1.pdf

was taken into use. The result may be impacted also by the fact that trawlers switch of their transponders (AIS) when fishing in IEZ, because they know about VTMIS monitoring.

Less illicit human and drug trafficking

According to the UN World Drug Report (2018) about a quarter to two-thirds of the cocaine on its way from South America to Europe passes through West African countries, specifically Cape Verde, Mali, Benin, Togo and Nigeria, Guinea-Bissau, and Ghana. The principal means of transportation have evolved since 2012 with the increasing use of air transport and corresponding decrease of transportation by sea, a trend which is most likely related to the increased number of flights between South America and West Africa. In the late 2000s, several large shipments of heroin trafficked in sea containers or as freight were seized in West Africa, suggesting that traffickers are now able to improve the logistics of trafficking and move much larger quantities, exploiting the region's geographic, political and economic vulnerabilities.

According to UNOCD reports, Ghana is not considered as a major route for human trafficking in Western Africa. It is, however, a transit point for West Africans subjected to sex trafficking in Europe, especially in Italy and Germany (Ministry of gender, children and social protection (2017). The exploitation of Ghanaians, particularly children, within the country is more prevalent than the transnational trafficking. The 2017-21 action plan for eliminating human trafficking does not mention marine surveillance as a means of work.

The VTMIS monitoring station provides the NACOB information about the presence, types and movement of vessels in the Ghana waters. In addition to that, they also need information about the vessel movement before reaching Ghana area and it´s port of origin. They also need skills to analyse the information and data but not enough training was provided for that.

The impact of VTMIS on reducing illicit trade of drugs and humans is difficult to detect. Much of the smuggling takes place through transhipments through small boats without AIS. However, in one case, a suspicious vessel was found through VTMIS.

Improved fish stocks

Based on the characterisation of the United Nations (UN) Convention of the Law of the Sea, Ghana is under international obligation to ensure that its own fishing fleets are regulated; that it has the capacity to regulate fishing activity in its Economic Exclusive Zone (EEZ) and designated fish-landing ports to avoid becoming a destination for illegally caught fish; and to ensure that its fish products entering the international markets are certified (Baidoo-Tsibu & Yeboah, 2017). According to the interviews, observations, research reports and newspaper articles, fisheries monitoring has considerably improved in the last 10 years due to many reasons:

- ✓ The legislation on fisheries has improved
- ✓ There is electronic surveillance, using various technologies such as VTMIS, VMS, ExactEarth, and TV32. FEU considers the VMS as their own surveillance tool, while VTMIS belongs to GMA
- ✓ Training of staff in using the electronic monitoring tools
- ✓ Employment of observers to control the vessels trawling in Ghanaian waters
- ✓ Collaboration with other stakeholders for monitoring has improved.

By October 2012, all Ghanaian tuna vessels, and by September 2014, all Ghanaian trawlers were fitted with VMS, and in the case of the trawlers, Automatic Identification System (AIS), with funding from the International Commission for the Conservation of Atlantic Tunas (ICCAT) and WARFP-Ghana. The WARFP provided Fisheries Commission an online Vessel Monitoring System (VMS) in 2014 and according to the 2017 implementation status report (The World Bank, 2017) VMS "…is effective at monitoring illegal fishing vessels within the Ghanaian territory. In collaboration with the Navy and the local police, now there are hardly any industrial trawlers fishing without a license."

The surveillance is therefore a combination of systems and it has considerably improved. Nevertheless, there are many contrasting opinions on the impact of VTMIS and VMS on fisheries: Ghana's small pelagic fishery is in crisis as fish stocks are depleted based on a lot of evidence on this from scientific reports, fisherfolks (men and women), trawler owners and government officers. Tuna fishing is considered more controlled now but fishing generally is still considered highly uncontrolled and unsustainable by the interviewed fishermen, fish mongers, civil society organizations and development partners. The surveillance systems are not capable of detecting the transhipments.

Improved livelihoods in the fishing industry

Because of increase in the number of fishermen and continuous decline in fishing stocks, the livelihoods in the fishing industry have not improved in the last few years. In the interviews and in the reports of NGOs, the destroying of fish breeding sites by trawlers, as well as constant overfishing are frequently mentioned. The movement of trawlers is not well controlled and there is a culture of impunity. The positive impact of VTMIS / VMS system in life of people active in fishing industry is seen mostly when they receive compensation for accidents such as destroying of fishing nets or splitting of canoes by big vessels occurs. According to several interviews, Fisheries Commission has been able to assist people in identifying vessels that have caused the accidents, especially oil tankers. In some cases, fishermen have received compensation. There is, however, also anecdotal information about corruption related to handling the incident reports by GMA or among the FEU observers who board trawlers to control IUU.

Improved safety of navigation, including piracy and threats to the gas pipeline

Around 80 % of all international trade in Ghana goes through maritime transport and hence it is important that GMA is able to monitor all the vessels that enter the Ghana waters. In terms of navigation safety the situation now is much better than it was in 2008, when the VTMIS was not yet in use.

While piracy off the Horn of Africa has been steadily declining since 2012, there has simultaneously been a significant rise in piracy, armed robbery against vessels, and other maritime crimes in the Gulf of Guinea region, which is home to some of the biggest offshore oilfields in the world. Oil tankers are attacked and oil is siphoned from the vessel on-site, before being sold on the black market. (UNOCD (2016) Regional Programme for West Africa 2016-2020).

Also here, the opinions of interviewees, newspaper articles and official documents offer many different views on the security situation. It was mentioned by many government officials, that Ghanaian waters are much safer now than earlier on, and this is shown by the increasing number of foreign vessels anchoring on Ghanaian waters while waiting for loading in Togo or Nigeria, instead of staying in their congested ports. This has also increased the income from berthing fees in Ghana.

According to the International Chamber of Commerce (ICC) report from 2017, the actual and attempted cases of piracy have evolved in the following way in Ghana (Table 9).

Table 9: Actual and attempted cases of piracy in Ghana (ICC 2017)

Year	No. of cases
2013	1
2014	4
2015	2
2016	3
2017	1

The actual attack in 2017 was a boarding instead of hijacking. In January – March 2018 Ghana recorded five pirate attacks, compared to the 11 attacks recorded between 2013 and 2017. In March 2018 there was

hijacking of a Ghanaian fishing vessel by allegedly Nigerian pirates and five South-Koreans on board were taken hostage, but the abandoned vessel was rescued by the Ghana Navy. It has also been reported that European tuna vessels are avoiding fishing in the Gulf of Guinea and nearby waters amid a rising threat of piracy in the area[18].

There is generally much more awareness and more people involved in the surveillance in Ghana than before the VTMIS project. The collaboration between agencies takes place through different institutions such as the MCS and the GMA board, as well as the whole process of implementing the Gulf of Guinea Strategy. People from different agencies are connected through formal and informal networks to monitor vessel movement in the GOG and they share their observations and intelligence with each other. The most important issue in combating piracy is not necessarily the issue of resources, but rather the lack of effective cooperation and coordination between maritime security bodies[19].

The VTMIS has had impact on creating a more safe and secure marine environment in the Ghanaian coast and it forms the platform on which other, more advanced monitoring systems can be added. The increased safety may have contributed to the growth of traffic and efficiency in Tema and Takoradi ports while the main environmental impact is the avoidance of incidents on the gas pipeline and around the gas fields. The impact on fisheries, drug and human trafficking, as well as human rights, gender equality and inequalities has not been realized.

EMQ9. What other noticeable impact did the project have (intended/unintended, positive/negative), particular in terms of human rights, gender equality, inequalities and environmental sustainability?

Impact on human rights, gender equality and inequalities

The human rights principles guiding the processes of development cooperation include the following:

- ✓ universality, interrelatedness and indivisibility
- ✓ equality and non-discrimination
- ✓ participation and inclusion
- ✓ accountability
- ✓ transparency

The human rights issues related to the fisheries sector would include cases of forced eviction, detention, child labour, forced labour, and gender-based violence. There is huge phenomenon of child labour and forced labour in Ghana's fishing industry, where poor Ghanaian children are recruited by brokers to fish in the Lake Volta region. The use of VTMIS system does not have any impact on the fisheries human rights situation, because VTMIS has not been used for monitoring of related activities.

According to the SFMP gender analysis (2014), there is a symbiotic relationship between men and women in the Ghanaian fisheries industry. Mainly, men fish and women do the marketing and processing. However, the roles are more complex. According to key informants, there are a couple of female fishers in the Central Region. The ability to obtain and sell fish is dependent on the ability to invest in the fishing business of a fisherman, getting fish from a husband/son or accessing credit to buy fish. Women comprise a minority of boat owners. These women have the potential to have significant influence, at least when it comes to the

[18]https://www.undercurrentnews.com/2018/06/27/european-tuna-vessels-avoid-gulf-of-guinea-amid-rising-piracy-threat/

[19] Blédé, 2014.

operation of their own vessels. They also frequently fund fishing trips. Because of their economic influence, fish traders have greater economic and political power than women in general do in Ghana[20].

The project has increased the accountability and transparency of GMA and government actions in general. The continuous monitoring of vessel movement and sharing of data, not only in the country between the agencies, but also regionally and internationally, make the government agencies more responsible. Some NGOs are pointing out that the data from VTMIS is not open access and it is not shared with the civil society or private sector. Sharing of data would increase citizens´ opportunities to make the government and private sector more accountable, examples include Costa Rica, Peru and Indonesia, which share all VMS data in public domain. One NGO recognized that GMA is now more open and more willing to cooperation than previously. In this sense, however, there is recognition of GMA developing toward more openness.

The project can be seen as increasing the accountability and transparency of GMA and government actions in general.

3.5. Sustainability

EMQ10. How sustainable are the results achieved in the project? Are the project results still relevant and are the systems installed/other outputs of the project still in efficient and effective use?

The present status of the centres and the sites gives a good indication about sustainability of the project results. The centres were taken into use about five years ago. When visiting them, the evaluation team found out that the lack of maintenance risks the sustainability of the project results.

Annex 4 shows the analysis table of the National Control Centre (NCC), the Area Control Centres (ACC), the Monitoring Stations (MS), the services they provide and the services they receive from the Remote Sensor Sites (RSS) and the Remote Base Stations (RBS). The summary of the results is presented in Table 10. Only the centres and stations visited during the field mission were analysed. The visited centres were NCC in Accra, ACC in Tema, ACC in Takoradi and the Navy Command Head Quarters (HQ) in Accra. The monitoring stations visited were Ghana Port and Harbours Authority (GPHA) Tema Port, Fisheries Commission (FC) in Tema, Ghana Revenue Authority (GRA) Customs Division in Accra, National Security Agency (NSA) in Accra, Navy Command West in Takoradi, Volta Lake Transportation Co in Akosombo and Narcotics Control Board (NACOB) in Accra.

Table 10: Services of the Centres and Monitoring Stations

Type of facility	Visited	VTMIS /AIS equipment in place	AIS on	AIS off time	Radar on	CCTV on	VHF in use	IP	AtoN in use	Meteorological and hydrological data on
Centre (NCC and ACCs)	All visited	Yes	Yes	-	No	No	Yes	Yes	No	No
Monitoring Stations	7 visited	Yes 7	Yes 3 No 4	2 weeks – 4 years	Feed not available (others) or not working (Navy)	Feed not available (others) or not working (GPHA)		Yes*		No

* In Navy Command West IP was not working

[20] Overa 1998

When the evaluation team visited the centres, the VTMIS monitors were working and they were on. Also, AISs, VHFs and IPs were in operation and working. CCTV video and radar pictures were generally not working. CCTV cameras were not turning and radar picture was only partial, as in most RCCs the radars were not rotating. AtoN service was not used, possibly because no meteorological nor hydrological data was available in any of the centres.

