A STUDY ON THE ESTABLISHMENT OF THE VESSEL TRAFFIC SYSTEM AT THE TURKISH REPUBLIC OF NORTHERN CYPRUS

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Mehmet Emin DEBEŞ: A Study on the Establishment of Vessel Trafic System on the Turkish Republic of Northern Cyprus

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To my Wife and my Kids.....

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ABSTRACT

The first Vessel Traffic Service (VTS) in the world started in 1949 in the Liverpool Port in the United Kingdom and it continued in Netherlands in 1956. In Turkey, planning and management of the marine traffic of the vessels using the waterways and ports in Turkey that started with Turkish Straits VTS services which came into service in 2003 together with the increase in the vessel traffic density enhance its effectiveness and the necessity every year. Feasibility studies in five new areas have been initiated for the establishment of the VTS system by force of the strategic decision taken by the maritime authority in 2008. These areas are Izmit Bay, Izmir Bay, Gulf of Iskenderun, Mersin and Aliaga-Izmir. Monitoring of the marine traffic has an important place as the Turkish Republic of Northern Cyprus (TRNC) is an important transition point in the Eastern Mediterranean region. For this reason, the evaluation of a VTS system to be located in the TRNC with this study with an Environmental (PEST: Political, Economic, Social, Technological) and the necessity of conducting a SWOT (Strengths, Weakness, Opportunities, Threats) analysis are required. In addition, the possible Traffic Monitoring Station (TMS) locations have been studied by carrying out field study. Evaluation of TRNC VST in geographical and strategic terms will benefit from the opportunities and facilities that both the Republic of Turkey and the TRNC will have as a part of the effect of VTS against the embargo imposed on the TRNC in the world. Three appropriate VTS stations have been chosen as a result of the field study carried out for 10 determined and recommended Traffic Monitoring Stations. These are Kormakitis Station of an altitude of 160 metres near Sadrazam Village in the Cape Kormakitis, Cape Apostolos Andreas Station of an altitude of 33 metres in the Cape Apostolos Andreas and Famagusta Station of an altitude of 19 metres in the Famagusta Free Port and Zone. It is also concluded that it would be appropriate to plan the Famagusta Station as VTS Centre. It is foreseen to monitor and follow the vessels in the zones out of the coverage area of these stations by Automatic Identification System (AIS). Safety and security in the shipping, navigation life, property and environment of the region will be enhanced by monitoring the vessels passing particularly through this region and by making use of the opportunities provided by technology in accordance with national and international regulations.

Keywords: TRNC; VTS; vessel traffic services; PEST analysis; SWOT analysis

ÖZET

Dünyadaki ilk Gemi Trafik Hizmeti (GTH) 1949 yılında İngiltere'nin Liverpool Limanında baylayıp daha sonra 1956 yılında Hollandada uygulanmaya devam etmiştir. Türkiye'de ise, gemi trafiğinin yoğunluğunun artması ile 2003 yılında hizmete giren Türk Boğazları Gemi Trafik Hizmetleri (GTH) ile başlayan Türkiye'deki su yolları ve limanlarını kullanan gemilerin deniz trafiğinin planlanması ve yönetimi her geçen yıl etkinliğini ve gerekliliğini artırmaktadır. 2008 yılında Türkiye denizcilik otoritesinin aldığı stratejik karar gereği beş yeni alanda GTH kurulumu için fizibilite çalışmaları başlatılmıştır. Bu alanlar; İzmit Körfezi, İzmir Körfezi, İskenderun Körfezi, Mersin ve Aliağa-İzmir'dir. Doğu Akdeniz bölgesinde Kuzey Kıbrıs Türk Cumhuriyeti (KKTC)'nin yeri önemli bir geçiş noktası üzerinde olması nedeniyle deniz trafiğinin izlenmesi önem arzetmektedir. Bu sebepten bu çalışma ile KKTC'de konumlandırılacak bir GTH sisteminin; Çevre (PEST: Politik, Ekonomik, Sosyal, Teknoloji) Analizi ile etki değerlendirmesi ve GTH kurulumu için GZFT (Güçlü ve Zayıf Yönler ile Fırsat ve Tehditler) Analizi gerçekleştirilmesi ile gerekliliği değerlendirilmektedir. Ayrıca, saha çalışması yapılarak olası Trafik Gözetim İstasyonlarının (TGİ) yerlerinin uygunlığu incelenmiştir. KKTC GTH'ın coğrafik ve stratejik açıdan değerlendirilmesi, dünyada KKTC'ye uygulanan ambargolara karşı GTH'ın etkisi ile hem TC hem de KKTC'nın sahip olacağı fırsat ve olanakların değerlendirmesi gerçekleştirilmiştir. Araştırma sonucu belirlenen ve öneride bulunulan 10 adet Trafik Gözetim İstasyonu için yapılan saha çalışması neticesinde 3 adet uygun GTH istasyonu belirlenmiştir. Bunlar sırası ile Kormacit burnu'ndaki Sadrazam Köy civarındaki rakkım değeri 160 metre olan Kormacit İstasyonu, Zafer Burnu'ndaki rakkım değeri 33 metre olan Zafer Burnu İstasyonu ve Gazimağusa Serbest Liman Bölgesindeki rakkım değeri 19 metre olan Gazimağusa İstasyonudur. Gazimağusa İstasyonunun ayrıca GTH Merkezi olarak planlamasının yapılmasının uygun olduğu anlaşılmıştır. Bu istasyonların kapsama alanı dışında kalan bölgeler için de gemilerin izlenme ve takip edilmesinin Otomatik tanımlama Sistemi (OTS) yardımı ile gerçekleştirilmesi öngörülmüştür. Özellikle bu bölgede geçiş yapan gemiler izlenerek ulusal ve uluslararası düzenlemere uygun, teknolojinin sağladığı imkanlardan faydalanarak bölgenin seyir, can, mal ve çevre emniyet ve güvenliğini arttırılabilecektir.

Anahtar Sözcükler: KKTC; GTH; gemi trafik hizmetleri; PEST analizi; GZFT analizi

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LIST OF ABBREVIATIONS

ACRS:	Advance Coastal Radar for Surveillance
AIS:	Automatic Identification System
ATS:	Air Traffic System
BORTEC:	Technical Feasibility Study of Southern Europe Maritime Border Surveillance System
BTC:	Baku – Tbilisi - Ceyhan Pipeline Project
E:	East
EEZ:	Exclusive Economic Zone
EMSA:	European Maritime Safety Agency
EU:	European Union
F:	Fix
Fl:	Flashing
GAP:	Güneydoğu Anadolu Projesi (Southeastern Anatolia Project)
GMDSS:	Global Maritime Distress and Safety System
GSM:	Global System for Mobile Communications
IALA:	International Association of Lighthouse Authorities
IAPH:	International Association of Ports and Harbors
IMO:	International Maritime Organization
IMPA:	International Maritime Pilot's Association
JRCC:	Joint Rescue Coordination Centre
m:	Meter
M:	Miles
MF:	Medium Frequency
Mo:	Morse
MRCC:	Maritime Rescue Coordination Centre
MSSIS:	Maritime Safety and security Information System
N:	North
NATO:	North Atlantic Treaty Organization
PEST:	Political, Economics, Social and Technological Analysis
R:	Red
SGK:	Sahil Güvenlik Komutanlığı (Coast Guard)

SSN:	Safe Sea Net
STEP:	Strategic Trend Evaluation Process
SWOT:	Strengths, Weaknesses, Opportunities and Threats Analysis
TGI:	Trafik Gözetim Istasyonu (Traffic Surveillance Station)
TMS:	Traffic Management System
TRNC:	Turkish Republic of Northern Cyprus
UNCLOS:	United Nations Convention on the Law of the sea
USA:	United States of America
VHF:	Very High Frequency
VMS:	Vessel Monitoring System
V-RMTC:	Italian Navy Regional Virtual Marine Traffic Centre
VTMS:	Vessel Traffic Management System
VTS:	Vessel Traffic System
W:	White

CHAPTER 1
INTRODUCTION

Cyprus is the third largest island in the Mediterranean after Sicily and Sardinia and it is located in the Eastern Mediterranean at the crossroads of the trade routes of three continents. The area of the Turkish Republic of Northern Cyprus (TRNC) is 3241.68 km^2 and the total surface area of Cyprus is 9,251.50 km^2 (Island surface area and distribution ratios are shown in Table 1.1). The closest neighbour country of TRNC is Turkey which is located in 65 km. Other neighbour countries are Syria (100 km), Egypt (420 km) and Rhodes Island (480 km) (KKTC TurizmTanıtma ve Pazarlama Dairesi, 2014). BeşParmak Mountains are located in the north of the TRNC between Kormakitis in the west and Cape Apostolos Andreas in the east in a width of 8-10 km and in a length of 170 km. The highest point is "SelviliTepe" (1024 m).

Table 1.1: Area of Cyprus and percentage of area
(KKTC TurizmTanıtma ve Pazarlama Dairesi, 2014)

TRNC	3,241.68 km^2	35.04%
Southern Cyprus	5509.78 km^2	59.56%
British Bases	256.01 km^2	2.77%
Buffer Zone	244.04 km^2	2.64%
Total	9,251.50 km^2	100%

When the TRNC is considered in terms of its location and characteristics, the strong and significant parts can be summarized as follows (Debeş, et al. 2014b):

- It has a long history and has hosted great civilizations.
- The first trade and shipping in the history of civilization has started in this region. (Today 30% of world trade, 25% of oil trade are carried out over Mediterranean Sea).
- The centre of gravity of the great civilizations was this region and Cyprus has always been in the forefront.
- It is located at the crossroads of east and west of the trade routes.
- High hydrocarbon resources are located on the seabed.

In addition in terms of Turkey, it has a special importance depends on the potential of the agricultural industry and of the export of water resources with Southeastern Anatolia Project

(GAP) project, in terms of having the nearest potential port bases, and in terms of routes of Baku–Tbilisi–Ceyhan (BTC) and Kerkük-Yumurtalık pipelines. When the distance to Turkey is considered, the distance between Cape Anamur and Cape Kormatikis is 45 nautical miles (nm), the distance between the furthest southern border of Turkey and Cape Apostolos Andreas is 67 nm.

In recent years, depending on the developments in Turkey, the need with Vessel Trafic Services (VTS) based on the marine traffic to this region has clearly emerges in converting Iskenderun Bay into a regional economy and logistics centre of gravity. In addition, VTS will make indisputable contributions to the increase the dominance in the maritime jurisdiction areas in the Eastern Mediterranean of Turkey. With this purpose Mersin VTS area is considered to be expanded for our country. However, while this case involves many positive effects, the most important negative effect will appear as violation of authority in terms of international state policies. VTS will also have many effects on maritime security and military in addition to the contributions it will make towards shipping.

