

ACCIDENT ANALYSIS IN DANGEROUS GOODS TRANSPORTATION IN  
AZERBAIJAN



ASADOV NAMIG

MAYIS 2019

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AZERBAYCANDA TEHLİKELİ MADDELERİN TAŞINMASI ZAMANI OLAN  
KAZALARIN ANALİZİ

NAMİG ASADOV

MAYIS 2019

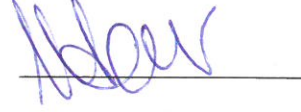
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## ABSTRACT

### ACCIDENT ANALYSIS IN DANGEROUS GOODS TRANSPORTATION IN AZERBAIJAN

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Logistics Management

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May 2019

Our country is an important place both in the region and in the world in terms of geographical location, industrial and commercial capacity, production and logistics services.

Thanks to infrastructure investments and geographical opportunities, road transport is the most used logistics method in our country.

Transport of dangerous goods on motorways requires the protection of people, animals and the environment and requires compliance with a set of rules to ensure compliance with these rules.

The rising momentum of industrialization in the world has also increased the use of hazardous materials and the transfer of the goods from one place to another. Many countries around the world are transporting dangerous goods via various transport modes such as maritime, road, air and rail.

With this thesis, it is aimed to investigate the level of logistics sector in Azerbaijan, the dangerous goods transported in our country and the accidents that have the time to transport dangerous goods.

**Keywords:** Azerbaijan Logistics Sector, Transportation of Dangerous Goods, Hazardous Materials

## ÖZET

### AZERBAYCANDA TEHLİKELİ MADDELERİN TAŞINMASI ZAMANI OLAN KAZALARIN ANALİZİ

NAMİG, ASADOV

Lojistik Yönetimi

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Mayıs 2019

Ülkemiz coğrafi konum, sınai ve ticari kapasite, üretim ve lojistik hizmetleri bakımından hem bölgede hem de dünyada önemli bir yer.

Altyapı yatırımları ve coğrafi fırsatlar sayesinde karayolu taşımacılığı ülkemizde en çok kullanılan lojistik yöntemdir.

Tehlikeli malların otoyollarda taşınması insanların, hayvanların ve çevrenin korunmasını gerektirir ve bu kurallara uyumu sağlamak için bir dizi kuralla uyumu gerektirir.

Dünyada yükselen sanayileşme momentumu, tehlikeli madde kullanımını ve malların bir yerden bir yere taşınmasını da arttırdı. Dünyanın dört bir yanındaki birçok ülke tehlikeli malları deniz, kara, hava ve demiryolu gibi çeşitli ulaştırma modlarıyla taşıyor.

Bu tez ile Azerbaycan'da lojistik sektörünün seviyesini, ülkemizde taşınan tehlikeli malları ve tehlikeli mal taşıma zamanı olan kazaları araştırmak amaçlanmaktadır.

**Anahtar Kelimeler:** Azerbaycan Lojistik Sektörü, Tehlikeli Maddelerin Taşınması, Tehlikeli Maddeler

To my family, fiance and friend, with thanks.



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Namig Asadov

July - 2019



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## ABBREVIATIONS

AADT	-	The Annual Average Daily Traffic
ADB	-	Asian Development Bank
ADXDC	-	Azerbaijan State Caspian Sea Ship
ADY	-	Azerbaijan Railways
AMAG	-	Azerbaijan Civil Aviation Day
AZAL	-	Azerbaijan Airlines
BBDTL	-	Baku International Maritime Trade Port
BHNA	-	International Air Transport Association
BQTN	-	Baku-Grozny-Tikhoretsk-Novorossiysk pipeline
BTB	-	Baku-Tbilisi-Baku
BTC	-	Baku-Tbilisi-Ceyhan pipeline
BTTL	-	Baku Sea Trade Port
BTY	-	Baku Freight Terminal
DNŞ	-	State Oil Company
EWTC	-	East West Transport Corridor
GHIX	-	Ship Movement Management Service
ICAO	-	International Civil Aviation Organization
IDB	-	Islamic Development Bank
IGC	-	Intergovernmental Commission
LPI	-	Logistics Performance Index
NAR	-	Nakhchivan Autonomous Republic
NSTC	-	North-South Transport Corridor
OECD	-	The Organization for Economic Co-operation and Development
SCP	-	South Caucasus Natural Gas (SCP)
TGI	-	Turkey, Greece and Italy
TRACECA	-	Transport Corridor Europe-Caucasus-Asia
XDG	-	Caspian Shipping
ZMASC	-	Transcaucasian Civil Aviation Corporation

## INTRODUCTION

The history of the Azerbaijani logistics sector dates back to the 19th century. For the first time the railway has been established for oil transportation. After much later, logistics did not develop much in Azerbaijan.