The evaluation team visited seven out of ten MSs. Only three of the MSs were, during the visit time, in operation. The MSs have been out of service between two weeks and four years. Two of the MSs have been out of operation for several years and two of them are expected to be serviced and be in operation relatively soon. In general if the MS was in operation, the services, which were available in MSs, which are AIS and IP, were working in all, exempt IP in one MS.

Annex 4 provides a table about the services that the RSSs and RBSs provide. Summary of the results is presented in the Table 11 below. All the RSSs and RBSs were analysed, even if all of them were not visited. The information about the non-visited RSSs/RBCs was available from the other sources – exempt radar rotation information about Ada and Keta.

Table 11: Services of the RSSs and RBSs

Tower	Site was visited by the evaluation team	In use = Air conditioning on	Radar rotates	CCTV works	Working microwave connection
RSSs	5/7	Yes	2/5	No	No
RBSs	1/3	No			No

RSSs were all in use and the air conditioning was on, which is the precondition for electronics to work. AIS was working in all of the RSSs. Radar was rotating only in two of the visited five RSSs. The CCTVs and the microwave services were not working.

RBSs have not been in operation since they were established.

The most important parts, which are AISs, of the NCC and ACCs are operational. Most of the Monitoring Stations were not in operation when visiting them. In general due to the lack of maintenance a large part of the services of the NCC and ACCs and monitoring stations are not working.

Only AIS, radio and phone connections are working in general. However, AIS is the most important tool in monitoring the vessel traffic.

The sustainability related to the technical aspects of the VTMIS/AIS services is not good. Due to lacking maintenance even more services may be lost in the future.

Have stakeholders in Ghana taken steps to ensure sustainability e.g. in budgeting or other processes?

The staff hired and trained for operating the VTMIS in NCC and ACCs has stayed well in GMA in surveying and monitoring positions. Based on the interviews, the staff is satisfied with their salaries. This is likely to be one of the reasons the employees have stayed. Also, most of the interviewed security guards of the RSSs and RBSs have stayed in their jobs from the beginning of the VTMIS project. Based on the interviews, their salaries are also very competitive with the other jobs of similar level. Obviously GMA has budgeted for high enough salaries in order to keep the staff in their positions. This improves the sustainability of the VTMIS system.

Unfortunately, GMA has not made any maintenance contract with Navielektro even if it has been discussed several times with Navielektro and Zeni Lite Corporation. Based on the interviews in GMA, they see the proposed maintenance contract as too expensive. The proposed annual cost for the maintenance contract would be about 5,5% – 7% (depending on the information source) of the VTMIS investment costs, which was about EUR 17 million. The contracting partner in the proposed maintenance contract would be Zeni Lite Group. The missing maintenance contract is risking the sustainability of the VTMIS project.

GMA has already made plans about next steps for the coastal surveillance and monitoring activities. They are considering a new system, which they did not want to tell more details about. Before getting the new system GMA plans to use drones for monitoring the vessel traffic by the coastal waters of Ghana. Drones and the new system may ensure further development and continuation of the surveillance and monitoring activities in Ghana.

GMA has been able to keep the employees in VTMIS offices, RSSs and RBCs, which improves sustainability of the operations. The missing maintenance contract risks the sustainability of the VTMIS operations.

3.6. Coordination, Complementarity, Coherence, Aid effectiveness

EMQ11. How were other programs and cooperation relevant to the project considered?

The feasibility study and appraisal report do not mention other initiatives related to maritime security or fisheries sector. In general, the context of the project is not discussed. Already in 2008, ECOWAS member states adopted the ECOWAS Vision 2020, which set out the strategic objectives for a borderless region, sustainable development, peace and good governance, and integration into the global market. The challenges in the maritime domain were already recognized but not considered in the VTMIS project proposal.

According to interviews, the coordination between the GMA and stakeholders has improved during the project. GMA calls daily all the monitoring centres to check if everything is fine. There are also other institutional arrangements such as FEU to work together on fisheries law enforcement and Ghana Maritime Authority Board to coordinate the response on security, such as GoGIN. In particular, GMA works closely with the Navy and the most important stakeholders are all members of the GMA board where VTMIS-related issues are frequently discussed. It was, however, mentioned by some stakeholder organizations, that GMA is not acting promptly in the event of problems with the equipment and that maintenance is usually late.

During the planning of the project the context was not described and considered. The project has contributed to strengthened collaboration between the stakeholders.

EMQ12. How well did the project promote ownership, alignment, harmonization, management for development results and mutual accountability?

Ownership

The VTMIS project is strongly owned by the government of Ghana through GMA straight from the initial stages in 2008. Already in 2010 GMA nominated a project coordinator who has been responsible for land purchase, recruitment and supervision of staff working in control centres, supervision of construction and

establishment of the system as well as general running of VTMIS in Ghana. He was in contact with Eltel and Navielektro throughout the project and has continued keeping touch with Navielektro in Finland. The coordinator continues to send monthly reports to the Ministry of Transport.

Apart from the Navy, which runs an area control centre, the other government agencies feel less ownership of VTMIS as they only operate monitoring stations. The MCS at Fisheries Commission feel that they own the VMS and other supporting systems, but not the VTMIS. To get information about radar data, they have to contact GMA; similarly, they cannot directly contact the vessels. The staff in the monitoring stations feel that they were not involved in the planning phase. On the other hand, also GMA staff in control centres feel that they don´t have control of the system maintenance and their voice is not heard.

Alignment and harmonization

The project was well aligned with the development priorities of the government of Ghana and of the Ministry of Transport (see EMQ 2).

Management for development results

The project did not have a result framework, which would have been a logical framework by the time of the project planning. The objectives of the project and the impacts to be achieved are discussed in the feasibility study, but no indicators were set for monitoring. The project implementors did not submit any reports to the MFA and therefore there is no final report or audit of the implementation. It is fair to say, that there has not been any management system for development results although the supplier and the GMA, as the receiver of the VTMIS, have managed well with the establishment of the system.

Mutual accountability

Mutual accountability is another concept agreed in Paris (2005) to increase aid efficiency. OECD defines mutual accountability as “a process by which two (or multiple) partners agree to be held responsible for the commitments that they have voluntarily made to each other. It relies on trust and partnership around shared agendas rather than on hard sanctions for non-compliance to encourage the behaviour change needed to meet commitments.”

As there was no project document but rather a technical feasibility study that defined the details of the VTMIS equipment and training, some of the development objectives of the project were not strictly implemented or monitored by the GMA. For example, environmental impact assessments (EIA) were not conducted; gender was not considered for training or employment in control centres of the GMA; the communication with the stakeholders having monitoring stations was not completely transparent, as in the case of Environmental Protection Agency (EPA). EPA did not receive the equipment although promised at an earlier stage.

There was no monitoring of the project by the MFA and the installed equipment, or project in general, was not audited.

The MFA officials responsible for concessional credit schemes have not had regular communication with the GMA or Ministry of Transport and Ministry of Finance in Ghana. The Embassy of Finland in Nigeria is responsible for the contacts between the two countries from the MFA part.

The VTMIS project is strongly owned by the government of Ghana through GMA straight from the initial stages in 2008 but other agencies feel less ownership. The project was well aligned with the development priorities of the government of Ghana and of the Ministry of Transport. The project did not have a management system for development results and no result-based framework was used. There was no monitoring of the project by the MFA and the installed equipment, or the project in general, has not been audited.

EMQ13. Were there contradictions with other policy areas and how were they handled?

How did the project impact debt sustainability in Ghana?

The team did not detect any other contradictions with other policy areas.

Based on the information and opinions received in the interviews, the CCS type of long-term interest subsidized loan was the right type of financing for the non-profit generating investment like VTMIS.

Ghana had taken already several concessional credit loans from Finland and other countries. Eltel Networks Corporation had already implemented several Finnish CCS financed electricity projects in Ghana and also with similar type of financing from other countries. Concessional Credit financing has been used quite intensively in Ghana.

CCS financing has been affordable to the Government of Ghana. According to Finnvera representatives, there have not been any problems with the loan repayment; the repayments have been paid regularly without any major delays.

Government of Ghana has been able to service the VTMIS loan received and there is no indication that it has had any negative impacts on the debt sustainability of Ghana.

3.7. Other

EMQ14. Did the project open up new business for the Finnish companies in Ghana/developing countries?

Navielektro Ky and Zeni Lite Group have been negotiating about maintenance contract with GMA, but until now without much success. There have been two paid maintenance visits made by Navielektro Ky in Ghana. However, this type of business is not preferred by the companies, instead they are looking for more stable maintenance contract.

Until now Navielektro and Zeni Lite Group (which is now Navielektro's partner instead of Eltel) have not sold VTMIS technology in any other developing country. However, there are several potential countries where the system could be sold. However, they would like to have a well operating system as a reference – the VTMIS in Ghana in its present condition is not a good reference. The maintenance contract with GMA would help to improve this.

Eltel Networks Corporation is not looking for new projects in developing countries, as they have stopped developing country operations. However, from Eltel's point of view the Ghana VTMIS project was successful and profitable.

In November 2017 the Minister for Foreign Trade and Development, Mr. Kai Mykkänen, led a Finnish business delegation to Nigeria and Ghana. The purpose was to boost trade between Finland and the two West African countries, as well as to explore the possibilities for investment. The delegation consisted on 25 Finnish private companies and public-sector organizations, working especially in the fields of communication technologies, education, health, cleantech and bio-economy. In particular, the opportunities on projects such as the WB E-

Transform project in Ghana were considered as offering potential procurement and funding opportunities across both the Education and ICT sectors.

The VTMIS system has not generated further business for Finnish companies yet. However, there are prospects for VTMIS export projects in other countries.

Was the project part of a strategy by the companies to expand operations in developing countries?

At the time the VTMIS project was implemented Eltel Networks Corporation had a strategy to implement telecommunication projects also abroad. They had had already seven telecommunication related projects in Ghana. Especially the towers, which were constructed in each of the RSSs and RBSs, are their brands. However, later Eltel has given up projects abroad because they are too risky.

For Navielektro Ky the VTMIS project was a continuation project for the earlier implemented Port Control System. The VTMIS is one of the large systems they have sold abroad. Navieletktro hopes that the Ghana VTMIS project works as a reference project for next projects, which are in planning stages.

In the future Zeni Lite Group has an interest to be active also in Finland through its Finnish subsidiary and sell VTMIS system with Navielektro abroad.

VTMIS project in Ghana was in line with strategies of Eltel Networks Corporation and Navielektro Ky. However, Eltel does not continue implementing projects abroad. Navielektro Ky and possibly Zeni Lite Group's Finnish subsidiary are interested in continuing VTMIS business abroad.

EMQ15. How did the project contribute more broadly to cooperation and relations between Finland and Ghana? Were there synergies with other Finnish cooperation in the region?

According to the Finnish Ambassador in Ghana as well as the trade commissioner of Business Finland in Nigeria, the project was a landmark project in Ghana with relatively high visibility for Finland. It has been frequently used as a success case when introducing business potential in West Africa. The Finnish implementing companies Eltel and Navielektro have introduced the project for example during the Finnish Minister of Trade-led delegation trip to the region and export promotion events in Finland.