The most important threat and problem for the potential strategic characteristic and opportunities for the TRNC intended to be summarized above is the disagreements on the maritime jurisdiction areas regarding the operation of energy reserves and live resources.The image of Cyprus Island taken from space is shown in Figure 1.1.

Figure 1.1: The photograph of Cyprus Island taken by USA National Aeronauticsand Space Administration

CAHPTER 2
TRNC AND MARITIME ACTIVITIES

Cyprus is under the influence of Mediterranean Climate. Summers are hot and dry, winters are mild and little rainy. While the annual rainfall in the lowland areas is 300 mm, reacher 1000 mm per year in Troodos Mountains. It snows TroodosMountains in winter. Temperature rarely falls below 0°C. Temperature rarely falls below 0°C (KKTC TurizmTanıtmavePazarlamaDairesi, 2014). Vegetation is maquisformed of small bushes. People living in villages do grain production, viticulture and grow citrus. In addition towheat and barley, oranges, mandarins and grapes on the outskirts of the mountains are cultivated.

The most common forest tree species are pine, cypress, oak and as was grown on the island at a later time, eucalyptus. The island is considered in the Taurus system of the Anatolian peninsula with the structure and the geographical landforms. The base of the island which is connected to Anatolia is surrounded by submarine pits deeper than 2000 m in the west and the south. In Cyprus, after Limassol Salt Lakethe second largest lake isLarnaca Salt Lake with an area of 2.2 square kilometres (Debeş et al, 2014a).

Cyprus is the accommodation and waypoints of birds between the continents Africa and Europe due to its geographical location. 7 of around 350 species of animals on the island are endemic. In addition, 26 species of reptiles live on the island. In the first age periods, while Cyprus was nearly covered by based wooded area, as wood is sold to countries that lack copper mines and forests, forest areas have been destroyed today (KKTC Turizm Tanıtma ve Pazarlama Dairesi, 2014). Cyprus coastlines have been visited by Chelonia and Carettacaretta turtles for approximately hundred million years. These creatures come to the beach of Northern Cyprus between May and August to lay eggs. Natural caves exist in the north of the island. There are around 85 natural caves including Incirli Cave with stalactites and stalagmites and Sutunlu Cave in Inonu Village.

Ports that are still active in the TRNC are as follows (TRNC Ministry of Public Works and Transport, 2013);

- Portof Famagusta
- KyreniaTourism Harbour.

In addition, the following are connected to Port of Famagusta in terms of inspection and technical services;

- Kalecik Fuel Filling Plants
- Kalecik Plaster and Cement Plants
- AltinbasOil and Filling Plants
- Aksa Power Generation Inc.

The following are connected to Kyrenia Port (TRNC Ministry of Public Works and Transport, 2013);

- Teknecik Power Plant Fuel Filling Plants
- Girne Marina
- Gemyat Delta Marina
- Gemikonagi Mines Pier
- Kumkoy Water Filling Facility.

The following fishing shelters connected to Department of Ports due to their physical conditions are available in addition to the TRNC ports.There are Fhisheries in the Port of Famagusta and other fishing shalters are named;

- Bogaz
- Kumyali
- Dipkarpaz (Şelonez)
- Efendiler
- Yenierenkoy
- Balalan
- Kaplica
- Tatlisu
- Esentepe
- Kyrenia Yacht and Fishing Shelter
- Lapta
- Kayalar
- Yedidalga

2.1 TRNC Territorial Waters

TRNC Territorial Waters have been increased from 3 nm to 12 nm with new regulations made by TRNC Territorial Waters Act, no. 42/2002 of Annex I, Part I of Official Gazette no. 68 dated 24.06.2002. (TRNC Ministry of Public Works and Transport, 2013) The coastline is 395.5 km. "Marine Jurisdiction Act" entered into force with no. 63/2005 of Annex I of the Official Gazette no. 206 dated 28.11.2005 (TRNC Ministry of Public Works and Transport, 2013).

2.2 Pilotage Services

Port of Famagusta and pilotage services around are executed by Famagusta Main Pilotage and Directorate of the Port with the help of 1 moorage motor and 3 tugboats; Kyrenia Tourism Harbour and pilotage services around are executed by Kyrenia Main Pilotage and Directorate of the Port with the support of one tugboat.

2.3 Cyprus Turkish Coastal Safety and Salvage Company Ltd.

Cyprus Turkish Coastal Safety and Salvage Company Ltd. is a company formed by the partnership of Republic of Turkey and Turkish Republic of Northern Cyprus. It has been operating under the shelter of TRNC Ministry of Public Works and Transportation. Cyprus Turkish Coastal Safety and Salvage Company Ltd. has been established in 2000 with the decision of the TRNC Council of Ministers no. E-1809-2000 by registering on TRNC Company Registry under the name of Cyprus Turkish Coastal Safety and Salvage Company Ltd. (TRNC Ministry of Public Works and Transport, 2013). Cyprus Turkish Coastal Safety and Salvage Company Ltd. providing services in terms of navigation, life, property and environmental safety to do search and rescue in TRNC territorial waters and in international waters. Even though Turkey provides sufficient support for search and rescue, marine signalization system and communication ability of Cyprus Turkish Coastal Safety and Salvage Company as well as the technology era and speed of today, it is unfortunately not at the desired level due to unplanned construction and staffing below the required standard.

2.4 Cyprus Turkish Radio

Cyprus Turkish Radio whose operation was transferred to Cyprus Turkish Coastal Safety and Salvage by the Decision of the TRNC Council of Ministers no. S-639-2006 dated 15 March 2006 has been modernized in accordance with Global Maritime Distress and Safety System (GMDSS) by spending 1.5 million dollars and it is opened in 2006 (TRNC Ministry of Public Works and Transport, 2013). Cyprus Turkish Radio works on the principle of 24 hours. A broad range of communication services ranging from Sicily in the west with MF (Medium Wave) and VHF (Short Wave), Lebanon in the east, Israel and Egypt are provided. Cyprus Turkish Radio carries out its activities in Telecommunications Office Centre in Nicosia; transmitter and receiver stations are available in Selvilitepe, Kantara, Mehmetcik and YeniIskele.

Cyprus Turkish Radio provided weather forecasts, meteorological warnings and alerts, ship-to-shore and shore-to-ship telephone services by posting distress, security, and emergency messages to all domestic and foreign-flagged ships sailing in the Eastern Mediterranean. AIS device is available within the radio. It is the only Coast Radio Station of the TRNC.

2.5 North Cyprus Coastguard

With the Coast Guard Act No. 1/1992 that entered into force on 3 January 1992, the protection of all the coasts, territorial waters, harbours and bays of the TRNC, ensuring its security, use of these rights and privileges in the seas under sovereign rights in line with the national and international law, prevention and monitoring of all kinds of smuggling over the sea and taking the necessary action against offenders are given to the inspection of Security Forces Headquarters.Syria crisis due to performing 30% of the world trade and 25% of the oil trade through the Mediterranean caused major countries including USA, Russia and China increase their military presence in the Mediterranean (TRNC Ministry of Public Works and Transport, 2013). The necessity to have a more powerful war fleet in the Mediterranean due to both the possession of energy sources such as oil - natural gas and the marine trade.

2.6 Existing Navigational Aids in the TRNC

Lighthouses that ensure the coastal navigation safety provide services to the ships travelling around Cyprus at the international standard levels. All lighthouses except for Canbulat Lighthouse work with solar systems. Maintenance of lighthouses is executed by Cyprus Turkish Coastal Safety and Salvage Company (TRNC Ministry of Public Works and Transport, 2013).

Table 2.1: Existing navigational aids in the TRNC
(TRNC Ministry of Public Works and Transport, 2013)

Name of Lighthouse	Location	Characteristic
Canbulat Lighthouse	Lat : 35° 07'4" N Long : 33° 56'8" E	FI(2)W 15s 23m 16M Stone Tower, Painted White
Karakol Lighthouse	Lat : 35° 08'6"N Long : 33° 55'6" E	FI (1)W R 7s18m 15M Reinforced Concrete Tower, Black Stripes Painted White
Lighthouse of Cape Elia (Zeytinlik)	Lat. : 35°19'8" N Long. : 34°02'9" E	Fl W 10s 31m 16M Concrete Tower, Black Banded Painted White
Cape Andreas (Zafer Burnu) Lighthouse	Lat. : 35°42'5" N Long. : 34°36'4" E	Fl(4)W20s 18m 15M Cylinder Mineral Tower,Painted White
Kyrenia Main Lighthouse	Lat. : 35°20'5" N Long. : 33°19'8" E	Fl(3)W20s 18m 17M Mineral Frame Toweron White Building, Painted Red and White
Kormakitis Lighthouse	Lat. : 35°24'0" N Long. : 32°55'2" E	Fl(2) W 20s30m 15M Mineral Collision Tower, Painted White
Yenierenkoy Lighthouse	Lat. : 35°33'7" N Long. : 34°12'6" E	Fl(2)W15s22m15M Concrete Tower, Painted White

Marine traffic flow and density in the Eastern Mediterranean has been shown in Figure 2.1 according to the Automatic Identification System (AIS) data of 29 November 2014 in the region (Marine Traffic, 2014). According to this, it is seen that the ships that come to the TRNC are very low in amount and the ship flow to the Southern Greek Cypriot Administration is frequent. Moreover, the intensity of the marine traffic around the Island is understood. Figure 2.2 shows the AIS and other navigational aids located on the island of Cyprus (Marine Traffic, 2014). There are only 7 lighthouses (according to the Department of Ports, in addition to the lighthouses shown in Figure 2.2, 12 port and shelter lighthouses are available) and 2 AIS receivers (Class B in Selvili Tepe and Kantara) in the TRNC (Debeş et al, 2014b).