When we look at the logistics performance index was 2.62 in 2010, this rate decreased to 2.45 in 2018 and Azerbaijan is in the 123th place with this result.

Dangerous substances in the environment or human health in which they are in the structure, which is used in our daily life in certain areas we are exposed to the use of substances. The use and transport of these substances has been an issue that has existed throughout the world for many years. The increase in industrialization and technology and the increase in the use of hazardous materials caused an increase in the transportation activities in this area.

Transport of dangerous goods can be carried out by transport modes such as land, air, iron and maritime. When the existing literature is examined, it is seen that the most of the road is preferred for the transportation of dangerous goods and the risks in the transportation of hazardous materials are evaluated. Considering the harmful effects of hazardous substances on the environment and human beings, transportation with an easily accessible mode has increased the preference for the highway. It is observed that the state has taken more measures regarding the road in the regulations such as legislation and convention. However, other modes of transport can be preferred for the transport of hazardous materials. In the literature, even though railway transportation is stated to be more reliable in the transportation of these substances, it is rarely discussed as a research topic.

It is understood that not only the appropriate transport mode is selected for the transport of dangerous substances, but also the documents to be kept during transport. The first issue to be considered in the transport of dangerous substances is to take all necessary measures to make the danger that can be prevented as much as possible. In this context, it is of great importance that the documents in the vehicle are prepared carefully and thoroughly. The fact that each class has different types of danger requires to prepare different documents in some special cases. The competent authorities and individuals provide the necessary conditions with the highest level of attention and attention during this process. Therefore, each class has its own type of danger, which

should ensure that the transportation is carried out with caution and that it should be included in the carriage together with the cargo as the forwarding document.

Considering the logistic sector in the world's major countries and Azerbaijan and the issues related to dangerous substances, a 4-part thesis has been prepared.

In the first part of the thesis, the concept of logistics is explained, the process of development of logistics, the importance of business functions and logistics in the world. At the same time, the logistics sector in America, Europe and Asia is analyzed.

In the second chapter, it is written how the logistics of Azerbaijan, how it has developed and which transportation methods it has. In addition to this, comprehensive information about road, rail, air and pipe roads in Azerbaijan is given.

In the first part of the thesis, the concepts of dangerous substances, types of hazard, structures, groups and substances which are not allowed to be transported are examined by firstly addressing the concept of hazardous materials and the details of the hazard substances are explained in detail.

In the fourth chapter, the transport of dangerous goods in Azerbaijan is explained. In addition, it is important to follow the rules when transporting dangerous goods and emphasize which tools are important. Accidents were analyzed in dangerous goods transportation.

### **Importance and aim of study**

The development of industrialization day by day increases the use of hazardous substances in this area, thus increasing the production and transportation of hazardous materials in recent years. With this increase, the risks of hazardous substances are handled more carefully and the importance given to this issue is evaluated by many parties such as researchers, enterprises and employees. The increase in the use of hazardous substances makes the transportation process continuous and regular. However, dangerous goods transport is a matter that should be dealt with more carefully than normal transportation considering the damage to the environment and people in general.

The main purpose of the study is analys the accidents during the transportation of dangerous goods and in detail to investigate the logistics sector of Azerbaijan. And this is to show what should be done to reduce or prevent accidents and what rules should be followed.



## **Design of Study**

Incident analysis method was used in the study and interview was taken from 3 logistics companies of Azerbaijan.

To make an appointment, we sent an official e-mail explaining the purpose of the interview and the concept of the study. Companies agreed to answer questions via email. The interview taken from Azerbaijani language is translated into English and shown in the Appendix.

The data from the questionnaire concerned the relationship between Azerbaijan logistics system and dangerous goods transportation. This data was analyzed and some propositions were determined.

The questions were completed after several meetings with my supervisor about the proposals. The questions used in the discussion guide can be found in Appendix in English.