The Embassy and Business Finland have also encountered a few instances from Ghanaian government officials showing interest towards Finnish companies due to this project and it has been taken up by the Ambassador several times with Ghanaian ministers and government officials.

The project has been used by the Finnish Embassy and Business Finland as a successful example of Finnish products in West Africa. The evaluation team did not find any further synergies between the VTMIS project and other Finnish cooperation in the region.

4. Conclusions

4.1 Relevance

The VTMIS was originally needed in Ghana in marine areas in order to:

- ✓ ensure safety of the West African Gas Pipeline and oil infrastructure;
- ✓ meet IMO requirements for survey and manage of vessel traffic and to provide meteorological and hydrological information for ships;
- ✓ control fishing activities and overfishing;
- ✓ prevent other illegal activities;
- ✓ support development of Lake Volta transport corridor.

VTMIS technology is relevant in marine areas to increase safety in ship traffic and for oil and gas infrastructure, but until now it has not shown to be relevant in Lake Volta area. The expectations for monitoring and controlling of illegal fishing, smuggling, transhipment and other illegal activities showed to be too optimistic, and would have required different approach and different set of skills.

The technology is appropriate, because it is relatively robust, easy to use and easy to learn.

The project responded to the national growth agenda by setting the basis for safety in oil industry and facilitated the expansion of transport in the ports in Tema and Takoradi. It also contributed to build the foundation of Ghana´s maritime security and paved the way for wider cooperation in Gulf of Guinea area e.g. GoGIN.

The VTMIS project is not directly in line with the Finnish development policy priorities of poverty reduction, nor with the MDGs. However, indirectly the project contributes to them. The alignment with the cross-cutting themes is weak but it promotes security, which is emphasized in the development policy as an important foundation of sustainable development.

4.2 Effectiveness

The immediate objective of the project of setting up a functioning VTMIS system was met. The client and other parties were satisfied with the Finnish companies and the quality of the installed VTMIS.

High-level support in Ghana facilitated the timely implementation of the project. The contractor had strong experience in implementing projects in Ghana.

The project managed to provide the necessary basic skills and capacity for GMA and other stakeholders to operate and use the systems effectively. The participants were satisfied with the quality of the training but considered it to be too short. However, VTMIS hardware and software maintenance training was not adequate.

Slow recruitment of officers affected the effectiveness of the training while the lack of contacts of the Finnish trainers to the GMA leadership, the owners of the project, limited determining the needs and appropriate contents of the training.

The project faced some problems with bureaucracy and financing of the GMA's part of the project and therefore some important features such as microwave connection and hydrological data cannot be provided by the system.

4.3 Efficiency

The project was implemented in a relatively efficient way, although there were several delays. Delays to some degree are common in CCS projects and in infrastructure projects in general. The delays were mostly due to bureaucracy.

The NCC and ACCs work well and the staff is motivated. Even if the capacity in NCC and ACCs and in Monitoring Stations to monitor the vessel traffic and to protect the gas and oil infrastructure was achieved, the same did not happen regarding fisheries and illegalities monitoring. VTMIS in Lake Volta was not taken into use and there have not been any monitoring activities since establishment.

Adequate capacity to maintain the system and the software was not achieved. The maintenance service provided by GMA is slow and the system is only partially operational due to inadequate maintenance and periodically unreliable and slow internet connection. Needs assessment and more intensive cooperation already in the establishment phase between GMA and other stakeholders could have contributed to better working cooperation later.

Assessment of the gender and social inclusion (GESI) of the project shows that in the planning phase the project was still gender aware although not sufficiently to be gender sensitive. The project implementation is considered GESI blind as there is no evidence of paying attention to gender or social inclusion during the implementation phase.

4.4 Impact

The VTMIS has had impact on creating a safer and more secure marine environment in the Ghanaian coast and it forms the platform on which other, more advanced monitoring systems and programs can be added. If the VTMIS works as expected Ghana is fulfilling all the requirements set by IMO for monitoring of the coastal waters. However, at present the system is not working as it should and the information provided by the system is not fully used, Ghana is not fully complying with the IMO requirements.

The increased safety and better coordination may have contributed to the growth of traffic and efficiency in Tema and Takoradi ports. Also efficiency of some other agencies may have improved. The main environmental impact of the system is the avoidance of incidents on the gas pipeline and around the gas fields. Even one avoided accident pays the investment back.

The impact on fisheries, drug and human trafficking, as well as human rights, gender equality and inequalities has not been realized.

However, the project can be seen as increasing the accountability and transparency of GMA and government actions in general.

4.5 Sustainability

The VTMIS system has been in operation for five years and NCC and ACCs are generally operational. Some MSs are not but some of them are active and operate well. There are generally frequent breaks in their operations due to technical problems.

The main equipment or sensor, which is the AIS, is working generally well. However, several other pieces of equipment are not working, due to delayed and lacking maintenance. The sustainability of the VTMIS services is not good and even more of the services may be lost in the future.

The missing maintenance contract risks the sustainability of the VTMIS operations.

GMA has been able to keep the employees in VTMIS offices, RSSs and RBCs and the staff is motivated and satisfied with their work, which improves the sustainability of the operations. However, additional and advanced training is missing and new staff is not trained in a structured manner, in particular in monitoring stations.

Many of the VTMIS users have also other monitoring systems. The systems complement each other, because monitoring is not interrupted if one system is down, and this increases the sustainability of monitoring activities.

4.6 Coordination, Complementarity, Coherence, Aid effectiveness

During the planning phase of the project, in the Feasibility Study, the other programmes and cooperation were not described and considered. However, the project was well aligned with the development priorities of the government of Ghana and of the Ministry of Transport. The project did not contradict with other policy areas.

During the implementation and operation, the VTMIS project has contributed to strengthened collaboration between GMA and the stakeholders.

The VTMIS project has been strongly owned by GMA straight from the initial stages of the project and its planning in 2008. The other agencies feel less ownership for the project.

The project did not have a management system for development results and no result-based framework was used. MFA has not monitored regularly the project and the installed equipment, or the project in general, has not been audited.

Government of Ghana has been able to service the VTMIS loan received and there has not been any indication that it had negative impacts on the debt sustainability of Ghana.

4.7 Other

The VTMIS system has not generated further business for Finnish companies yet. However, there are prospects for VTMIS export projects in other countries.

VTMIS project in Ghana was in line with the strategies of Eltel Networks Corporation and Navielektro Ky. However, Eltel does not continue implementing projects abroad. Navielektro Ky and possibly the Finnish subsidiary of Zeni Lite Group are interested in continuing VTMIS business abroad. In the future, VTMIS in Ghana would be a better project reference for the companies, if the maintenance of the system worked.

The project has been used by the Finnish Embassy and Business Finland as a successful example of Finnish products in West Africa. The evaluation team did not find any further synergies between the VTMIS project and other Finnish cooperation in the region.

5. Recommendations

The following recommendations are addressed to the MFA:

Relevance

1. More attention should be paid to aligning concessional credit projects better with the Finnish development policy and to the relevance of all the parts of the project.

2. The appraisal process should have more resources and appraisal report recommendations should be seriously considered. There should be a reporting procedure during the implementation, where the decisions to deviate from the recommendations of the Appraisal Report are clearly justified and documented.

Effectiveness

3. Proper indicators should be prepared already in the Feasibility study stage of the project to facilitate the monitoring of the project implementation. Alternatively, based on the feasibility study, a project document should be prepared with proper indicators.

4. Implementation of the CCS/PIF projects should be monitored during the implementation phase.

Efficiency

The project plan should have an inbuilt project component to establish a cooperation and coordination body between organizations, if a precondition for a successful project is a good cooperation between stakeholder organizations. The appraisal process should ensure that such a component exists.

5. More resources are needed to the appraisal to properly assess the context and to prepare a project document or an improved feasibility study with targets on tailor-made training for each stakeholder organization as well as on gender and human rights.

Impact

6. Assess better the context when designing a CCS project avoiding too optimistic description of expected impacts.

Sustainability

7. MFA should continue discussions with the recipient government and its institutions in the implementation phase to emphasize the sustainability. Make sure there is a system or a contract for maintenance and a plan for continuous training. Coordinate with other development partners for the organization of training.

Coordination, Complementarity, Coherence, Aid effectiveness

8. Context should be better considered in order to get the wider coordination working as early as possible and the activities of other development partners could be considered better.

Other

9. MFA through its embassies, regional department and the PIF unit should keep contact with the government receiving concessional credit and emphasize the need for maintaining the investment.

6. Lessons learned

When pursuing development impacts, the plan for a concessional credit project cannot depend solely on the analysis and feasibility study prepared by a commercial company. The appraisal of the study must be more resourced and it should be conducted by a team of professionals having expertise on the subject matter and on the development issues. The appraisal recommendations should be discussed with the recipient government and changes necessary for achieving development impacts should be discussed and agreed on between the governments.

Training of local staff may not always be the priority of the recipient government, neither the maintenance of the purchased technology. They are, however, the main factors of sustainability and should therefore be emphasized in concessional credit projects.

Beneficiaries and other stakeholders should participate in assessing the comprehensive needs and drawing a realistic theory of change and results framework for a concessional credit project. The results framework provides a good understanding of project objectives and it helps in monitoring and evaluating the changes to which the project has contributed.

Human rights and gender may not be the priority of companies exporting technology from Finland, but to achieve development impacts, they must be mainstreamed in the plans, agreed with the companies and the government receiving the credit. Their fulfilment should be monitored through adequate indicators.

The contact between the MFA and the recipient government should not cease after the signing of the concessional credit agreement. MFA should allocate resources for monitoring the progress and keeping in contact with the ministries in the recipient country, maybe through the embassy or through the staff in the PIF unit.

Annexes:

Annex 1: Terms of Reference: End of Project Evaluation of Concessional Credit Scheme Project
Annex 2: Evaluation Matrix
Annex 3: Result Framework
Annex 4: Status of VTMIS/AIS Centres, Monitoring Stations, Remote Sensor Sites and Remote Base Stations
Annex 5: List of Organizations and persons interviewed
Annex 6: List of Documents reviewed
Annex 7: Focus Group Discussion (FGD) and Key Informant Interview (KII) checklist
Annex 8: Photographs of the technology and project sites

MINISTRY FOR FOREIGN AFFAIRS OF FINLAND 2 March 2018
Department for Development Policy

Terms of Reference

End of Project Evaluation of Concessional Credit Scheme Project:

Vessel Traffic Management and Information System (VTMIS) for Coastal Surveillance in the Republic of Ghana and Automatic Identification System (AIS) for Lake Volta.

1. OVERALL BACKGROUND TO THE EVALUATION

The Public Sector Investment Facility (PIF) is one of the Finnish government's financing instruments in the development policy field. Its purpose is to provide financial support to developing countries' public sector investments that are aligned with the UN sustainable development goals (SDGs) and that make use of Finnish technology and know-how. PIF financing is a form of concessional investment credit provided by a financial institution to the target country, which in addition to an interest subsidy element includes other support measures of the Finnish government's development cooperation.

The PIF was launched in December 2016. It was preceded by the Concessional Credit Scheme (CCS) that was discontinued in 2012. The CCS was based on the same legal framework as the PIF and it had similar objectives to the PIF in promoting economic and social development in developing countries by making use of the experience and technology of Finnish companies. However, the scheme was criticized for not focusing sufficiently on achieving development results, which contributed to the decision to discontinue the scheme.