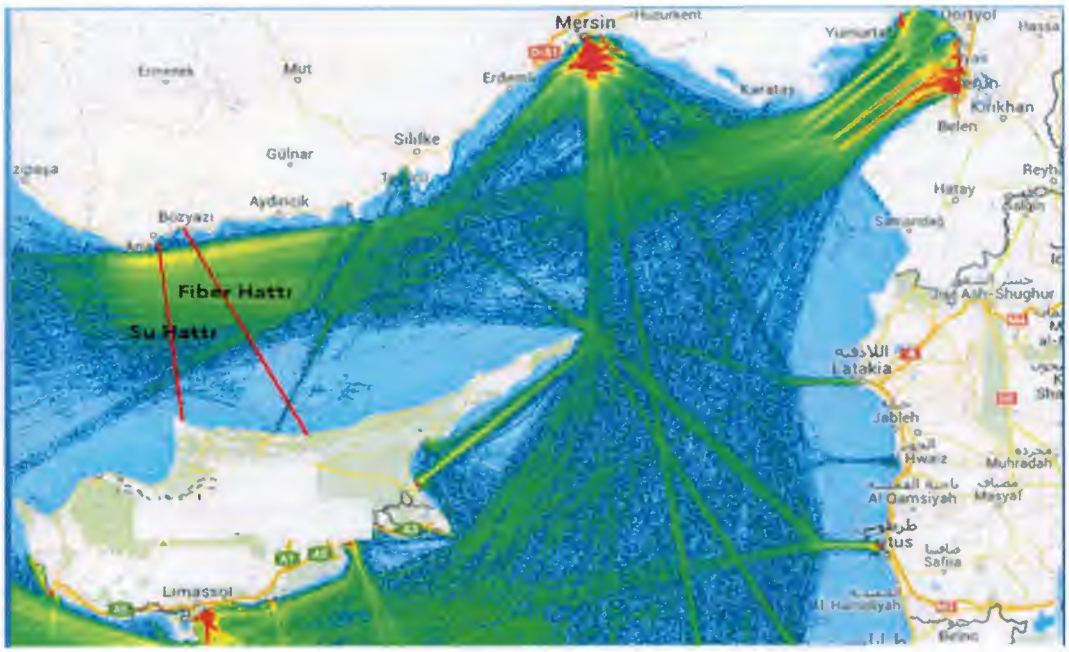


Figure 2.1: Maritimetraffic density in theEastern Mediterranean Region (AIS data) (Marine Traffic, 2014)

Figure 2.2: Locations of AIS receiver and other navigational aids (Marine Traffic, 2014)

Table 3.3: EU Integrated Maritime Policies, Regional AIS Cooperation Network (European Commission-Joint Research Centre, 2008)

Condition of Integration	Country	Details
None or little cooperation	Portugal, Spain, Italy	
Different administrations are within the same system.	Cyprus	Marine Trade Department, Police and Naval Forces use the same Radar system.
	Malta	Maritime administration and the Armed Forces use the same VTS system.
	Slovenia	Police and Maritime administration use the same Radar system.
Integrated systems are used.	France	Sub-systems and authorities integrated with SPATIONAV.
Integrated systems are planned.	Portugal	Maritime Operations Centre is integrated with different administrations. New Border Police is integrated with different administrations.
	Spain	Integrated to AIS, SIVE.
	Italy	Border Police System is integrated with different administrations.
	Slovenia	VMS is integrated to VTS.
	Malta	VMS is integrated to VTS.
	Greece	VTS system is expanded with trade and border controls.

Table 3.4: Responsibilities of Republic of Cyprus according to 3rd Working Document of EU Integrated Maritime Policies (European Commission-Joint Research Centre, 2008)

CyprusACRS (Advance Coastal Radar for Surveillance)				
Administration		**Responsibilities**		
Police		Territorial Waters Patrol and adjacent High seas, Radars.		
Port Authority		VTS		
Marine Trade Department		AIS		
Department of Aquaculture		VMS		
System	**Administration**	**Purpose**	**Other administration**	**Cross Linkage**
Coastal Radar: ACRS Additional AIS	Radar: Naval Forces? AIS: Marine Trade Department	Law force	Police (user)	3 administrations are included: Armed Forces, Police, Marine Trade Department
VTS	Local port authorities Marine Trade	Traffic monitoring		2 administrations are included: Port authorities,

	Department (AIS receivers).			Marine Trade Department
VMS	Department of Aquaculture, Nicosia.	Monitoring 28 trawlers carrying the flag of Cyprus.		Police can view the VMS on a different display in the ACRS system.
VTMIS	Marine Trade Department	Traffic monitoring, gathering data, distribution to the relevant administrations.		Integration of ACRS and VTS. Providing data to Police, SSN, JRCC and other administrations when necessary.
Patrol	Police	Patrol		

CHAPTER 4

LEGISLATION ON THE PLANNED VTS IN TRNC

4.1 Legal Status of VTS

Despite the international attempts towards the establishment of basic principles on the personnel, equipment and qualities of the VTS systems, the legal status of VTS has not been clarified today (Topsoy, 2013). Having a dynamic structure of which the technological infrastructure constantly changes parallel to the developments in electronic, radar and computer technologies extends this process even further. For this reason, in this practice that each VTS authority identifies its own legal nature and tries to establish its own rules. This disorganization makes it difficult to establish a common policy and an international standard on VTS. Within this scope, the legal nature between VTS Centre and the ships should primarily be discussed (Topsoy, 2013). VTS system is an interactive system in which users (generally ships) and VTS centres are in a mutual communication (Erol, 1999). While ships approachingthe VTS region report the issues such as its identity, departure and arrival ports, the nature of the load it carries and its request for pilotage at predefined locations and times, VTS centre informs the details regarding the marine traffic and other environmental conditions to the relevant ships. In this sense, neither a legal relationship subject to public law rules nor a private law contractual relationship exists between VTS centre and the ships. As the execution of VTS services by private institutions such as public institutions or port authority is not significant, "recommendations" or "instructions" given by VTS centre within the scope of traffic arrangement services will not change the situation either (Oral, 2010).

Hence, it can be said that a sui generis legal relationship as a mixture of public and private law exists among the ships.The establishment and operation aims of the provided services is bringing Air Traffic Services (ATS) and VTS systems close and render the direct application of the specific risks of air and maritime transportation and different development of two systems on the VTS system without adapting the rules on ATS to the traditional structure of maritime law impossible (Topsoy, 2013). Yet, the main duty of ATS is to monitor the air traffic in order to ensure the activity of air vehicles according to the flight plans. In particular, the limited vision of air vehicles render them dependent on the flight systems and technical failures or organization faults generally lead to great disasters, the high-speed flights of air vehicles prevent pilots in terms of timing from taking necessary precautions. In maritime transportation, master mariners have time, particularly in system failures, in order to take and apply many precautions such as anchoring primarily, demanding towboats or anchoring.

In addition, the specific structure of air transportation leads to the international and easy arrangement of the legal status of ATS, the long and traditional structure of maritime transportation causes the slow development of VTS legally. In this sense, VTS system approaches to pilotage services rather than ATS when the purpose of establishment and services provided to ships are taken into account (Topsoy, 2013).

VTS systems are established and operated by coastal states and using public authority as they are high-cost services that require huge investments. Therefore, it should be stated in the doctrine that VTS is of the nature of a public service (Topsoy, 2013). The significant role that VTS has in ensuring life, property, navigational and environmental safety in the maritime areas in places such as ports where the marine traffic is busy, at first glance, it supports the view that VTS is of a public service nature. Furthermore, it does not seem possible that VTS is considered as a public service in line with the administrative law. This is because it is not sufficient for coastal states that use mere public authorities to qualify VTS as a public service on its own. Coastal states decide establishing a VTS system in the practice by taking into account the marine traffic density or environmental factors. If VTS was a public service in terms of administrative law, the legal responsibility of a coastal state that does not establish a VTS system on a maritime space where it was obligatory to establish this system should have been questioned; yet, today, the coastal states do not have such an obligation arising from national or international law (Topsoy, 2013).

4.2 Exclusive Economic Zone (EEZ)

Exclusive Economic Zone has been explained in the Articles 55-60 of The United Nations Convention on the Law of the Sea (UNCLOS) signed in 1982 (Ertürk, 2011). As a summary of these articles, EEZ is a legal concept that gives the right to research and operate the living and non-living natural resources in the countries within 200 nm, to carry out a general research on the sea, to build a plant on the sea, and that gives the freedom to lay submarine cables and oil pipelines. While "Continental Shelf" carries a more geopolitical sense, has a more economic and legal meaning. According to the UNCLOS, coastal states have the following rights in this region:

- To research the living and non-living natural resources on the water on the seabed, in the seabed and under their land, to carry out activities regarding execution, protection and management.
- To carry out activities regarding the research and operation of the region for economic purposes such as energy production from water, streams and wind.
- To build and use artificial islands, plants and buildings, and to conduct scientific research regarding the sea.

Exclusive economic zone (EEZ) is the maritime region that has special rights such as researching and using the maritime resources of a state including water and wind energy. This area extends over 200 nm on the state land from the coastal line of the state towards the sea. The EEZ of Turkey, TRNC, Southern Greek Cypriot Administration and Greece are shown in Figure 4.1.

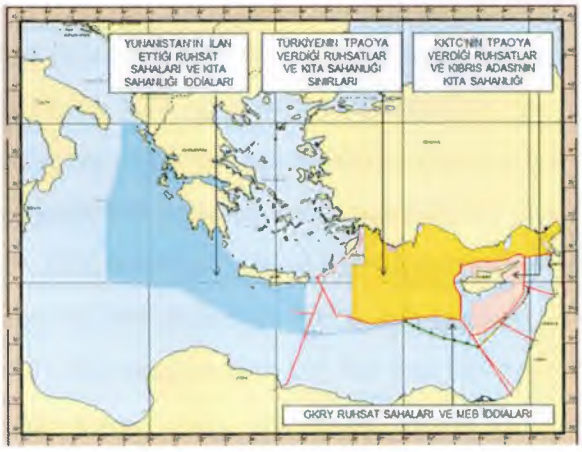


Figure 4.1: EEZ chart of Eastern Mediterenian Sea

The widely encountered problem of the EEZ practice is the geographical limitations. As the world does not have a straight shape, the border of 200 miles of the countries overlaps with each other. This type of problems is encountered particularly in the eastern Mediterranean.