## **Incident Analysis Method**

The method of the research is incident analysis for accidents in Azerbaijan. In the research, data were collected and evaluated with standard data collection tools from Azerbaijani news sites. These data collection tools; It is due to the fact that accidents occurred during the transportation of dangerous goods are recorded on the news site.

While doing research, I reviewed the news sites. When reviewing, I paid attention to how reliable these sites belong to Azerbaijan. Road and railway research were carried out between 2010-2019. However, there are no restrictions for air and sea transport due to being few accidents when dangerous goods transportation. In addition, these sites are known as reliable sites in Azerbaijan and approved by people. These sites were accessed using the title and sub-title keywords. At the same time, while writing these accidents, attention was paid to the transportation of dangerous goods. The results of these keywords are shown in the Table 18.

**Table 1: Title results**

Keywords	Results
Azerbaijan railway accidents	301.000
Azerbaijan airway accidents	128.000
Azerbaijan sea accidents	393.000
Azerbaijan road accidents	3,810.000

When we look at these results, most road-related results were obtained. The reason for this is that, as I explained in the second chapter, the most common mode of transport in Azerbaijan is by road. Likewise, the pipe path is the mode of transport in which the least result is achieved if it is the second most common transport path.

I wrote these accidents using 83 news sites. This news sites are shown in Appendix D. These selected news sites are all official sites of Azerbaijan. 90 percent of these sites have more than 5 years of experience. With all this in mind, I have made sure that my research method is reliable for study from these sites. The rest was just repeated. 7 of these accidents were published on the same news website. In order to shorten them and examine them in detail, I did more efficient research using the new subtitle keywords based on the results I found. These sub-titles belong to 4 types of transport modes, which are concluded in each separate separation and shown in findings.

**Table 2: Subtitles for Railway**

Keywords	Results
Bine railway accidents	16.600
Keshle rail accidents	316
Rail accident in Baku	5640
Hajigabul rail accidents	2760
Railway accidents in Azerbaijan in XIX century	116

**Table 3: Subtitle for Roadway**

Keywords	Results
Road accidents in Azerbaijan in XXI century	19.000
Truck accidents in Baku	59.200
Alat-Astara highway accidents	6.120
Baku-Sumgayit highway truck accidents	20.500
Truck accidents in Baku-Guba highway	27.700
Truck accident in Qazax	4.370
Truck accident in Jalilabad	1.990

**Table 4: Subtitle for Seaway**

Keywords	Results
“Azərbaycanın 60 illiyi” ship accident in 1983	6
Merkur-2 ship accident	5620
“İsrafil Huseynov” ship	1230

**Table 5: Subtitle for Airway**

Keywords	Results
Air accident in Azerbaijan in XIX century	56.100
Gandja airport 1965	60
Gakh airport accident in 1974	10
Nakhchivan airport accident in 1995	4270
An-140 air accident in 2005	15.600
Air accident in Afghanistan in 2011	24.800

## **Interview**

We aimed to get general information about dangerous goods transportation and Azerbaijan logistics problems. We tried to analyze the connection between dangerous goods transportation and Azerbaijan logistics system. We looked for some connections between their profile and features of logistics.

Snowball method was used when selecting logistics companies. One of the companies directed me to take an interview with other logistics companies of Azerbaijan. And I looked at how many years of experience they had in selecting these companies, as well as looking at how reliable these companies were in the Azerbaijani logistics sector, and then contacted them by e-mail. I tried to reach many companies by e-mail, but only 3 of them agreed to return and interview.

All general information about Interview is shown in the appendix.

## CHAPTER 1

### DEFINITION OF LOGISTICS

Logistics as a science in the 1900s was first used as a military term and is the most rational, effective, and consistent service in wars or military operations. This is a French word that refers to all services that unite and implement the plan and program (Baki, 2004).

Although there is no single logistic definition, different institutions and organizations have different definitions (Orhan, 2014). Logistics is the process of monitoring and managing customer needs, as well as the efficient and effective flow of all types of products, services and information flow from the raw material point to the end of the product consumption (Alkan and Erdal, 2007). logistics; This is a site that covers all the information and the movement of materials from sources of raw materials to processing by the end user. As you know, logistics is not only shipping but also storage, customs procedures. Supply chain management, including transportation, storage, customs clearance, insurance, processing, packaging, evaluation of orders to meet the needs of customers from production to consumption. Although all these processes take place, they also include direct service and information flow and information flow between delivery points and delivery points. At the end of the 20th century and the beginning of the 21st century, the concept of logistics was recognized as concepts of globalization, supply chain management and combined transport (Koban and H, 2013).