As part of the decision to launch the PIF instruments, steps were taken to ensure a stronger focus on development results. One of these steps is to increase the number of end of project evaluations of PIF and CCS projects. The aim is to generate information on development results and lessons learned from the projects particularly to support programming and management of the PIF financial instrument. It was envisaged that three evaluations would be carried out on a yearly basis starting from 2017.

2. BACKGROUND TO THE PROJECT TO BE EVALUATED

The objective of the Vessel Traffic Management Information System for Costal Surveillance in the Republic of Ghana and Automatic Identification System for Lake Volta project was to provide the Ghana Maritime Authority (GMA) and other stakeholders with the necessary information that is required to improve the surveillance and management of the maritime vessel traffic in the coastal areas and navigable waters of Ghana. Ghana's aim is to become a maritime hub in the region. Furthermore, the project aimed to contribute towards compliance of Ghana with the International Maritime Organisation's (IMO) international conventions and agreements, such as the International Convention for the Safety of Life at Sea (SOLAS) and the Global Maritime Distress and Safety System (GMDSS).

The contract entitled "The Implementation of a Vessel Traffic Management Information System for Coastal Surveillance in the Republic of Ghana and Automatic Identification System for Lake Volta" between the Ghana Maritime Authority (GMA) and Eltel Networks Corporation was signed in January

2011 and the funding decision by the Ministry for Foreign Affairs of Finland (MFA) was done on 3 March 2011. The total credit approved for the project was 17.7 million euros, which included the contract price of 16.6 million euros.

The project consists of an integrated Vessel Traffic Management Information System (VTMIS) system, comprising eleven remote sensor sites and five manned monitoring and control centers called Area Control Centers. The remote sensor sites were to be equipped with various sensors for detecting shipping vessels and small boats. These include radar, an Automatic Identification System (AIS), and Closed Circuit TV (CCTV). The project included eight sites along the coastline, providing full coverage of the coastal area, and three sites at strategic locations on Lake Volta. Meteorological sensors were also to be installed at the remote sites to provide local weather data from the sites to control centers. Training to the personnel in charge for operations and maintenance was also included in the project.

Socio-economic benefits from the project were particularly envisaged for the fishing industry through the improved ability of GMA to monitor the activities of foreign fishing vessels and prevent damage to Ghana's fish stocks and breeding grounds. Fishing is an important industry in Ghana accounting for 4,5% of GDP and employing 2.2 million Ghanaians in 2007 according to the feasibility study of the project. Other potential benefits include reduction of illegal activities such as piracy and narcotics trade. More accurate and timely information can also lead to better safety that can have both positive economic and environmental benefits e.g. through a reduction of shipping accidents that can also lead to environmental hazards such as oil spills.

3. OBJECTIVES OF THE EVALUATION

The overall objective of the end of project evaluation is to provide an external, independent and objective assessment of the project. The evaluation is expected to enable the MFA to evaluate whether the project was implemented in an appropriate and efficient way, how well it achieved the targets and goals laid out in the project plan, and particularly how sustainable the results of the project are, including any long-term development impacts of the project. The evaluation is expected to provide the MFA with lessons-learned that can be used to support programming of the PIF funding instrument. The evaluation is also expected to generate information for the MFA on the development impact of the CCS funded projects and the sustainability of these results.

4. SCOPE AND GENERAL APPROACH OF THE EVALUATION

The evaluation should focus on the project implemented in Ghana as specified in the project document. It should analyze the planning and implementation phases of the project as well as actions taken to ensure sustainability of results after the completion of the project. It should consider actions taken by the project owner and key stakeholders in Ghana, the private sector companies involved in implementing the project in Finland, Ghana and elsewhere and it should consider the support provided by key stakeholders facilitating the CCS-instrument including the MFA.

The project should be analyzed in the context of relevant development strategies of Ghana and the development policy of the Government of Finland particularly in the context of the CCS instrument at the time. Further, particular attention should be paid to gender and social equality, human rights including equal participation of marginalized groups and environmental sustainability. The evaluation should also provide information on outcomes of the project for the ultimate beneficiaries. This could require constructing a results framework ex-post and indicators as the project document does not explicitly provide these. The evaluation should also provide information on how the project contributed to the longer-term operations of the Finnish companies involved in the project in developing country markets.

5. ISSUES TO BE STUDIED

The main issues should be studied against the evaluation criteria below. The evaluation team may also take up other issues.

Relevance

- Was the project relevant, including technology provided, particularly for the GMA and other stakeholders involved in the surveillance and management of the maritime vessel traffic?
- Did the project contribute to Ghana's development plans and sector strategies? Was the project in line with Finland's development policy objectives and global development goals?

Effectiveness

- To what extent did the project achieve its immediate objective of implementing a VTMIS and AIS and providing the necessary skills/capacity to GMA and other stakeholders to operate and use the systems effectively? Was the quality and quantity in accordance with plans?
- What were the key success factors or bottle necks that contributed to the project either achieving or falling short of its objectives? What was the role/contribution of the different actors (project owner, contactor and other stakeholders including the MFA)?

Efficiency

- How efficiently were available resources transformed into intended results in terms of quantity, quality and time? Can the project be deemed to have been good *value for money*?
- What were the key success factors/bottle necks that contributed/constrained implementation (planning, procurement, implementation, risk management, monitoring, follow-up after close of project)? What was the role/contribution of the different actors?

Impact

- How well did the project succeed in achieving its overall objective to improve surveillance and management of maritime vessel traffic in Ghana? How did the project contribute towards longer term objectives of improved safety of navigation; increased port efficiency; better environmental protection; deterrence of illicit trade; improved fish stocks and livelihoods in the fishing industry?
- What other noticeable impact did the project have (intended/unintended, positive/negative), particular in terms of human rights, gender equality, inequalities and environmental sustainability?

Sustainability

- How sustainable are the results achieved in the project? Have stakeholders in Ghana taken steps to ensure sustainability e.g. in budgeting or other processes? Are the project results still relevant and are the systems installed/other outputs of the project still in efficient and effective use?

Coordination, complementarity, coherence, aid effectiveness

- How were other programmes and cooperation relevant to the project taken into account?
- How well did the project promote ownership, alignment, harmonization, management for development results and mutual accountability?
- Were there contradictions with other policy areas and how were they handled? How did the project impact debt sustainability in Ghana?

Other

- Did the project open up new business for the Finnish companies in Ghana/developing countries? Was the project part of a strategy by the companies to expand operations in developing countries?
- How did the project contribute more broadly to cooperation and relations between Finland and Ghana? Were there synergies with other Finnish cooperation in the region?

6. METHODOLOGY

The evaluation team is expected to determine the most appropriate methodology to use in the evaluation, particularly taking into account that ex-post there is limited availability of documentation. The team is expected to use multiple methods, both quantitative and qualitative, to ensure best outcome of the evaluation. The work should include a desk review of existing material, possible identification of further relevant material, data analysis of available statistics/indicators, interviews with relevant stakeholders and a field visit. The assignment includes an inception phase, field work and final analysis and reporting phase. The team is also expected to construct ex-post a results framework and to identify/construct indicators to evaluate results. Results should be validated using multiple sources.

The evaluation should be conducted in close cooperation with the MFA. At a minimum, the evaluation team is expected to hold (i) a kick-off meeting to discuss selection of evaluation methodology and detailed work plan; (ii) a meeting prior to the field mission that presents the Inception Report and outline detailed plans for the field visit; (iii) a meeting following the field visit that presents preliminary findings; and (iv) presentation of the final report and recommendations to the MFA. Further, the evaluation team is also expected to be available to participate in a public launch of the report.

7. WORK PLAN

The evaluation should be completed by mid-August 2018 with a public launch of the report tentatively during the last week of August 2018.

The evaluation is divided into three phases. The outputs of the assignment are as follows:

- An Inception Report will be produced within three weeks of the start of the assignment, and before the field visit.
- A first draft of the Final Report will be produced within two weeks of the field visit. The MFA and key stakeholders identified by the MFA will have two weeks in which to comment the draft report.
- The Final Report will be submitted within one week after receiving comments on the first draft by the MFA and other stakeholders. The Final Report will be commented and the final clearance will be provided by the MFA.

The evaluation team is also expected to propose and implement a quality assurance system for the evaluation. The proposal needs to specify the quality assurance process, methodology and tools.

8. EXPERTISE REQUIRED

The team should have expertise related to the substance of the project, including the technology provided; experience in development cooperation and development evaluations relevant to the region; knowledge of the CCS and PIF instrument; expertise in human rights based approach, gender, and environmental assessments.

The service provider is expected to nominate the team in accordance with the Framework Agreement on the supply of the provision of assessment, monitoring and evaluation of Public Sector Investment Facility (PIF) and Concessional Credit projects financed by the Ministry for Foreign Affairs of Finland (*PIF Framework Agreement*). The team proposed is subject to approval by the Ministry.

9. REPORTING

The team is expected to provide an inception report, a draft final report and a final report as well as a presentation of preliminary findings and a presentation of evaluation findings. Each report is subjected to approval by the MFA. The final report should not exceed 50 pages (plus annexes) with clear findings and conclusions, as well as recommendations and any lessons learned following logically from the findings and conclusions. The Final Report should include an executive summary of two pages. All reports will be submitted to the MFA in English in electronic format.

10. TENTATIVE BUDGET AND WORKPLAN

The company shall be responsible for the hiring of the personnel and financial management. The company shall also take the responsibility of adequate backup services to the evaluation team.

The budget is based on the cost structure agreed to in the *PIF Framework Agreement*.

11. MANDATE

The evaluation team is expected to and entitled to discuss with relevant parties, government authorities, local authorities, civil society organizations, private sector and individuals relevant to the assignment.

The consultant is not, however, authorized to make any commitments on behalf of the Government of Finland or represent him or herself as representative of the Government of Finland.

The team shall share this TOR and/or the letter of introduction of the assignment with the stakeholders they work with.

The evaluation team is responsible for organizing the meetings and field visit related to the evaluation. The MFA will seek to provide support in arranging meetings particularly at the official level.