For example; Figure 4.1 shows the EEZ of Turkey and Egypt and Syria and Lebanon are engaged (Dogan, 2013).These problems are generally arranged and solved by EEZ Treaties signed between countries. Republic of Turkey has signed the 1982 United Nations Convention on the Law of the Sea (UNCLOS) and did not constitute a side. Thus, Republic of Turkey is not a side of Exclusive Economic Zone (Özel and Erdoğan, 2014; Vogler and Thompson, 2015). Eastern Mediterranean Region is a region that contains the coastline of many countries due to its structure. Although the multiplicity of coastline states constitutes a factor that increases the economic activity of the region, it causes conflicts among countries from time to time. Jurisdiction conflicts are one of these that are recently on the agenda. Rich oil and natural gas beds located around the island of Cyprus led the countries around the region to share the resources so as to benefit from the wealth of this environment. In particular, many countries, primarily the Southern Greek Cypriot Administration, have recently signed EEZ agreements and started strategic relationships among countries within this scope. However, Turkey has been excluded from this strategic partnership.Countries of the Eastern Mediterranean region faced the problem of jurisdictional conflicts due to the legal conflicts that already exist on the issue of oil and natural gas that recently emerged in the region. Some countries including the Southern Greek Cypriot Administration maintained the solution by the EEZ agreements that they have signed in between. While these countries make sharing among each other, they excluded Turkey which is not a party of the UNCLOS. In addition, they ignored the TRNC that is currently dealing with the issue of international recognition. Turkey and TRNC have a tough reaction against these arrangements and they stated that they do not recognize the agreements. As Turkey is not a party of the UNCLOS, thus it will not be a party of any EZZ agreement in this context, the possibility of solving the arising maritime area problems within the framework customary law and on the basis of the principle of equity is suggested.In spite of these reactions of Turkey and the TRNC and various solution strategies, EZZ agreements have been approved and entered into force. When the geopolitical importance of the region is taken into account, it will be convenient to determine the policies of Turkey according to the fact that this type of strategies likely to be followed.As stated in the above parts, the main reason of the jurisdiction conflicts experienced in the Eastern Mediterranean Region is the overlapping of the Exclusive Economic Zone (EEZ) and the arguments among the EEZ borders as the Mediterranean is an epicontinental sea.Some legal and regional characteristic can also be added to the reasons of jurisdiction conflicts apart from this main reason. These include the problems of the change in the international law, the complicated political geography of the region, the conflicting

benefits among countries in the region and the sharing of oil and natural gas is a problem. The case of the TRNC is another reason of jurisdiction conflicts. As the recognition of the TRNC in the international arena is currently discussed, its rights on the issues of EEZ are automatically discussed. Nevertheless, Turkey Ministry of Foreign Affairs believes that the Southern Greek Cypriot Administration is not the only authority on the island and it disregards the rights of the TRNC by acting like this (Topsoy, 2013; Ertürk, 2011).

CHAPTER 5
EXPERIMENTAL STUDY: PEST and SWOT Analyses

A survey study including the determined question "Should a VTS be set up in the TRNC according to your opinion? How will be its management and what will be its effects once it is set up? How will it affect Turkey and the TRNC?" and many similar questions has been carried out on people who have a maritime background in the TRNC. Short demographic questions were included in the first part of the survey, the opinions on the research question was included in the first part which was followed by the environmental analysis. Data transferred through 15 experts has been compiled for the environmental analysis; SWOT analysis has been conducted as the second survey practice and has been applied on the same group. The survey planned to be applied on more than 50 experts under normal cases has been delivered to both the government offices and civil institutions and organizations related to maritime activities in the TRNC. However, few people who have knowledge to fill the survey returned back and unfortunately many of them did not fill the survey. Before moving on to the results of the analysis, the summary information regarding the environmental (PEST) and SWOT analyses are included in the parts below.

5.1 Environmental (PEST) Analysis

Environmental analysis is an analysis to detect the important issues to find out issues that are significant and warrant immediate action and to reveal those who are positively or negatively affected by these factors by analysing Political, Economic, Social and Technological (PEST) factors. Environmental analysis is specially conducted before the SWOT analysis. PEST Analysis is an analysis that is allows us to investigate the environmental factors around us and demonstrates what the environment is and will be in a Political, Economic, Social and Technological sense that we use in defining their effects on us are and will be (Stratejik Yöntem, 2014).

PEST is a term that has been used for the last 10-15 years and it is hard to put forward its arising point. "Scanning the Business Environment" is the first reference made to the business environment techniques and tools and it is an article written by Francis J. Aguilar (1967) on "ETPS" which are the capitals of Economica, Technological, Political and Socio-Cultural. Shortly after this publication, Arnold Brown from the Institute of Life Insurance rearranged the term as "STEP" (Strategic Trend Evaluation Process) in order to arrange the results of external environmental analysis.

After that this "macro external environmental analysis" or "changed environmental analysis" has been rearranged as STEPE (Socio-cultural, Technical, Economic, Political and Ecological) analysis. In the 1980s, many authors including Fahey, Narayanan, Morrison, Renfro, Boucher, Mekke and Porter used different abbreviations such as PEST, PESTLE, STEEPLE, etc. in their articles. However, any priority of any format or grading does not exist. The abbreviation PEST is known to be more popular than the abbreviation STEP. Some purists claim that the abbreviations STEP or PEST contain more appropriate titles for all cases whereas others claim that there is a need for other titles for the external environmental analysis. PEST analysis is also called PESTLE (**P**olitical, **E**conomic, **S**ocial, **T**echnological, **L**egal, **E**nvironmental) with a wider content and different types of analysis are available depending on its different names (Tekno Sector, 2013).

The stages of PEST analysis can be defined as introduction (stage of the preparation for analysis), determination of the market, determination of the subject of analysis (discussion of objectives and results), determination of the type of analysis (PEST, PESTLE/PESTEL, PESTLIED, STEEPLE, SLEPT, STEPE, ETPS, etc.), determination of analysis factors, conduction of analysis (notes, potential effects, probabilities and severity ratings are determined). The next stage is the transfer of the analysis results to SWOT table(Tekno Sector, 2013).

5.2 SWOT Analysis

PEST Analysis is important in terms of balancing the SWOT Analysis internal factors and their external factors against the environmental factors (Tekno Sector, 2013). It is a matrix that demonstrates the following for a work of which SWOT Analysis is being carried out or planned to be carried out:

- **(S)**trengths - Strong sides,
- **(W)**eaknesses - Weak points,
- **(O)**pportunities - External opportunities, and
- **(T)**Threats - External threats

The most important characteristic of the SWOT Analysis is that it allows a deeper evaluation by using the opportunities and strong points and it allows minimizing the weak points that it defines against the threats. SWOT analysis contains the examining of the environmental factors, the identification of important opportunities for the future of the business, taking precautions against the activities that can be threat for the business by pre-defining them, the emergence of the strengths of the business and the identification of the cases, conditions and environments that they will be necessary to use, taking precautions by determining the weak sides of the business, the analysis of the difficult conditions that the enterprise can experience against the threats due to its weak sides and the strategical, planning, etc. approaches (Tekno Sector, 2013). SWOT template generally used in the research is shown on Figure 5.1.

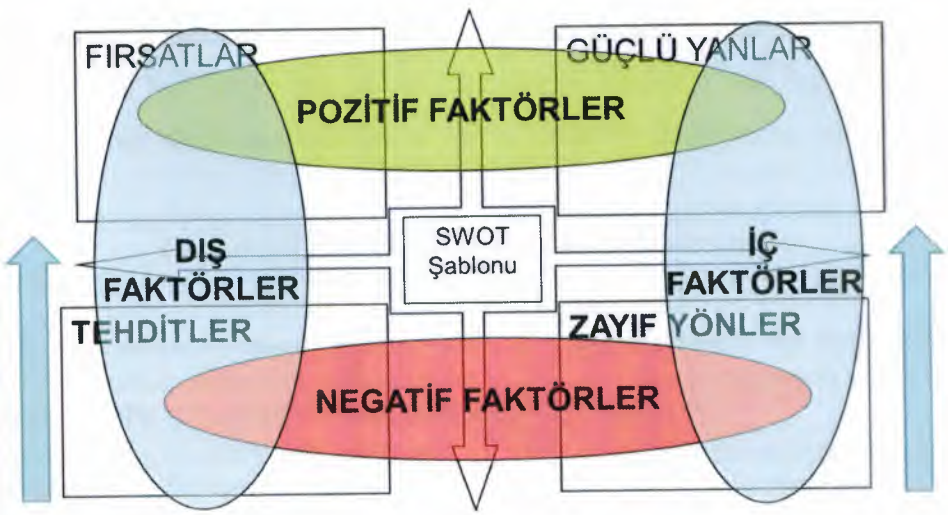


Figure 5.1: SWOT template

5.3 Research Limitations

The Environmental (PEST) Analysis form arranged for this study has been filled by conducting one-to-one interviews with 15 Oceangoing Ship Masters (Unlimited) who graduated from ITU Maritime Faculty and live in the TRNC. Data obtained after the practice of PEST analysis were adapted for the SWOT analysis and a second survey was prepared that included the research question. All the people with maritime background employed in the TRNC since November 2014 were demanded to provide their views. Only a total of 15 of them provided their views from the same group. Data and evaluations regarding the surveys containing PEST and SWOT analyses are presented following parts (Debeş et al, 2014b).

5.4 Results of PEST and SWOT Analyses

All the people who took part in the survey are competent as Unlimited Ship Masters and they graduated from High Maritime School (currently called ITU Maritime Faculty). These people who are considered as experts have provided their opinions to the research question in writing. The common idea in this case is particularly the setting up of a VTS system in the TRNC. There is an agreement on the selection of the location of the watchtowers as a part of this system and there is a disagreement on whether the control and management of the VTS Centre should belong to Turkey or TRNC. Certain experts believe that if the towers are located at higher locations, the coverage area would increase and some of them believe that the setting up in this type of places will not be effective due to the factors such as maintenance. On the other side, a majority states that the management should belong to Turkey and some of them insist that the management should belong to Turkey or support should be provided by Turkey due to cases of human resources and first operation of the system. Environment Analysis results are shown in Table 5.1 (Debeş et al, 2014b).

Table 5.1: PEST/PESTLE analysis evaluation table

Political	**Economical**
• The effect of the Southern Greek Cypriot Administration on the orientation of the marine traffic in the Eastern Mediterranean will decrease, so this would cause an advantage for the agreement. • It will constitute a positive message to the international community. • There may be a pressure factor. • It can create positive thoughts in other countries for a country where embargo is	• Increase in the work fields. • The development of the maritime sector. • It will create opportunities for the TRNC maritime transportation, • It may lead to an indirect increase in the economy. • Development of the economy of the region and sectors. • It may cause an increase in the

implemented. • The increase in the environmental impact can provide strength in the political arena. • It can be effective for the recognition. • International relations may develop. • It can constitute an obstacle to inhibition of the Southern Greek Cypriot Administration.	economical investments and reliability.
Social • The number of companies operating in the maritime sector may increase. • TRNC public is very sensitive against contamination of marine coastal environment. Protection of the marine coastal environment will be satisfied once the VTS is set up in the TRNC. • Monitoring of environmental contamination. • Maritime tourism and its positive effects on the maritime culture. • Refugee movements are easier to follow.	**Technological** • Formation of more modern and safe ports. • Positive contribution towards the search and rescue activities. • Increase in the technology transfers. • Monitoring of marine traffic in international standards and in all environmental conditions.