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Annex 2. Evaluation matrix for the End of Project Evaluation

Evaluation matrix questions (EMQ)	Indicators/judgement criteria	Data collection method	Source of data
RELEVANCE			
EMQ1. Was the project relevant, including technology provided, particularly for the GMA and other stakeholders involved in the surveillance and management of the maritime vessel traffic?	Degree of the relevance of the project and usefulness / appropriate level of the technology.	Semi-structured interviews	GMA leadership and staff in area centres. Project contractor / technology providers. VTMIS/AIS technical experts.
EMQ2. Did the project contribute to Ghana's development plans and sector strategies?	Degree of alignment with policies, strategies, programmes and plans of Ghana.	Desk study	Ghana´s development plans, coastal management strategies, Transport Corridor Programme and other relevant strategies / programmes / plans.
EMQ3. Was the project in line with Finland's development policy objectives and global development goals?	Degree of alignment with Finland´s development policy objectives and UN SDGs.	Desk study / semi-structured interviews	Finland´s development policy programme 2007 and UN's SDGs.
EFFECTIVENESS			
EMQ4. To what extent did the project achieve its immediate objective of implementing a VTMIS and AIS and providing the necessary skills/capacity to GMA and other stakeholders to operate and use the systems effectively? *Was the quality and quantity in accordance with plans?*	Number of established and operational Area Control Centres and Remote Sensor Sites. Quality and rate of operation of the system. Skills and capacity of GMA and other stakeholders in operating and using for their benefit the system. Quality and timeliness of assistance	Desk study Semi-structured interviews Visits to project sites	Reports of MoFA, GMA, Eltel and Navielektro. Staff in GMA, Area Contrl Centres and other stakeholders in Ghana. Staff in Navielektro and Eltel. Observations in the Area Control Centres and Remote Sensor Sites.

	provided by Navielektro. Number of training courses / days. Alignment of training with plans. Number of men and women trained for different tasks needed.		
EMQ5. What were the key success factors or bottle necks that contributed to the project either achieving or falling short of its objectives? *What was the role/contribution of the different actors (project owner, contactor and other stakeholders including the MFA)?*	Achievement / failures for achieving the project objectives. Factors of achieving / not achieving the objectives. Role of different actors (GMA, Navielektro, Eltel, MFA and other stakeholder) in achieving / not achieving the objectives	Desk study Semi-structured interviews Visits to the project sites	Reports of MoFA, GMA, Eltel and Navielektro. Staff in GMA, Area Contrl Centres and other stakeholders in Ghana. Staff in Navielektro and Eltel. Observations in the Area Control Centres and Remote Sensor Sites.
EFFICIENCY			
EMQ6. How efficiently were available resources transformed into intended results in terms of quantity, quality and time - i.e. can the project be deemed to have been good value for money?	The cost of achieving the results compared to other similar projects. The original timetable compared to the realized timetable.	Desk studies Semi-structured interviews	Staff of Eltel, Navielektro and GMA. Reports by Eltel, Navielektro and GMA. Studies on costs and implementation of comparable investments / projects (if existing / available).
EMQ7. What were the key success factors/bottle necks that contributed/constrained implementation? *What was the*	Key factors contributing / hindering the timeliness of the project, including planning, procurement, implementation, risk management, monitoring and follow-up phases.	Desk studies Semi-structured interviews Visits to the project sites	Reports by Eltel, Navielektro and GMA Staff of Eltel, Navielektro and GMA

role/contribution of the different actors?	Actions for offsetting of risks during the construction and operating phases of the systems. Roles of actors in different phases of the project		Observations in the Area Control Centres and Remote Sensor Sites.
IMPACT			
EMQ8. How well did the project succeed in achieving its overall objective to improve surveillance and management of maritime vessel traffic in Ghana? *How did the project contribute towards longer term objectives of improved safety of navigation; increased port efficiency; better environmental protection; less disturbance of wildlife; deterrence of illicit trade; improved fish stocks and livelihoods in the fishing industry?*	Changes in the surveillance and management of maritime vessel traffic in Ghana 2011-2017 and contribution of VTMIS and AIS to the changes. Existence of a monitoring system to follow the indicators and the results in each of the indicators: - Changes in safety of navigation - Changes in port efficiency - Changes in environmental protection - Changes in disturbance of wildlife - Changes in illicit trade - Changes in fish stocks - Changes in livelihoods of men and women in the fishing industry Usefulness / benefits / problems of VTMIS and AIS as perceived by stakeholders. Estimation of the financial and economic benefits / costs.	Desk studies Semi-structured interviews / ad hoc interviews Field visits e.g to the project sites, harbours, fisheries communities, etc.	Annual and other government reports and observations (ministries and development projects) on navigation safety, port efficiency, environmental protection, disturbance of wildlife, illicit trade, fish stocks, coastal livelihoods: Reports, surveys and observations by civil society and other organizations on navigation safety, port efficiency, environmental protection, disturbance of wildlife, illicit trade, fish stocks, coastal livelihoods: GMA leadership and staff, Ministry of Fisheries and Aquaculture, Ministry of Transport, Maritime Rescue and Coordination Centre, Navy, National Security Agency, Narcotics Control Board, Meteorological Agency, Environmental Protection Agency, Ghana Ports & Harbour Authority,

			Local authorities, Civil society organizations including Ghana Inshore Fisheries Association Ghana Industrial Trawlers Association National Fish Processors and Traders Association Donor-funded projects, EU Delegation, UN/international organizations (e.g. IMO, IUCN).
EMQ9. What other noticeable impact did the project have (intended/unintended, positive/negative), particular in terms of human rights, gender equality, inequalities and environmental sustainability?	Changes in human rights, gender equality, inequalities and environmental sustainability in coastal and Lake Volta areas and contribution of the VTMIS and AIS installation and operations to them?	Semi-structured interviews Focus group discussions / ad hoc interviews Desk studies Field visits e.g to the project sites, harbours, fisheries communities, etc.	Local authorities in coastal areas, Environmental CSOs, Women's unions, Ghana Inshore Fisheries Association, Ghana Industrial Trawlers Association, National Fish Processors and Traders Association, Hen Mpoano NGO, Local communities on the coast and by Lake Volta.
SUSTAINABILITY			
EMQ10. How sustainable are the results achieved in the project? *Have stakeholders in Ghana taken steps to ensure sustainability e.g. in budgeting or other processes?* *Are the project results still relevant and are the systems installed/other outputs of the*	Evidence of the constant maintenance of the VTMIS and AIS systems. Evidence of sustained budget to maintain the VTMIS and AIS systems. Evidence of skilled staff in area centres.	Desk studies Semi-structured interviews Visits to the project sites	Leadership and staff in GMA and Area Contrl Centres. Staff of Eltel and Navielektro. GMA annual budget 2013-18; financial reports 2013-17. Observations in the Area Control Centres and Remote Sensor Sites.

project still in efficient and effective use?	Evidence of efficient and effective use of systems. Evidence of education / training courses.		Education / training institutions.
COORDINATION, COMPLEMENTARITY, COHERENCE, AID EFFECTIVENESS			
EMQ11. How were other programs and cooperation relevant to the project considered?	Evidence on coordination with other programmes and cooperation.	Desk studies Semi-structured interviews	Feasibility study and Appraisal report. Staff of GMA, Eltel and Navielektro. Other ministries and authorities
EMQ12. How well did the project promote ownership, alignment, harmonization, management for development results and mutual accountability?	Ownership of the project by GMA. Leadership in planning and implementing the surveillance systems. Existence of monitoring systems or plans to install them.	Desk studies Semi-structured interviews	Feasibility study and Appraisal report. GMA leadership and staff and also staff of Eltel and Navielektro. Ministry of Fisheries and Aquaculture, Ministry of Transport, Maritime Rescue and Coordination Centre, Navy, National Security Agency, Narcotics Control Board, Meteorological Agency, Environmental Protection Agency, Ghana Ports & Harbour Authority Civil society organizations.
EMQ13. Were there contradictions with other policy areas and how were they handled? *How did the project impact*	Evidence of contradictions with other policies (coastal and Lake Volta economic development, environment policies, fisheries policies…)	Desk studies Semi-structured interviews	Other ministries, Ghana Ports & Harbour Authority, Civil society organizations, Development partners.

debt sustainability in Ghana?	Regular repayments of the loan by Ghana government in 2016-17.		Ministry of Finance Fortis Bank Finnvera
OTHER			
EMQ14. Did the project open up new business for the Finnish companies in Ghana/developing countries? *Was the project part of a strategy by the companies to expand operations in developing countries?*	New operations started in Ghana and in developing countries by Eltel and Navielektro. Other new Finnish businesses started in Ghana in 2012-18. Evidence of export strategies of the companies involved.	Semi-structured interviews Desk studies	Eltel, Navielektro Finnvera, Finnfund, Tekes Business Finland (Team Finland), Embassy of Finland in Nigeria, Finnish companies active in Ghana Internet
EMQ15. How did the project contribute more broadly to cooperation and relations between Finland and Ghana? *Were there synergies with other Finnish cooperation in the region?*	Changes in the relations between Finland and Ghana and contribution of the project. Awareness of the project among stakeholders. Evidence of synergies with other Finnish cooperation in the region.	Semi-structured interviews Desk studies	Finnvera Finnfund Tekes MFA, Embassy of Finland in Nigeria, Eltel, Navielektro, Finnish companies active in Ghana. Stakeholders in Ghana.

Annex 3 Result framework

Results	Indicators	Baseline value	Target value	Means of verification	Assumptions
Impact objective					
Improved surveillance and management of maritime vessel traffic in the coastal areas and navigable waters in Ghana.	Ghana complies with the IMOs international conventions (Safety of Life at Sea, SOLAS and Global Maritime Distress and Safety System, GMDSS)				Strong commitment by government leaders and other stakeholders Sufficient capacity to enforce the law, including the preparedness to react in the case of illegalities (boat fleet etc) Adequate cooperation between the stakeholders in using the VTMIS
	Increased traffic in Ghana´s Atlantic ports				
	Increased port efficiency				
	Better environmental protection				
	Less illicit human and drug trafficking				
	Less disturbance of wildlife				
	Improved fish stocks				
	Improved livelihoods in the fishing industry				

Results	Indicators	Baseline value	Target value	Means of verification	Assumptions
Outcome					
VTMIS surveillance system in place in Ghana.	NCC and ACCs functioning 24/7				Sufficient commitment and funds to maintain and improve the surveillance and management system of maritime vessel traffic Active stakeholder participation (other government agencies, navy, civil society, private sector)
	Monitoring stations functioning 24 / 7				
	RSSs and RBSs with all their sensors functioning				
	Staff with sufficient training employed in NCC, ACCs and MSs				
	Information provided for ships and vessels for safe navigation				
	Continuous maintenance working for the VTMIS system and equipment				
	Continuous training system functioning for VTMIS monitoring				
Output 1. Infrastructure constructed or made available for VTMIS and control / monitoring centres					

Results	Indicators	Baseline value	Target value	Means of verification	Assumptions
Output 1.1. VTMIS NCC and ACCs and their infrastructure constructed	Number of NCC and ACCs constructed				GMA can provide appropriate sites for the NCC, ACCS, RSSs and RBSs and infrastructure needed for them (e.g. electricity and roads) There is willingness and financial capacity to maintain the infrastructure
Output 1.2. RSSs and their infrastructure constructed	Number of RSSs sites constructed.				
Output 1.3. RBSs and their infrastructure constructed	Number of RBSs sites constructed.				
Output 1.4. Space for MSs provided	Number of MSs rooms				
Output 1.5. Communication (e.g. Internet, Microwave) constructed or organized between RSSs and RBSs and NCC, ACCs	Communication coverage percentage between sites and centres.				