Table 5.2: SWOT analysis evaluation table

Strong sides G1: Geography G1.1 Location/Position G1.2 Land conditions G1.3 Meteorological conditions G2: Strategical Importance	**Opportunities** F1: International Recognition F2: Regional Marine Traffic Control (formation of traffic lines, acceptability by IMO) F3: Technological development F4: Employment (labour and economy) F5: Growth of the volume of marine trade (port, arriving ship, etc.) F6: Economic (protection of submarine treasure) F7: Maritime jurisdiction
Weak Sides Z1: Human Resource Z1.1: Scarcity of field experts Z1.2: Lack of Education Z2: Economical Z3: Political Uncertainty Z4: Rules (lack of international laws and reformation of the rules to be formed according to international standards, potential to become a strong side later)	**Threats** T1: Political Structure T2: Organizational T2.1 Prejudgements T2.2 Bureaucracy T2.3 Lack of coordination T3: Neighbour countries T4: Refugee movements in the region

Results of the SWOT analysis are shown in Table 5.2 The concrete results obtained for the VTS system to be set up in the TRNC as a result of these evaluations are as follows:

- Setting up two watchtowers (the infrastructure is available in both places, all the necessities can be fulfilled regarding the infrastructure including the maintenance) as high as possible in the eastern and western capes (Cape Apostolos Andreas and Cape Kormakitis) within the borders of TRNC.
- There should be a system that will include marine ports (Famagusta and Kyrenia Ports).
- It is suggested to set up the towers on highlands in order to improve the coverage areas (it will contain more difficulties compared to other suggestions due to the infrastructure and maintenance).
- The middle of the Northern part as it is an alternative place (currently the area where the water and electricity pipeline that will come from Turkey is placed).
- According to a majority of opinions, VTS Centre should be placed in Famagusta, according to others; the main centre should be in Kyrenia. On the other hand, such a centre should be in Turkey and the system operation should be carried out by Turkey until the development in human resources and field experts occur.

CHAPTER 6
PROPOSED TRNC-VTS

If a VTS will be set up at anywhere, the planning at the first stage should be evaluated at the following four stages according to the international rules (such as IMO, IALA, IAPH, IMPA, etc.)

a. *Initial evaluation:* This evaluation contains the research on whether an active traffic method is a convenient solution for the determined problems of the marine traffic and the initial risk analysis.
b. *Feasibility and design:* The aim here is to define the necessary system functions to reach the marine traffic, safety and efficiency level.
c. *Risk evaluation:* It is confirmed that the system with the defined functions and the other precautions to be taken will decrease the accidents and/or dangers within the scope of the intended level.

d. *Cost-benefit analysis:* It is defined whether the reductions calculated at the risk level with the setting up of the system and the decision is made.

6.1 Aim of TRNC-VTS

The aim of the VTS system to be set up in the TRNC is to increase the safety and security of the marine environment by taking into account the environmental factors rather than arranging the marine traffic. In addition, its other duties are the following:

a. Monitoring,
b. Providing information,
c. Assistance (navigation, search and rescue and related units),
d. Preventing accidents,
e. Protecting,
f. Traffic management,
g. Strategic planning/practice

The system renders a system (VTS) that will monitor and follow the marine vehicles obligatory due to environmental sensitivity although the vessel traffic density around the island (except the marine traffic in the Cape Apostolos Andreas) does not require the setting up of a VST system. It is essential to set up a VTS in the TRNC due to the environmental pollution, the human trafficking in the region and its strategic importance.

The expectation from TRNC-VTS as a *"Coastal and Regional VTS"* consists of the following:

- To improve the marine traffic safety and efficiency and to protect the marine environment against the negative effects of the marine traffic,
- To create an ideal awareness on marine environment at a national level especially in the Aegean and the Eastern Mediterranean,
- To support the efficiency of this system by transferring all the necessary data for the Vessel Traffic Management System,
- To create a safer and more efficient traffic structure for passenger, large and deep draft vessels,
- To follow the in-port actions in coordination with the Directorates of Ports (mooring, departing, shifting, anchoring actions, etc.),
- To be in more interaction with local passenger vessels of 20 m or more,

- To contribute towards more efficient work of the vessel and port plants in the port regions (anchoring, non-anchoring, mooring-departure planning, etc.).
- To make positive contribution to the quality and efficiency of the replenishment services (fuel, water, food, etc.) in the region.

6.2 Duties and Responsibilities of TRNC-VTS

As in other VTS, they are as follows:

- To monitor the marine traffic in the marine region within the scope of TRNC VTS with high sensitivity all the time under all types of environmental conditions,
- To improve the safety of the marine traffic,
- To improve the vessel navigational safety efficiently on the basis of responsibility of the Master,
- To accommodate and maintain the "maritime traffic image" and transfer this information to the ships when necessary, to measure the navigational information to be used for this purpose with great sensitivity and keep the records.
- To record all the sound, data and images, to show again when necessary,
- To follow the practice of national and international legislations in the name of the administration,
- To provide the necessary information that can help the decision taking of the Master on the navigation in a timely manner in order to reduce the risks of accident, to give necessary warnings, advice and instructions when necessary,
- To provide an effective and rapid intervention in the case of accident, to maximize the life and property safety and to minimize the marine pollution and other economic losses, to ensure the safety of the traffic as soon as possible and provide the necessary coordination and information service regarding the relevant institutions with this aim,
- To store all kinds of evidence including all kinds of images and sound records that may be required by the official authorities in the cases that might require judicial and administrative investigation, to satisfy depending on the availability upon official request,
- To ensure a more effective traffic organization and management by exchanging information with the neighbour VTS centres.

The above duties and responsibilities of TRNC-VTS will be carried out under the services "Information (IS)", "Navigation (NAS)" and "Traffic Organization (TOS)". However, the

regional VTS will not be active on the arrangement of the traffic and it can only provide support to the Directorate of Ports.

6.3 Components of TRNC-VTS

The marine traffic in the TRNC VTS zone will be monitored by using radar, AIS, CCTV cameras, Electronic Navigational Chart (ENC), Very High Frequency (VHF) devices Dadio Telephone (RT), Digital Selective Call (DSC), and Direction Finder (DF) (TC Ulaştırma, Denizcilik ve Haberleşme Bakanlığı 2014). In addition, traffic density and structure, navigation hazards, local climate, topography, environmental requirements, commercial aspects and the extent of a VTS area sets the requirements for VTS equipment and these factors will have substantial impact on life cycle costs of a VTS and the acquisition of VTS equipment. Equipment may include:

- CommunicationsVHF, and MF/HF radio equipment
- VTS Radar System
- Automatic Identification System (AIS)
- Closed Circuit TV Cameras (CCTV) (optional)
- Radio Direction Finders (RDF) VHF/DF
- Hydrometeo equipment and/or
- VTS Data System.
- Measuring sensors (optional, currents, salinity, temperature, etc.).

6.4 Organizational Structure of TRNC-VTS

The staff of TRNC-VTS might be kept at a minimum amount in the beginning. As the public governance of the TRNC is too cumbersome it is recommended to establish it as a State Economic Enterprises managed by a Directorate with a fast working decision mechanism. The name of this Directorate should be "Vessel Traffic Services Directorate" and should be inspected by the Directorate of Ports.

In technical and operational terms, a structure consisting of two assistants working with a shift system where each shifts will contain 2 Operators (one Supervisor and one Operator) formed of 4 shifts is recommended as shown in Figure 6.1. In this case, the total number of employees is 14. For example; features of staff to work as a VTS operator is specified in the "regulations regarding the operation and the setting up of VTS" in Turkey Chapter 6, Article 16 (Gemi Trafik Hizmetleri Sistemlerinin Kurulmasına ve İşletilmesine İlişkin Yönetmelik, 2007).

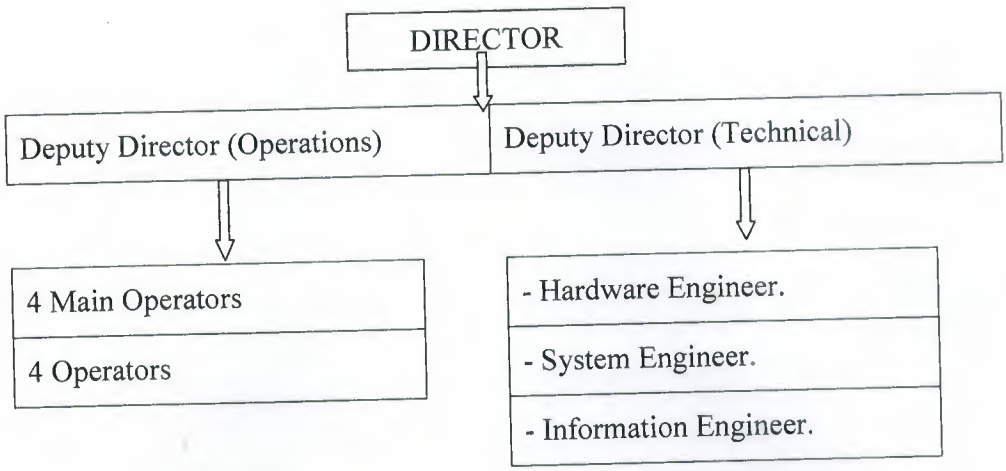


Figure 6.1: Suggested organizational structures of TRNC-VTS

A sample image regarding how the VTS Centre should be is shown in Figure 6.2. Moreover, a sample image of the watchtowers is shown in Figure 6.3.

Figure 6.2: VTS control centre (sample)

Figure 6.3: Sample of a traffic watchtowerin the Istanbul Strait

CHAPTER 7
FIELD WORK:TRAFFIC WATCHTOWERS AND DETERMINING LOCATIONFOR THE VTS CENTRE

Factors to be taken into account when determining the VTS Centre and Traffic Monitoring Stations (TMS):

a. Size of the area to be monitored and technical facilities and system capability regarding monitoring,
b. Factors such as Traffic Separation Scheme (TSS), iron locations, reporting, etc.
c. Vessel traffic density and the nature of the payload,
d. Navigational challenges of the region or the port,
e. Environmental sensitivity,
f. Meteorological and hydrological factors,
g. Sensitive political situation in the Aegean Sea,
h. Political sensitivities in the East Mediterranean.

The process of determining TRNC-VTS Centre and Traffic Monitoring Stations (TMS) after the surver evaluations, expert opinions and pre-studies is as follows. My study that contains the first survey results and evaluations in the beginning of the thesis has been presented in the 1st National VTS Congress (08 - 09 December 2014, Istanbul) and it attracted the attention of Ministry of Transport, Maritime Affairs and Communications and related people. As a result of this, it was decided to expand Mersin VTS and preparations started. The first meeting has been held in Ankara on 19 March 2015 on the request of Ministry of Transport, Maritime Affairs and Communications and the participants included DIDGM, BIDB and DTGM, KEGM from the Ministry of Transport, Maritime Affairs and Communications, NEU/University of Kyrenia and ITU-TRNC Education-Research Campuses participants. I have personally attended within the scope of my research study in the name of Near East University/University of Kyrenia. After sharing the relevant data with TRNC VTS, it is decided to combine the next meeting with the Feasibility study and carry it out in the TRNC.