Results	Indicators	Baseline value	Target value	Means of verification	Assumptions
and MSs					
Output 2. VTMIS technology installed					
Output 2.1. Five VTMIS NCC and ACCs and eight MSs equipped and operational	Number of NCC and ACCs equipped				GMA can provide appropriate space for the NCC, ACCS, RSSs and RBSs There is willingness and financial capacity to maintain the systems
	Number of MSs equipped				
	Equipment in NCC and ACCs functioning				
	Equipment in MSs functioning				
	Regular maintenance system for NCC, ACCs and MSs established and operating				
Output 2.2. 11 RSSs and RBSs equipped and operational	Number of RSSs equipped				
	Number of RBSs equipped				
	Sensors in RSSs functioning				
	Sensors in RBSs functioning				
	Sensor information transmitted and available in NCC and ACCs				
	Sensor information transmitted				

Results	Indicators	Baseline value	Target value	Means of verification	Assumptions
	and available in MSs				
	Regular maintenance system for RSSs and RBSs established and operating				
Output 3. Capacity of GMA and stakeholder organizations´ personnel improved.					
Output 3.1. Personnel in VTMIS NCC, ACCs and MSs have sufficient capacity to operate and maintain the system	Sufficient education level of staff operating the system				GMA has enough staff with higher education level to be trained The trained staff stays in GMA
	Number of staff trained (women / men)				
Output 3.2. Software specialists have enough capacity to operate the system	Sufficient education level of software specialists				The trained staff stays in GMA
	Number of staff trained (women / men)				
Output 3.3. Maintenance staff has enough capacity and equipment to maintain the system	Sufficient education level of maintenance specialists				The trained staff stays in GMA
	Number of staff trained (women / men)				

Annex 4: Status of VTMIS/AIS Centres, Monitoring Stations, Remote Sensor Sites and Remote Base Stations

Status of VTMIS/AIS Centres and Monitoring Stations

Facility	Visited	VTMIS /AIS equipment in place	AIS on	AIS off time	Radar on	CCTV on	VHF in use	IP	AtoN in use	Meteorological and hydrological data on	Other comment
NCC, GMA/Accra	Yes	Yes	Yes	-		No	Yes	Yes	No	No	MF , LRIT working but used rarely, 2*Training VTMIS sets
ACC, GMA/Tema	Yes	Yes	Yes	-	Yes	No	Yes	Yes	No	No	MF, Training VTMIS set, German set for GMDSS but MRCC no working.
ACC, GMA/Takoradi	Yes	Yes	Yes	-	No*	No	Yes	Yes	No	No	MF, Training VTMIS set.
ACC, Navy HQ Command, Accra	Yes	Yes	Yes	-	No*	No	Yes	Yes	No	No	Training VTMIS set.
MS, Navy Command West, Takoradi	Yes	Yes	Yes	-	No		No	No	No	No	They use other VHF. They have never seen CCTV. Do they have the CCTV feed or not Do they have radar feed or not
MS, GPHA, Tema Port	Yes	Yes	No	2 weeks		No		Yes		No	They use other VHF. Do they have VTMIS CCTV video feed
MS, Fisheries Commission, Tema	Yes	Yes	Yes	-				Yes		No	
MS, Customs, GRA, Accra	Yes	Yes	No	Some weeks or months				Yes		No	
MS, NSA	Yes	Yes	No	2 years				Yes		No	
MS, NACOB	Yes	Yes	Yes	-				Yes		No	
MS, Volta Lake Transport Co.	Yes	Yes	No	> 4 years				Yes		No	
GPHA/Takoradi	Yes	No									Have Navielektor's Port Control system in use.
Regional Maritime University, Accra	Yes	No									Never received VTMIS, but staff was trained for it.
MS, Navy Command East	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
MS, Marine Police	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
MS, Immigration	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	

* Radar operating partly, not useful for vessel traffic monitoring

Status of VTMIS/AIS Remote Sensor Sites and Remote Base Stations

Tower	Site was visited by the evaluation team	In use = Air conditioning on	Radar rotates	CCTV works	Working microwave connection	Other comment
East, Tema	Yes	Yes	Yes	No	No*	CCTV not turning
East, Winneba	Yes	Yes	No	No	No*	When visiting tower the radar did not rotate. Later in Navy HQ they indicated – it rotates.
West, Cape Coast	Yes	Yes	No	No	No*	
West, Takoradi	Yes	Yes	Yes	No	No*	CCTV not turning
Volta, Akosombo/Anum	Yes	No		No	No*	
East, Ada	No	Yes	n/a	No	No*	
East, Keta	No	Yes	n/a	No	No*	
West, Axim	No	Yes	No	No	No*	Navy HQ information – radar not rotating
West, Epunsa	No	Yes	No	No	No*	Navy HQ information – radar not rotating
Volta, Kete Krachi	No	No		No	No*	
Volta, Dambai	No	No		No	No*	

n/a = information not available
* Microwave connection never worked

Annex 5. List of Organizations and People Consulted

Organisation	Persons
Financing Partners	
BNP Paribas Fortis SA/NV	Mr Tim Lamey (former employee of BNP) nowadays in Mizuho Bank Ltd, Senior Director Head of Export Finance, EMEA European Structured Finance Department
Finnvera	Ms Hannele Matilainen, Senior Advisor Jarkko Haapiainen , Senior Advisor
Ministry for Foreign Affairs	Mr Antti Piispanen, Commercial Counsellor Henna-Riikka Pihlapuro, Desk Officer, Concessional Credits
Valtiokonttori	Ms Ringnell Maritta, credit advisor (luottoasiantuntija)
Contractors and technology providers	
Aboa Mare	Mr Bo Lindroos, Senior lecturer
Eltel Networks Corp.	Mr Antti Lassila, Director, Sales & Business Development
Navielektro Ky	Mr Mats Koivisto, Chief Technical Advisor Mr Asser Koivisto, Managing Director
Zeni Lite Buoy	Mr Johnatan Langlois, Deputy General Manager
Ghana Maritime Authority (GMA) and Ministry of Transport	
GMA, ACC East, Tema + RSS	Mr Charles Bodakpui, GMA, VTMIS Mr Paul Mensah-Abvampah, VTMIS Mr Augustus Arthur, VTMIS
GMA, ACC West, Takoradi + RSS	Mr David Wilson, VTMIS radio operator
GMA, NCC directors, Accra	Kwame Owusu, Director General, Capt. Inusah, VTMIS Director Mr Daniel Appianin, Deputy Director General
GMA, NCC, maintenance, Accra	Augustine Chongaterah, maintenance officer
GMA RBS, Akosombo/Anum	Mr Emmanuel Hedzri, Watchman Mr Nicholas Nyarko, Watchman
GMA, RSS, Cape Coast	Mr John Kruesi, Watchman
GMA, RSS, Winneba	Mr Alfred Nana Acquah, Watchman Mr Christopher Dzanx, Watchman
Lake Volta Transportation Company, MS	Mr Eric Obuobi, Network Administrator/VTMIS operator, Mr Ofoe Emmanuel, Captain Seini Abdulai, Mr Ekua Benin Prah, Ms Rose Applah Okyere
Ministry of Transport	Mr Eric Tetteh, Acting Director
Other ministries and beneficiaries among	

government in Ghana	
Customs Division of Ghana Revenue Authority (GRA), MS	Mr Seidu Iddrisu Iddisah, Assistant Commissioner (Preventive), Customs Division/enforcement, Mr Andrew K. Seshie, VTMIS Surveying and Monitoring
Environmental Protection Agency (EPA)	Ms Kojo Agbenor-Efunam, Chief Programme Office, Oil/Gas, Ms Larry Kotoe, Principal Program Officer
Fisheries Commission (FC), Takoradi	Mr Theodore Kwadjosse, Officer-in-charge Monitoring, Control, and Surveillance Division
Fisheries Commission (FC), Tema	Mr Yosef Yaw Yeboah, Assistant Director
Ghana Ports and Harbours Authority (GPHA), Takoradi, MS	Capt. James R. Quayson, Harbour Master & PFSO, Mr Justice Akwo, Signals officer
Ghana Ports and Harbours Authority (GPHA), Tema, MS	Capt. Christian Yeboah-Asante, Harbour Master, Mr Alex Cepaa, Senior IT Officer, VTMIS
Ministry of Finance, Accra	Mr Daniel Frimpong Yeboah, Senior Economics Office
Narcotics Control Board (NACOB), MS	Mr Benjamin Oti Odei, Acting Head MMU, Ms Henrietta Sackey, VTMIS Ms Mahama Bima Fulera, VTMIS
National Security Agency (NSA), MS	Mr. Ani Elischama, Chief Desk Officer
Navy Command HQ, ACC	LT(GN) Gideon Yankey – Officer in Charge, Naval HQ, Mr Nyumuteye Emmanuel, Petty Officer, Naval HQ MDC
Navy Command West, MS	Commander Samuel Agelazono, Command Operations Officer LT (GN) Kofi Abaka Anamana, AB' Abrocquah Richard Gem, AB' Essel Emmanuel, AB' Apolala Godfred
Non-governmental organizations and final beneficiaries (fisheries: fishermen, fish mongers, trawlers)	
Fishermen in Elmina	Mr Kojo Acon + three other fishermen
Fishermen in Takoradi/Secondi in Friends of the Nation office	Mr Mike Aboka-Edu from Axim, Regional Secretary – Ghana National Canoe Fishermen Council (GNCFC) Mr Jeremiah Eshun, GNCFC Eastern Region, Canoe Owners, son of chef fisherman Mr Emmanuel Nii Onsaku, Former Chairman of Line&Hook Fishermen Association in Sekondi.
Friends of the Nation, Takoradi	Wim C. Mullie, Senior Environment & Biodiversity Advisor, Kyei Kawadwo Yamoah, Programmes Manager
Ghana Industrial Trawlers Association (GITA) and Jerome's Famous Fish Markets Tema	Mr Jerome Selorm Deamesi, President and Jerome's Famous Fish Markets, Chief Executive Officer
National Association of Fish Processors and Traders (NAFPT)	Ms Emelia Abakah-Adu, Vice-president

SNV	Mr Emmanuel Kwarteng, Advisor MS Benedicta Avega, Consultant
Development partners	
Danish Maritime Authority, e-Navigation	Mr Christopher Saarnak, PhD, EfficienSea2 project manager, Chief Adviser
Delegation of the European Union to Ghana	Mr Benoist Bazin, Head of Operations– Infrastructure and Sustainable Development Mr Zoltan Agai, Head of Cooperation Mr Sotirios Bazikamwe, Governance Advisor
Embassy of Denmark, Abuja, Nigeria	Captain Soren Skovbjerg Nielsen, Defence attaché
GoGIN project	Mr Eric Glotin, Gulf of Guinea Interregional Network, Key Expert 2 – Deputy for ECOWAS and Adviser at the Western African Regional Maritime Security Center (CRESMAO) + 4 other GoGIN experts, Mr Nuno Monica, GoGIN Mr Olivier Combes – Academie Maritime, Côte d´Ivoire
USAID / Ghana Sustainable Fisheries Management Project	Dr. Socrates Apetorgbor, Fisheries specialist – Fisheries management and policy
The World Bank	Mr Steynar Matthiasson
Other	
Business Finland	Mr Korda Asare, General Manager, Outotec Service Centre, West Africa Mr Raheem Olu, Trade Commissioner Business Finland Nigeria (West Africa)
Embassy of Finland, Abuja, Nigeria	Ms Pirjo Suomela-Chowdhury, Ambassador
GMEA Group	Leeni Ojaniemi
Local leader, Winneba	Kobina Bortse Gyateh, King Ghartey VII
Western Finland Vessel Traffic Centre	Mr Mats Koivisto from Navielektro, Chief Technical Advisor
Regional Maritime University, Accra	Capt William B. Wricketts, Head of Marine Safety Department, + two other from university administration
Tanecon Oy	Mr Tauno Kääriä, Managing Director

Annex 6: List of Documents reviewed

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Annex 7 Focus Group Discussion (FGD) and Key Informant Interview (KII) check list

1. Financier / financing

- How were you involved in the project – what was your role?
- What are your roles in financing issues and processes of the project?
- How did the project succeed from your point of view? – and different phases?
- Was the financing planning process and plan well done?
- How was the financing plan implemented and was the reporting well done?
- Have all the payments been received / paid in time?
- Where is the project now in financing terms?
- What kind of challenges / limitations / problems did the project implementation have?
- What kind of positive experiences did the implementation provide?
- Do you have any documents that you could provide for the evaluation?
- Have there been changes in the relations between Finland and Ghana – has the project contributed to these changes?
- Were there any synergies with other Finnish cooperation in the region?
- Have any new Finnish businesses started in Ghana in 2012-18?