The preliminary meeting on the "Enlargement of Vessel Traffic Services Eastern Mediterranean (Cyprus)" under the auspices of the General Directorate of Marine and Inland Waters and the Ministry of Transport, Maritime Affairs and Communications has been held between 20-24 April 2015 in cooperation with TRNC Ministry of Public Works and Transportation, Faculty of Maritime in the campus of Near East University (NEU) /University of Kyrenia and ITU-TRNC Education-Research Campuses.

Institutions and organizations that will take part in the feasibility study commission within the scope of the project are the following: TR Ministry of Transport, Maritime Affairs and Communications, General Directorate of Marine and Inland Waters, Naval Forces Command, Coast Guard Command, General Directorate of Coastal Safety, Information Technology Department, TRNC Ministry of Public Works and Transport, TRNC Security Forces Command, Cyprus Turkish Coastal Safety and Salvage Co. Ltd. ITU-TRNC Education-Research Campuses and the University of Kyrenia.

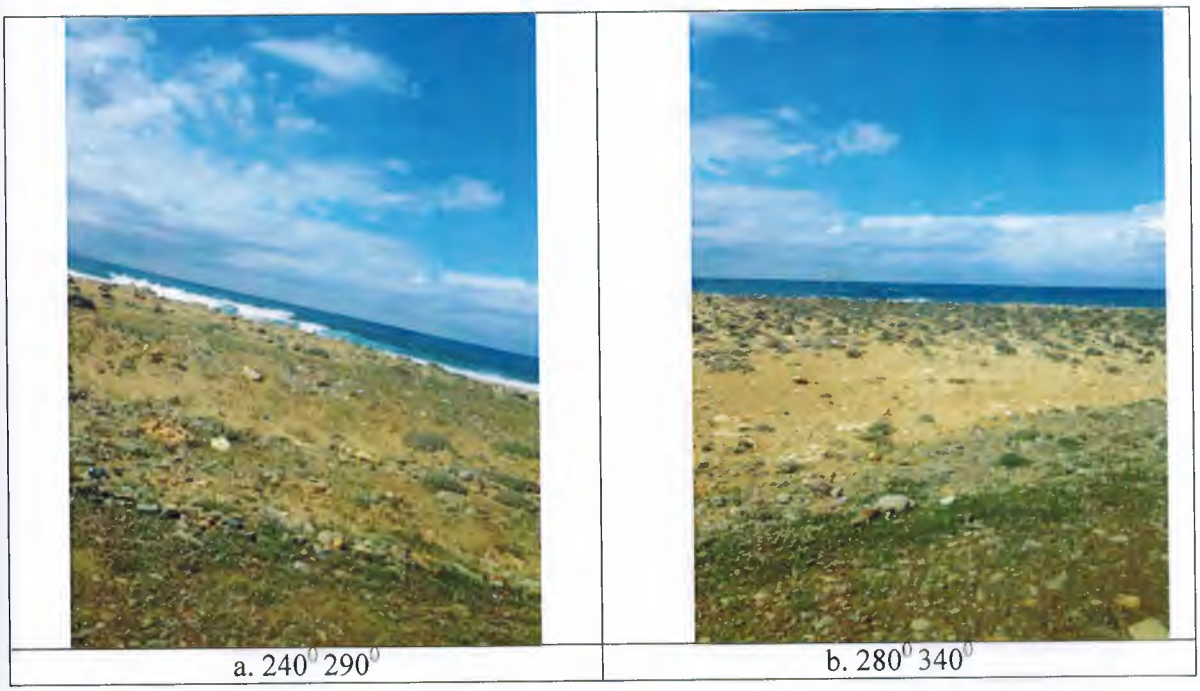
NEU/University of Kyrenia planning meeting was held on 20 April 2015 after the preliminary meeting and the groups arranged for the feasibility study (one-two people from each institution) started the field research in order to see the places included in my thesis. I have personally attended all the determined fields, the areas that we have not attended as the commission but I planned in the previous first study are also shown in this research study. The information on the field research that has been carried out the the feasibility commission that contains the recommended areas in the first study is included in the part below.

The vessel traffic in the area, the locations of the critical plants and environmental sensitivities have been examined with the aim of determining the scope of the VTS system planned to be set up. A study has been conducted primarily on the map for the purpose of determining the TMS to be set up subsequently, I presented the first studies on my thesis at this stage and as a result of an opinion exchange with all the participants on the suggested locations, as the Feasibility Commission in order to monitor the vessel trafficking in Famagusta, the discovery has been planned in order to vessel tracficking of Cape Apostolos Andreas and Port of Famagusta as well as Kyrenia Tourism Harbour and to monitor to improve the safety of the water and fiber lines including this field. Feasibility commission have excluded Cape Kormakitis and Famagusta Port suggested in the first study of my thesis from the investigation. For this reason, I am presenting my investigation on Cape Kormakitis and Famagusta Port before parring on the details of the details of the Feasibility Commission.

7.1 Cape Kormakitis

Date of field inspection: 10 April 2015, Coordinates: Lat. 35° 24'0" N, Long. 32° 55'2" E, Altitude: 5 metres

Cape Kormakitis is the location of Kormakitis Lighthouse and it is a public zone. Energy and fiber infrastructure are available in Sadrazam Village which is 2.3 km away.



a. 240° 290°

b. 280° 340°

c. 200^0 -250^0

d. 330^0 -000^0 000^0 -220^0

Figure 7.1: Images of Cape Kormakitis Lighthouse zone from different angles of view

7.2 Famagusta Port Zone

Date of field inspection: 25 April 2015, Coordinates: 35° 07' 59.4" N 033° 56' 15.1"E Altitude: 19 m

Famagusta Free Port and Zone General Directorate building is in Famagusta Free zone, affiliated to Ministry of Economy, and does not have any problems regarding the energy infrastructure.

a. 350^0 -030^0

b. 030^0 080^0

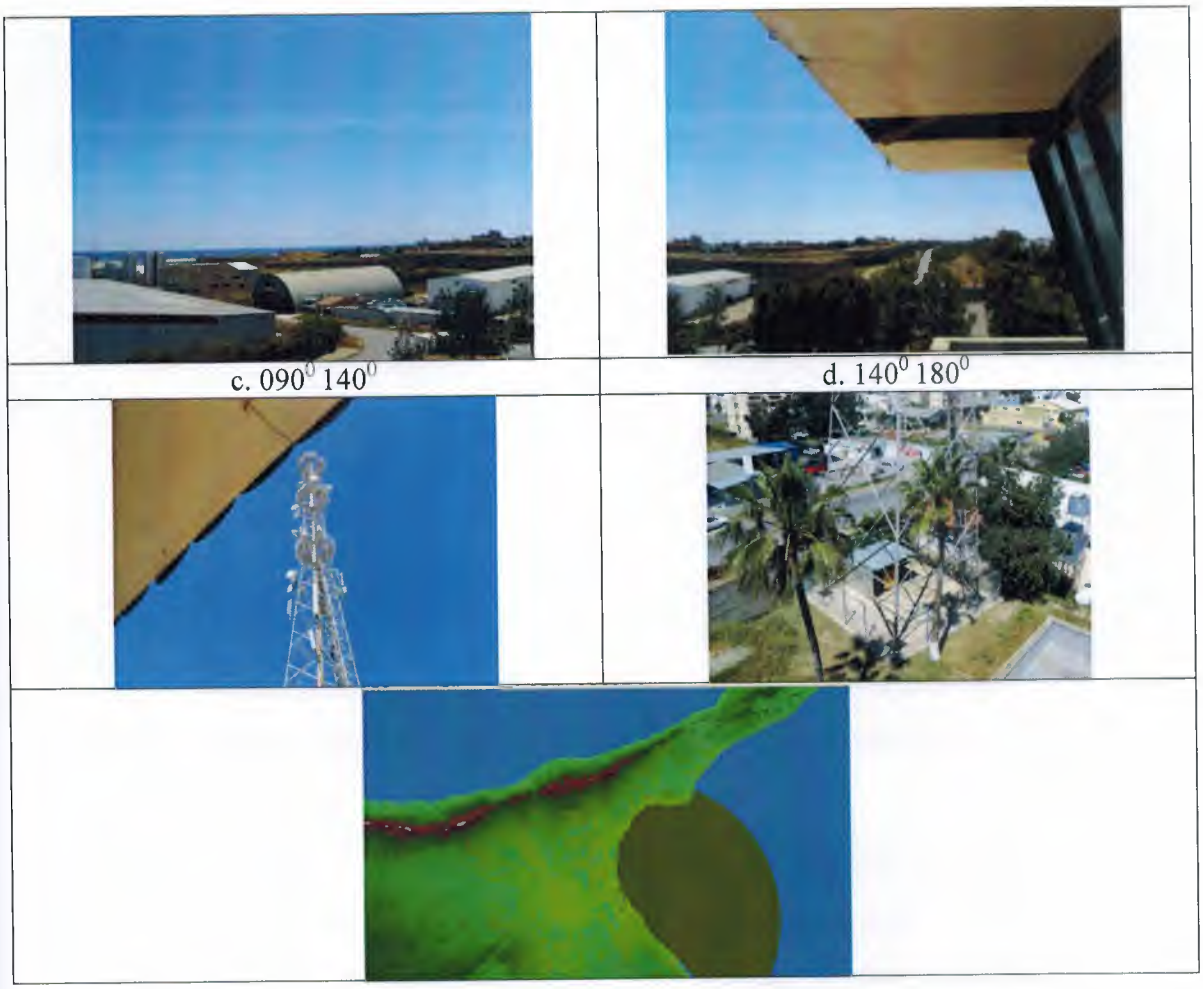


Figure 7.2: Images of Famagusta Free Port from different angles of view

Field is in the border of Free port and area. This area is under the control of TRNC Ministry of Economy. Building is the building of Directorate of Famagusta Free port and area. The GSM antenna that Turkcell and Telsim uses commonly on the side of the building.There is space around the building to erect another antenna. The watchtower on top of the building is in a bad state and requires repair.

7.2.1 Costguard Port Watchtower

The watchtower used by Coastal Security Forces in the Famagusta Port as an alternative location between the internal port and the external port. A tower of 5-6 m to be built here can be an ideal TMS. Altitude is around 16m and there is no problem with the infrastructure.

Figure 7.2.1: Images of Famagusta Port SGK port watchtower

The feasibility commission is divided into two groups as technical and operational; discoveries/observations have been made in the fields where TMS will be set up in technical terms and in the Directorates of Famagusta and Kyrenia Tourism Ports in operational terms.All the field research has been evaluated in accordance with the TMS Location Selection Form prepared on Annex-3; the following information has been researched for each area/region in line with this.

1. Field Name
2. Information about Field (Public, Private, etc.)
3. Coordinates
4. Altitude Information
5. Information on Energy Infrastructure (Information on electricity infrastructure and its transmission)
6. Information on Communication Infrastructure (Fiber Optic for Around 2Mb)
7. Photography (0° -360° +30°)
8. Notes on Field

7.3 Teknecik Powerplant

Coordinate: 35° 20` 11`` N; 033° 27` 48`` E Altitude: 15 metres

An investigation has been performed with the aim of setting up a TMS in Teknecik Powerplant primarily in order to monitor the vessel traffic of Kyrenia Harbour Port and to improve the safety of the pipelines of water and fiber lines that come from Turkey. The field is evaluated as ideal to monitor the fiber line and the entrance of Kyrenia Tourism Harbour, but it is evaluated as an alternative location as it is identifed that the range a TMS to be set up here will not reach Cape Kormakitis.

Figure 7.3: Location of Teknecik Powerplant

Figure 7.3.1: Location of Teknecik Powerplant on a rock

Figure 7.3.2: Image of Teknecik Watch Tower

7.4 Cape Apostolos Andreas

Coordinate: 35° 41` 40`` N; 034° 35` 14``E Altitude: 33 m Ownership Status: Public (National Park Area)

A discovery has been made in the Cape Apostolos Andreas which is the turning point of the marine traffic between Eastern Mediterranean-Famagusta. Nevertheless, a discovery has been made in the location where GSM transmitters are available in the same region alternatively due to the special condition of this field.

Figure 7.4: Location of Cape Apostolos Andreas on the island

Figure 7.4.1: Location of radar antenna (on a rock)

	
a. 0-60	b. 0-120

Figure 7.4.2: Images of Cape Apostolos Andreas from different angles of view

7.4.1 Karpaz GSM Towers

Coordinate: 35° 40` 39`` N; 034° 34` 04``E Location of Karpaz GSM Towers on the island

Altitude: 95 metres

Ownership Status: Public (National Park Area-Woodland Area)

Figure 7.4.3: Location of Karpaz GSM Towers

a. 0-60 b. 0-120

c. 0-180 d. 0-240

e. 0-300 f. 0-360

Figure 7.4.4: Images of Karpaz GSM Towers

7.5 Zeytinlik Lighthouse

Coordinate: 35° 19` 30`` N; 034° 02` 50``E Altitude: 26 m Ownership Status: Public (Lighthouse belonging to TRNC Coastal Safety and Salvage Company Ltd.)

Figure 7.5: Location of Zeytinlik Lighthouse

a. 0-60 | b. 0-120

c. 120-180 | d. 180-240

Figure 7.5.1: Images of Zeytinlik Lighthouse

7.6 Sadrazam Village

Coordinate: 35° 22` 45`` N; 032° 57` 15``E Altitude: 160 m Ownership Status: Public

Figure 7.6: Location of Sadrazam Village

a. 0-60 b. 60-120

c. 120-180 d. 180-240

e. 240-300 f. 300-360

Figure 7.6.1: Images of Sadrazam Village

Alternating radar coverage areas obtained as a result of the carried out studies are shown in Figure 7.7.

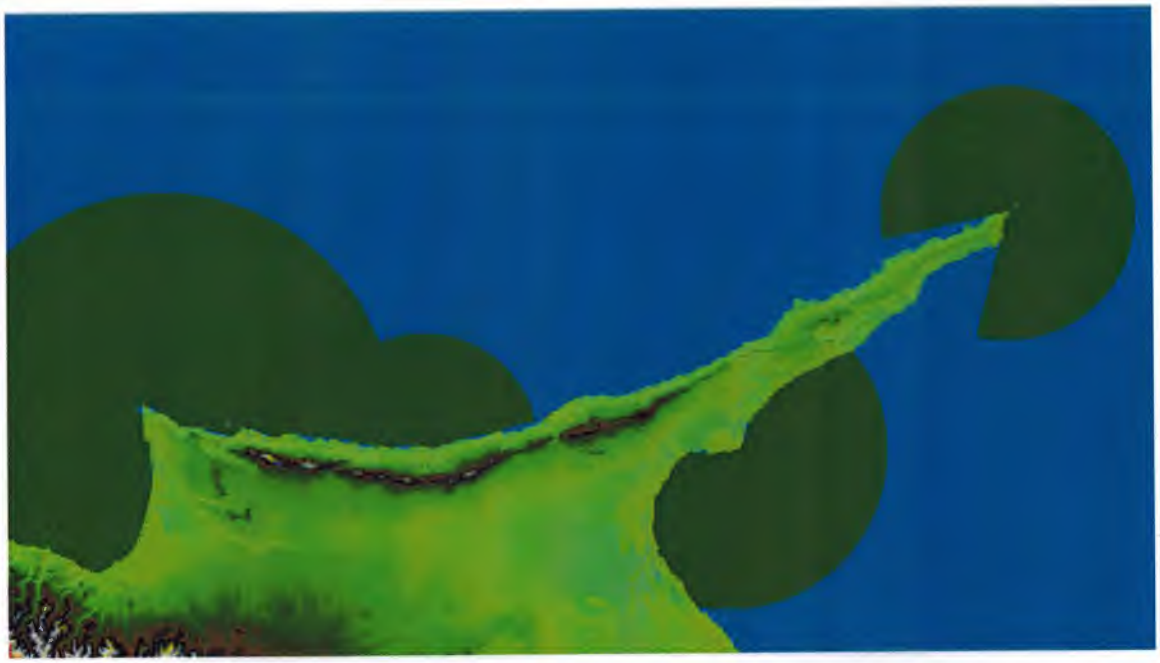
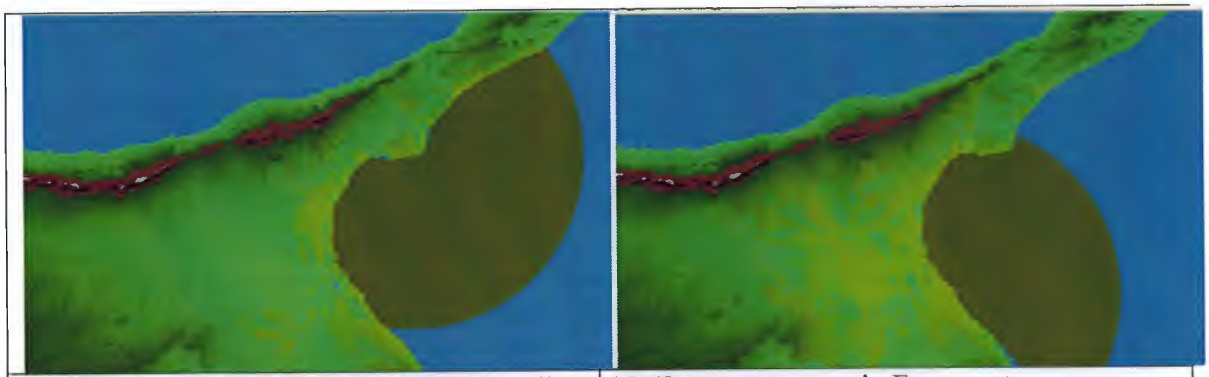


Figure 7.7: Sadrazam Village, Teknecik, Cape ApostolosAndreas and Zeytinlik Lighthouse Radar coverage range of traffic towers



TMS coverage area in the Zone of Zeytinlik Lighthouse	TMS coverage area in Famagusta

Figure 7.8: TMS coverage area differences between zone of Zeytinlik Lighthouse and Famagusta

Figure 7.8 shows;if we compare the Radar Coverage Ranges of the both TMS, it is clear that in Famagusta TMS, will run more efficiently from Zeytinlik TMS.

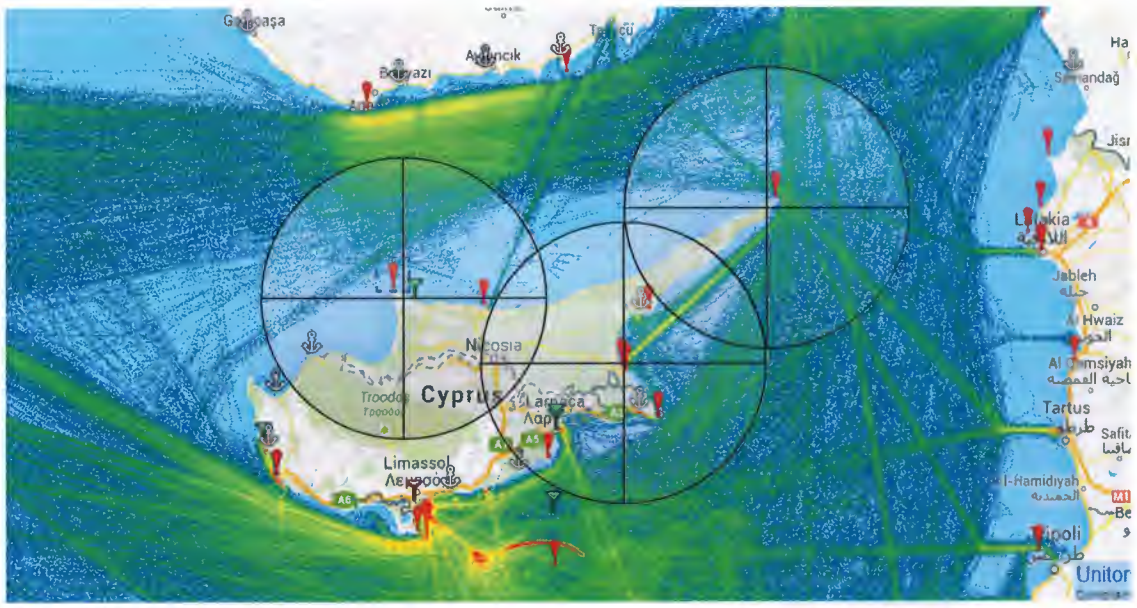


Figure 7.9: Fields determined for the radar coverage and TMS locations on vesseldensity chart

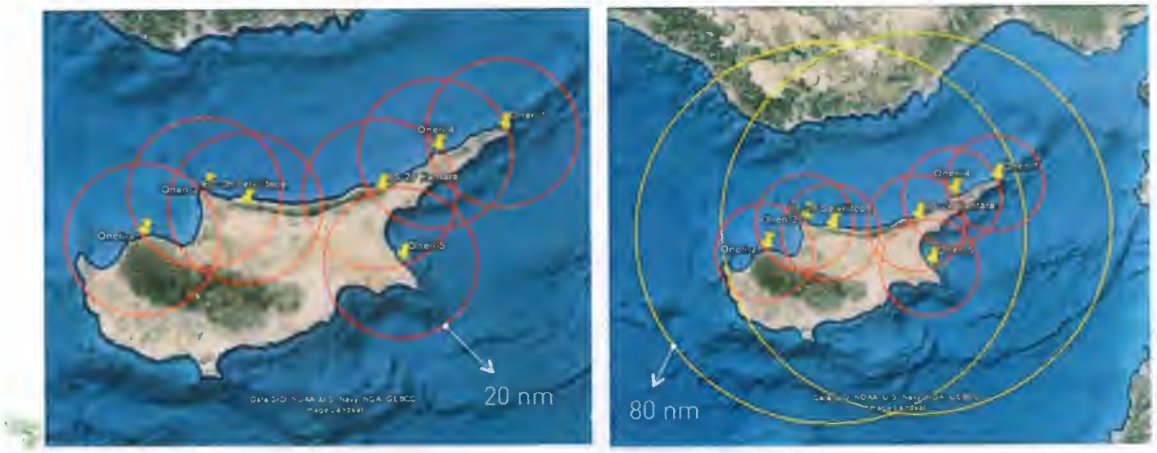


Figure 7.10: Planned AIS stations and their coverage areas

It is planned to equip the VTS to be established with only three TMS, as shown in Figure 7.9. The regions outside the coverage area of the radar must be equipped with AIS stations so as to cover the entire coast as shown in Figure 7.10 as the radar coverage of the entire coast of the TRNC is not possible.