2. Contractor and technology provider / practical implementation, financing (Navielektro, Eltel, Aboa Mare)

- How were you involved in the project – what was your role?
- Did you find the project relevant for the conditions in Ghana?
- Was the project implemented according to the original timetable and according to plans?
- Did the project reach its outputs?
- Did the project reach its outcome?
- What were the impacts of the project?
- What kind of challenges / limitations / problems did the project implementation have?
- What kind of positive experiences did the implementation provide?
- The key success factors / failure factors in the project?
- Was the implementation efficient?
- Was the technology provided appropriate for the recipient?
- Was the education level of trained staff sufficient for the training?
- Was the recipient ready to take responsibility of the project implementation and operation?
- How was the sustainability ensured in the project?
- Have the results and impacts been sustained?
- Did the project consider other projects or programmes in the country or the region?
- Have any new business operations been started in Ghana and in developing countries by your company?
- Was the project in line with your company's export strategy?
- Did you receive the payments in time?
- What would you do differently if you would do the project again?
- How and what kind of project should have been implemented to reach the expected impacts?
- Do you have any documents that you could provide for the evaluation?

3. GMA and Ministry of Tranportation /practical implementation and financing

- What were your experiences of the project?
- Did the project reach its outputs?
- Did the project reach its outcome?
- What were the impacts of the project? Can you indicate changes in safety of navigation / port efficiency/ environmental protection / disturbance of wildlife/ illicit trade / fish stocks

livelihoods of men and women in the fishing industry?
- Was the impact sufficient? What could be done to improve it?
- What kind of challenges / limitations / problems did the project implementation have?
- Was the project implemented according to the original plan and timing?
- What kind of positive experiences the implementation provided?
- The key success factors / failure factors in the project?
- Was the implementation efficient?
- Was the training provided by the Finnish company satisfactory (quality and quantity)? How many men and women were trained and where?
- Was the technology provided appropriate for GMA?
- Was GMA ready to assume responsibility of the project implementation and operation?
- How was the sustainability ensured in the project?
- Have the results and impacts been sustained?
- Did the project consider other projects in the country or the region?
- Was the project in line with the policies, strategies and programs of Ghana and the sector?
- How did you experience CCS project financing?
- Were there any problems with the CCS financing?
- What would you do differently if you would do the project again?
- How and what kind of project should have been implemented to reach more impacts?
- Do you find the project as a good investment by the Government of Ghana?
- Do you have any documents that you could provide for the evaluation?

4. Other ministries and administration in Ghana / Cooperation, practical impacts and impacts (environmental, social and financial)
- What do you know about the project?
- How were you involved in the project – what was your role? Were you consulted and sufficiently informed during the planning and implementation of the project?
- What were your experiences of the project?
- What were your expectations from the project? / What benefits were expected?
- Did the project reach your expectations? / What benefits have been achieved? Can you indicate changes in safety of navigation / port efficiency/ environmental protection / disturbance of wildlife/ illicit trade / fish stocks / livelihoods of men and women in the fishing industry?
- What kind of challenges / limitations / problems you experienced with the project?
- What kind of positive experiences you had with the project?
- The key success factors / failure factors in the project from your perspective?
- How was the sustainability ensured in the project?
- Did the project consider the other projects – especially your sector - in the country or the region?
- Was the project in line with the policies, strategies and programs of Ghana and the sector?
- How and what kind of project should have been implemented to reach the expected impacts?
- Do you have any documents that you could provide for the evaluation?

5. Fisheries / Impacts on fishermen, fisherwoman, fishing industry and fish stocks
- What do you know about the project?
- How did you get information about the project? What information?
- Were you involved / informed during planning or implementation phase?
- What are your experiences of the coastal surveillance system? Have you benefitted from it?
- What were your expectations from the project? / What benefits were expected? Especially related to fish and fisheries or environmental protection or social issues or role and rights of women or different groups of people?

- Did the project reach your expectations? / What benefits did realize? Especially related to fish and fisheries or environmental protection or social issues or role and rights of women or different groups of people?
- Can you indicate any changes in safety of navigation / port efficiency/ environmental protection / disturbance of wildlife/ illicit trade / fish stocks / livelihoods of men and women in the fishing industry?
- How and what kind of project should have been implemented to reach the expected impacts?
- Do you have any documents that you could provide for the evaluation?

6. NGOs in environment, gender or social sector / Associations / Community groups

- What do you know about the project?
- How did you get information about the project? What information?
- Were you involved / informed during planning or implementation phase?
- What were your experiences of the project?
- What were your expectation from the project? / What benefits were expected? Especially related to environmental protection or social issues or role and rights of women or different groups of people?
- Did the project reach your expectations? / What benefits did realize? Especially related to environmental protection or social issues or role and rights of women or different groups of people?
- Can you indicate changes in safety of navigation / port efficiency/ environmental protection / disturbance of wildlife/ illicit trade / fish stocks / livelihoods of men and women in the fishing industry?
- How and what kind of project should have been implemented to reach the expected impacts?
- Do you have any documents that you could provide for the evaluation?

7. Other donors (EU, USAID…)

- What do you know about the project?
- How did you get information about the project? What information?
- Were you involved / informed during planning or implementation phase?
- What were your experiences of the project?
- What were your expectation from the project? / What benefits were expected? Especially related to environmental protection or social issues or role and rights of women or different groups of people?
- Did the project reach your expectations? / What benefits did realize? Especially related to environmental protection or social issues or role and rights of women or different groups of people?
- Can you indicate changes in safety of navigation / port efficiency/ environmental protection / disturbance of wildlife/ illicit trade / fish stocks / livelihoods of men and women in the fishing industry?
- How and what kind of project should have been implemented to reach the expected impacts?
- Do you have any documents that you could provide for the evaluation?

8. Training institution

- What was your role in the project?
- How did you get involved in the project?
- How was the training organized from the project side?
- How was the training organized from the training institution side?
- How did the training go? Was it successful? Comments of the trainees?
- Was the education level of trainees sufficient for the training?
- Was GMA satisfied?

- Are you aware of the performance of trained people after the training?
- Have you received information about the trained persons now?
- Do you have any documents that you could provide for the evaluation?

Annex 8. Photographs of Stations, Sites and Technology

Photo 1: Fishing canoe at a beach, the Harbor of Tema on the background and ships at anchor in the distance

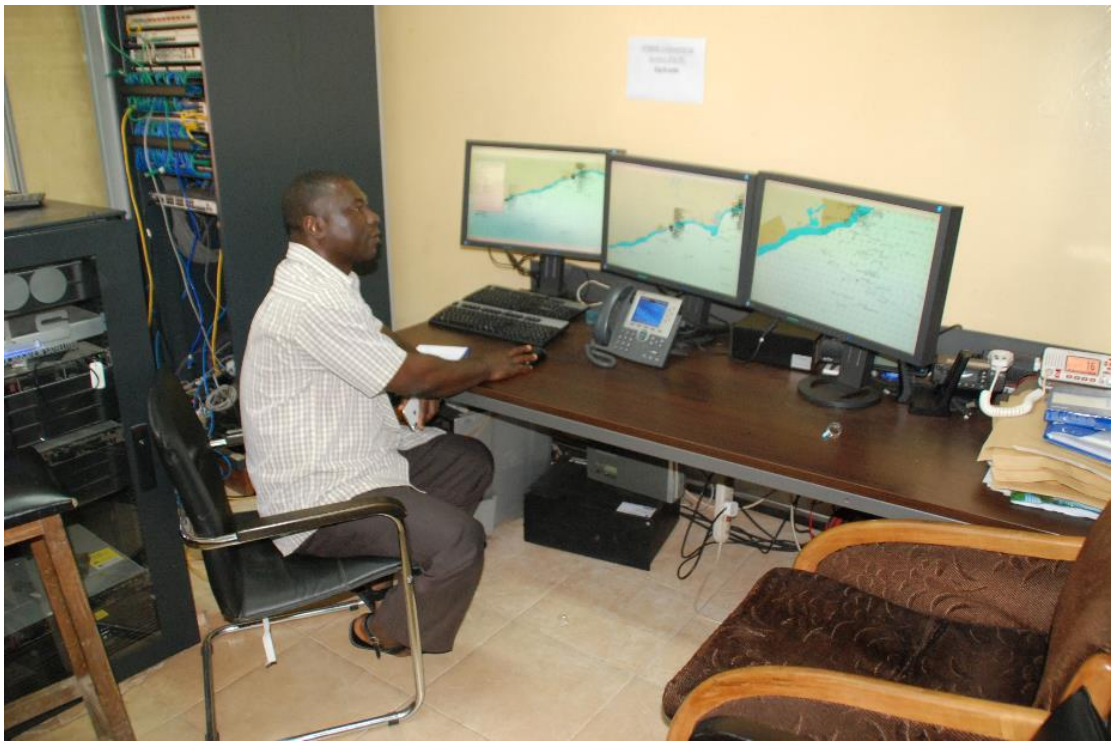

Photo 2: Monitoring in Fisheries Commission Monitoring Station (MS) in Tema

Photo 3: GMA, VTMIS National Coordination Center (NCC), Accra

Photo 4: GMA, VTMIS monitoring in NCC, Accra

Photo 5: GMA, Monitoring in Area Control Center (ACC), East, Tema

Photo 6: National Security Agency (NSA) MS, which has not worked for two years, Accra

Photo 7: Remote Base Station (RBS) in Anum

Photo 8: Remote Sensor Site (RSS) in Winneba

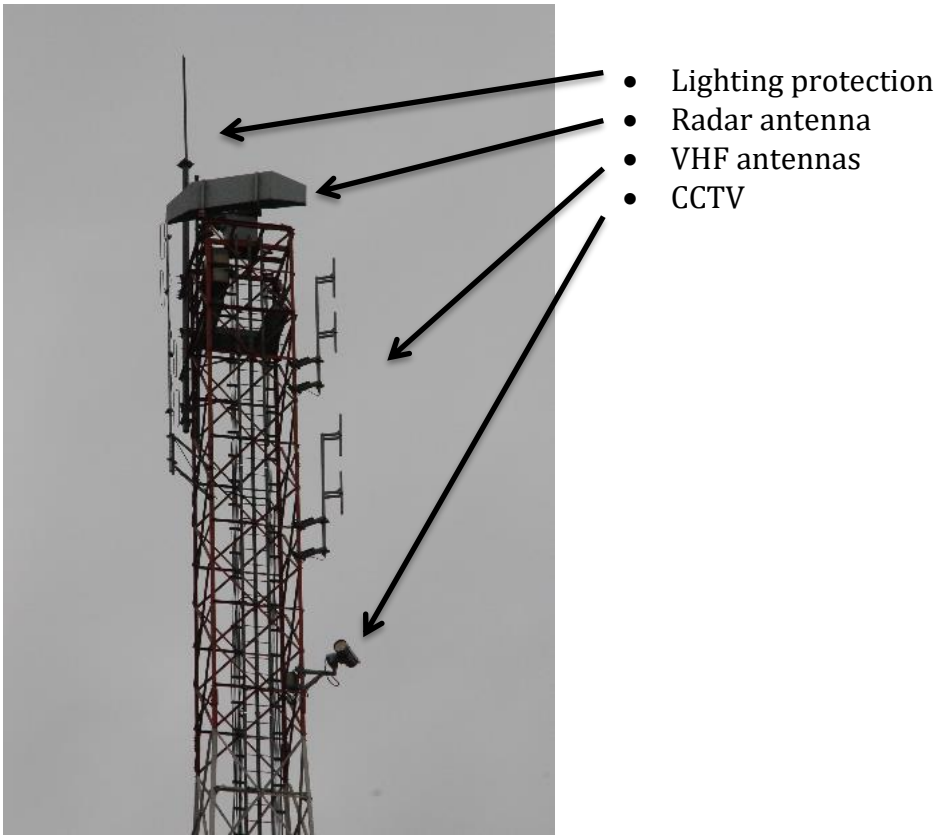

Photo 9: Remote Sensor Site (RSS) tower in Winneba: lighting protection, radar antenna, VHF antennas nnd CCTV.

Photo 10: Remote Sensor Site (RSS): fence, tower, generator (yellow), air conditioned server room (in front of the tower) and office (on the right side of the tower) in Winneba

Photo 11: Remote Sensor Site (RSS) generator in Winneba

Photo 12: Fishing harbor in Elmina

Photo 13: Fishermen in Elmina

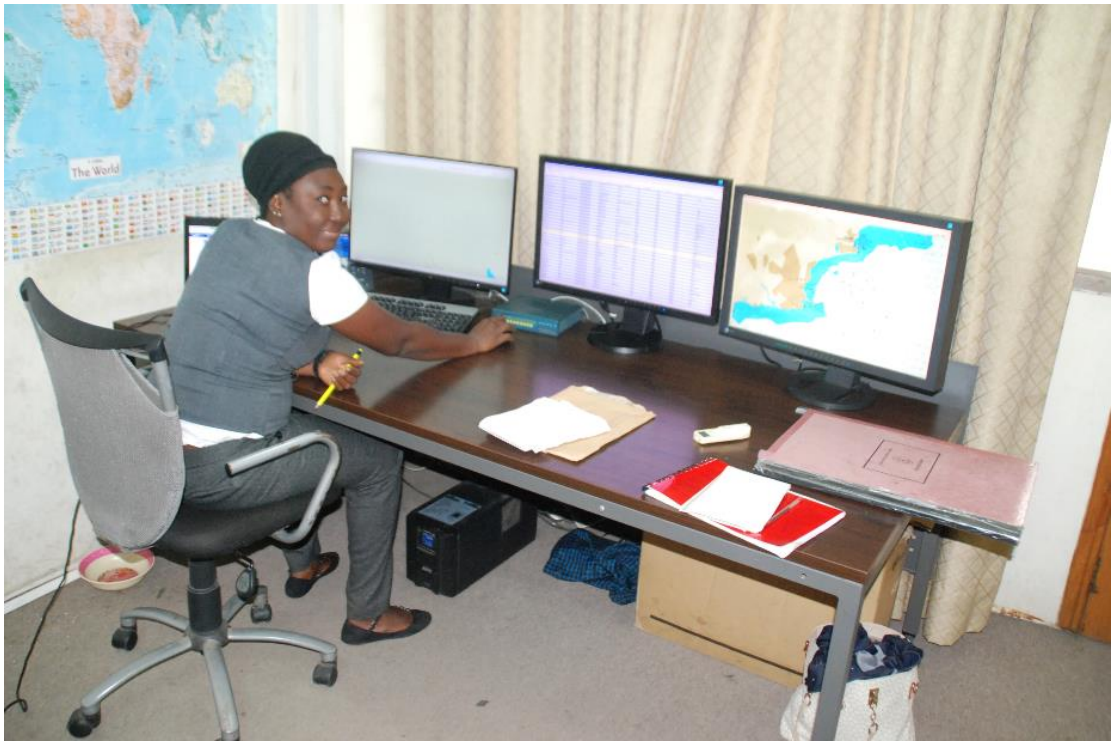

Photo 14: Monitoring in Narcotics Control Board (NACOB) MS in Accra,

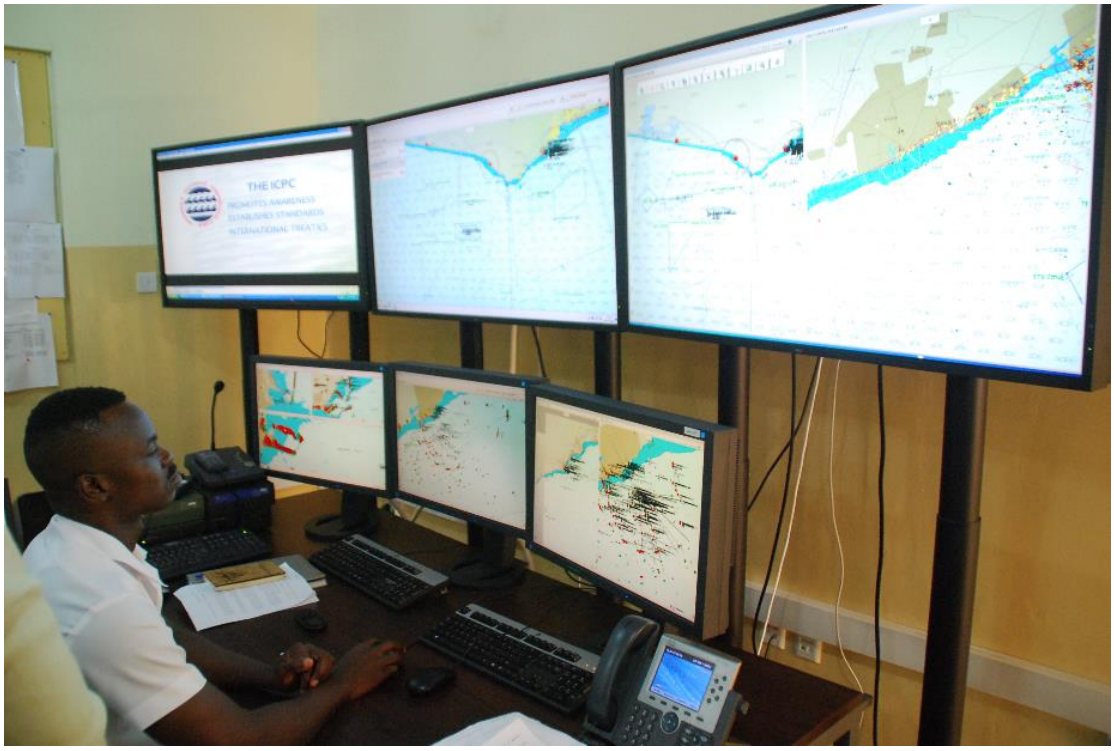

Photo 15: Monitoring in Navy Headquarters ACC in Accra

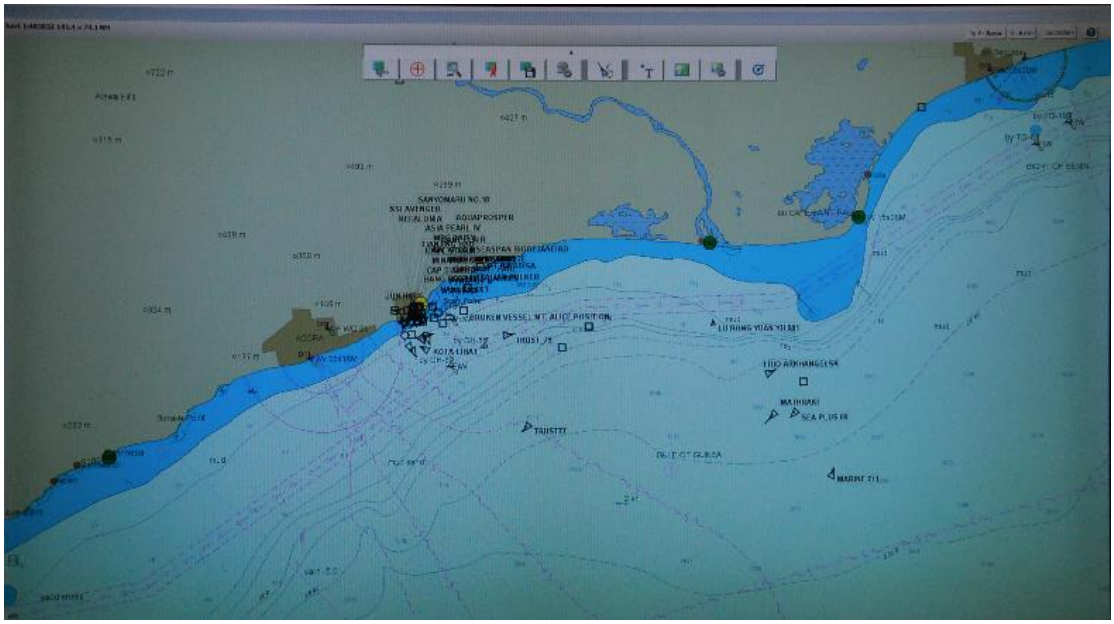

Photo 16: VTMIS monitor picture by Tema with moving and anchored ships

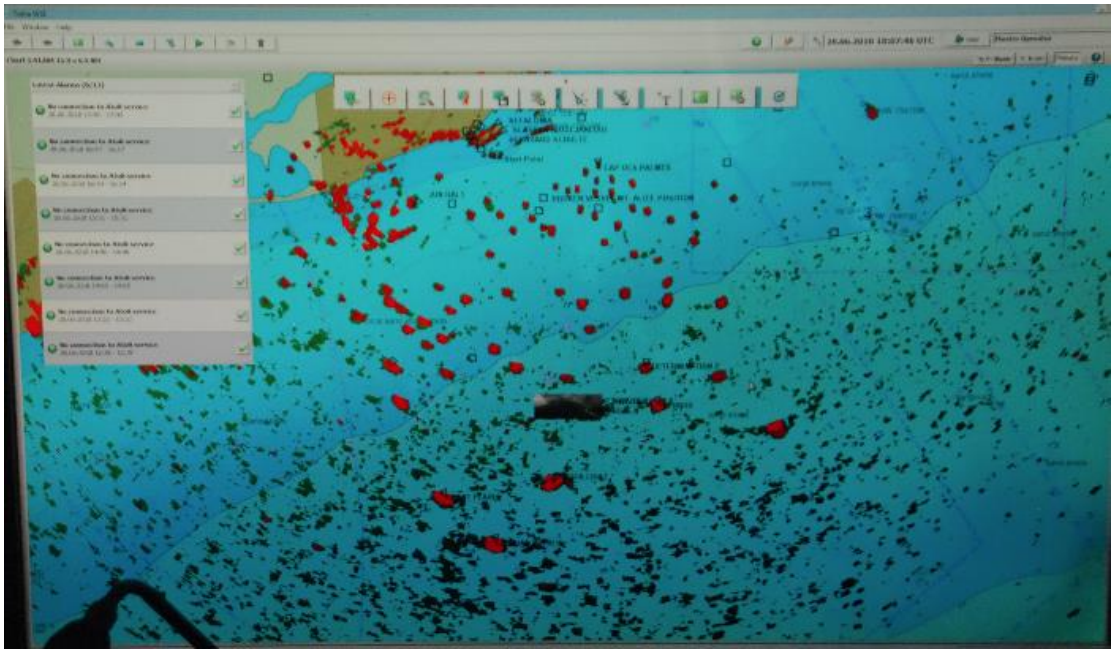

Photo 17: VTMIS radar picture

Photo 18: GMA, Central Processing Equipment in Tema ACC in an air conditioned room.