CHAPTER 8
CONCLUSIONS

This research presents the way how a VTS system to be set up in the TRNC or to cover the TRNC should be, they type of opportunities and threats it contains, the necessary conditions for its setting up and the steps to be followed after its establishment as a fundamental study. According to this, the expectations from a VTS system to be set up in the TRNC can be summarized as follows:

- To play the role of a regional VTS as well as a coastal VTS for the TRNC port and marine borders,
- To improve the safety and efficiency of the marine traffic in Turkey, the TRNC and the region,
- To protect the marine environment,
- To create an awareness on the marine environment at a national/international level in the Eastern Mediterranean,
- To enable the data transfer between Turkey and the TRNC and to support the efficiency of the vessel management system,
- To follow the port activities of the TRNC (mooring, departing, anchoring, etc.)
- To make positive contribution to the quality and efficiency of the replenishment services (fuel, water, food, etc.) in the region.

TRNC-VTS to be installed is very significant as it will enrich the statistical information regarding the maritime. In order to process the wakes to be obtained from the TMS to be set up, it is believed that the transfer of the wakes to be obtained from the TMS to Mersin VTS Centre over the network infrastructure, subjecting them to a wake fusion and the transfer of the obtained image to the TRNC over the network would be convenient.

- Adminitrative and Operational Needs,
- Determining VTS zone,
- Identification of the location of VTS centre,
- Preparation of VTS legislation,
- Employment, training and qualification of VTS personnel,

In conclusion, the contributions that will be made by VTS to be set up in the TRNC are indisputably acceptable according to the gathered data. It is estimated that ensuring the most effective way of establishing this by setting up three (3) traffic monitoring stations (TMS) in Cape Kormakitis, Cape Apostolos Andreas and at the location of Zeytinlik Lighthouse or at a convenient location at the Famagusta Port. It is also anticipated that the regions out of the coverage of these three radars will be monitored by Automatic Identification System (AIS) and this will be carried out by the VTS Operators to be employed in the VTS Centre to be established in the TRNC (in Kyrenia and/or Port of Famagusta).

The propesed VTS is to be equipped with simple 3 TMS, the radar of all the TRNC outside radar coverage that shores of coverage to be able regions Figure 7.9 is required as was seen to be equipped with the AIS stations to cover the entire coast.

The main aim of TRNC-VTS will be the protection and monitoring of the environment rather than monitoring and planning of the vessel traffic. When the vessel traffic around is considered, this level of density may not require the setting up of a VTS, but as an island country which makes tourism a basic stone of the economy, protection of the environment and prevention of the marine pollution come into prominence. Another reason for this is that TRNC maritime and marine environment will become stronger in case of the human trafficking due to the recent political instability in the Middle Eastern countries and in the event that an agreement is made as a result of the negotiations between the TRNC and Southern Greek Cypriot Administration.

The structure of TRNC-VTS to carry out this duty should be under the control of an Official authority. Therefore, it should be structured as an autonomous Department affiliated to Ministry of Public Works and Transport or Directorate of Ports. It is formed of technical and operational assistants under the administration of a director and operators working with the assistants as well as expert staff on technical and information technology. All the staff related to the technical field and operations be trained and qualified and should have continuous in-service training and updated information. Training of this staff can be provided by the Universities in the TRNC providing education on maritime, including Near East University.

It is obvious that the information and data sharing between VTS Centre in the TRNC and Turkey will be available. The political and strategic long-term national benefits should be considered in addition to the short-term technical and operational benefits while taking these decisions. It also has an important place for other issues that require the consideration of the political balance that will especially appear in a wider range apart from the constant effects.

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APPENDICES

APPENDIX 1

QUESTIONNAIRE FOR PEST ANALYSIS

KKTC'de Gemi Trafik Hizmetleri (GTH) Sistemi Kurulmasına ilişkin

PEST Analizi Değerlendirmesi

Açıklama:

PEST analizi; "**P**olitik, **E**konomik, **S**osyal ve **T**eknolojik" faktörlerin incelenerek, **önemli ve hemen** harekete geçilmesi gerekenleri tespit etmek ve bu faktörlerin, **olumlu veya olumsuz**, kimleri **etkilediğini** ortaya çıkarmak için yapılan bir analizdir.

Politik/Hukuki Faktörlere Örnekler: Mevcut durumda ekolojik/çevresel yasalar/kurallar, Devlet politikaları, Vergi sistemi, Dış ticaret düzenlemeleri, Hükümet politikaları, Mevcut hükümetin durumu, Devletin müdahalesi, Uluslararası ilişkiler, Yerel market baskısı, Grup baskıları, Uluslararası baskı, Grup çatışmaları

Ekonomik Faktörlere Örnekler: Dünyadaki genel ekonomik durum, Uluslararası ekonomik kuruluşlar, Ticari döngüler, Enflasyon ve değişim oranları, Ekonomik büyüme ve GNP değişimleri, Faiz oranları Döviz kuru, Para ve kredi kaynakları, güvensizlik durumu, İş gücü mevcudiyeti, Enerji mevcudiyeti ve maliyeti, Market/ticaret döngüsü, Özel endüstri faktörleri

Sosyal Faktörlere Örnekler: Çevreye olan hassasiyet, Tüketici eğilimleri, Yeni ihtiyaç ve istekler, Çalışma ve boş zaman eğilimleri, Zenginlik ve gelir dağılımı, Toplumun yaş ve eğitim dağılımı, Doğum artış oranı ve ortalama ömür, Toplumdaki etik değerler, Demografik (Nüfus) özellikler Tüketici davranışları ve görüşleri, Medya görüşleri

Teknolojik Faktörlere Örnekler: IT kullanımının yaygınlığı, Yeni ürünler, Enerji kaynakları ve kullanabilirlik, Alternatif ve yeni teknolojiler, Girdi kaynakları, maliyetleri ve mevcudiyetleri, Hükümet, endüstri ve üniversitelerin ARGE harcamaları, Ekolojik faktörler, Teknoloji transferi, Altyapı teknolojisi, Değişen teknoloji/çözümleri, Fikri mülkiye unsurları, Küresel iletişim

* Yukarıdaki açıklamalar ışığında size göre KKTC'de GTH sistemi kurulur ise bunun;

- **Politik** etkileri nelerdir.

- **Ekonomik** etkileri nelerdir.

- **Sosyal** etkileri nelerdir.

- **Teknolojik** etkileri nelerdir.

APPENDIX 2

QUESTIONNAIRE FOR SWOT ANAYLSIS

KKTC'de Gemi Trafik Hizmetleri Servisi Kurulmasına İlişkin

Denizcilik Sektöründeki Uzman Görüşleri

Sayın İlgili,

Yüksek Lisans tez çalışması olarak "KKTC'de Gemi Trafik Hizmetleri (GTH) Kurulumu" üzerine araştırma yapmaktayım. Bu konu ile ilgili değerli görüşlerinize ihtiyaç duymaktayım. Sizden alınan bilgiler tamamen gizli kalacak olup, araştırma sonuçları sizler ve akademik platformlarda paylaşılacaktır.

Katılımınızdan dolayı teşekkür ederim.

Çalıştığınız Sektör/Kurum:.....

Göreviniz:.....

Denizcilik ile ilgili tecrübeleriniz nelerdir, kısaca açıklayınız. (denizde çalışma veya kurumda geçirdiğiniz toplam süreleri de belirterek açıklayabilirsiniz).

-
-
-
-
-

Sizce KKTC'de GTH kurulmalı mı? En önemli en az üç gerekçenizi lütfen belirtiniz.

Evet.

-
-
-

Hayır.

-
-
-

KKTC'de GTH kurulduğu takdirde;

Kontrol Merkezi nerede olmalı?

Gözetleme Kuleleri kaç adet ve nereye konulmalıdır?

KKTC'de GTH kurulduğu takdirde Kontrol Merkezi'nin idaresi (GTH Yönetimiz) sizce Türkiye'de mi KKTC'de mi olmalı? Neden?

Size göre kurulacak GTH Sisteminin GÜÇLÜ YANLARI nelerdir?

-
-
-
-
-

Size göre kurulacak GTH Sisteminin ZAYIF YANLARI nelerdir?

-
-
-
-
-

Size göre kurulacak GTH Sistemi KKTC'ye ne gibi FIRSATLAR getirir?

-
-
-
-
-

Size göre kurulacak GTH Sistemi KKTC'ye ne gibi TEHDİTLER getirir?

-
-
-
-
-

Değerli katılım ve zamanınız için teşekkür ederim.

APPENDIX 3

TRAFFIC SURVEILLANCE STATION SELECTION FORM

Trafik gözetim istasyonu yer seçim formu

Tarih: ..... Nisan 2015

Sayfa: ...../.....

Saha Adı	:	
Saha Hakkında Bilgi (Kamu, Özel, vb.)	:	
Koordinatları:	:	° ' '' K ° ' '' D
Rakım Bilgisi		
Enerji Altyapısı Billgisi (Elektrik altyapısı ile iletimi bilgileri)	:	
Haberleşme Alt Yapısı Bilgisi (Yaklaşık 2Mb için Fiber Optik)	:	
0°-360° +30° Resim/Foto Çekme	:	
Saha Hakkında Notlar	:	