## 1.1. Stages og Logitics Management

**Table 6: Stages of Logistics Management (Özdoğan, 2016)**

Physical distribution	Manufacturing support	Supply support
Customer Service Delivery Process	Process of planning, programming and supporting production activities	Material and product acquisition process from outside supply sources
Activities Required for Physical Distribution	Activities related to manufacturing support	Activities required by procurement functions
Accepting Orders	Main production schedule planning	Quality safety
Order Processing	Supporting intra-ware goods movements	Storage
Availability of Stocks	Carrying in the production process	Observing and acceptance
Storage Movements	Separation of parts and implementation of the process in this context	Moving into management
Transportation for the operation and operation within the Distribution Channel	Responsibilities	Order Placement
Basic obligations included	Storage of inventories at manufacturing sites	Interviews
Pricing	Flexibility for postponement and geographic coordination between physical distribution and manufacturing	Finding a supply source
Incentive Support		Needs Planning
Customer service		Responsibilities
Delivery		Determine the limits of the supply source; make aggregation continuous
Returning Goods		Performing guidance research for new sources of supply
Marketing planning and coordination in areas such as maintaining the product life curve		Coordination with supply resources

The main objective of the Physical Distribution is to provide the desired level of customer service strategically in the context of low total cost and generate revenue		Purpose of Supply Function
		Identify appropriate procurement at cost and support manufacturing or re-sales organizations

As shown in Table 1, logistics management consists of three main steps. At the first stage, the physical order continues. The physical deployment phase begins with the order acceptance phase. After receiving the orders, orders are processed, inventory management is carried out in the warehouse and warehouses. The key points to consider at this stage are the proper design and management of delivery, customer service, delivery stages, and prices. The second step in logistics management is the production support process, which consists of determining the raw materials and materials that will be needed in the production process. In the production process, transportation, the main production program and distribution support in a warehouse are one of the basic levels of logistics management. Ensuring the necessary coordination between production and physical distribution is one of the main tasks of logistics management. Purchasing is the process of supplying raw materials and goods using external sources. In this context, government procurement covers a wide range of activities - from quality control to security processes and supervision and reception. Factors that need to be emphasized in the procurement process include determining the characteristics and limits of supply sources, finding new sources of supply, and establishing permanent and systematic relationships with existing procurement resources.

## **1.2. The Importance of Logistics Management**

When evaluating the principles of the logistics system, it becomes clear that these are primarily strategic movements of goods, storage, and material requirements. (Aydın and Öğüt, 2008) Logistics strategies play an important role in business development, meeting customer expectations, reducing inventory, reducing production processes and the supply chain. In this context, the importance of managing logistics for an organization can be called (Tuna, 2001).

- High cost; has a significant share in turnover.
- Affects wife and organizational success
- It has a long-term strategic impact on organizational success.
- It establishes long-term trade relations with suppliers.
- It contributes to customer satisfaction by creating a connection with customers.
- Procurement time is important in terms of reliability and customer expectations.
- It provides a high level of benefit in terms of achieving business strategies.
- Promotes business growth

## **1.3. Logistics sector in the world**

The logistics sector plays an important role in the growth of countries. It is difficult to estimate the scale of the sector, and as many of them believe, the global logistics market in 2006 amounted to \$ 5 trillion. The logistics sector should be one of the fastest growing industries with an annual growth of 7-9% in Europe, 15% in North America and 20% in Asia. The leading countries in the field of logistics are the USA, Great Britain, Japan, the Netherlands, Germany, France, Hungary and Bulgaria. More than 50% of the global logistics market, such as Hong Kong and Dubai outside the United States and Europe, aims to become a logistics base in the near future. Future regions will be Asia-Pacific, Eastern Europe, Russia and the Middle East (PricewaterhouseCoopers., 2010). The development of logistics and global transportation has gained importance in the world as quickly as in Azerbaijan. There are many closely related areas in the analysis of the logistics sector, and since this is the structure of the service sector, it is impossible to obtain real and clear statistical



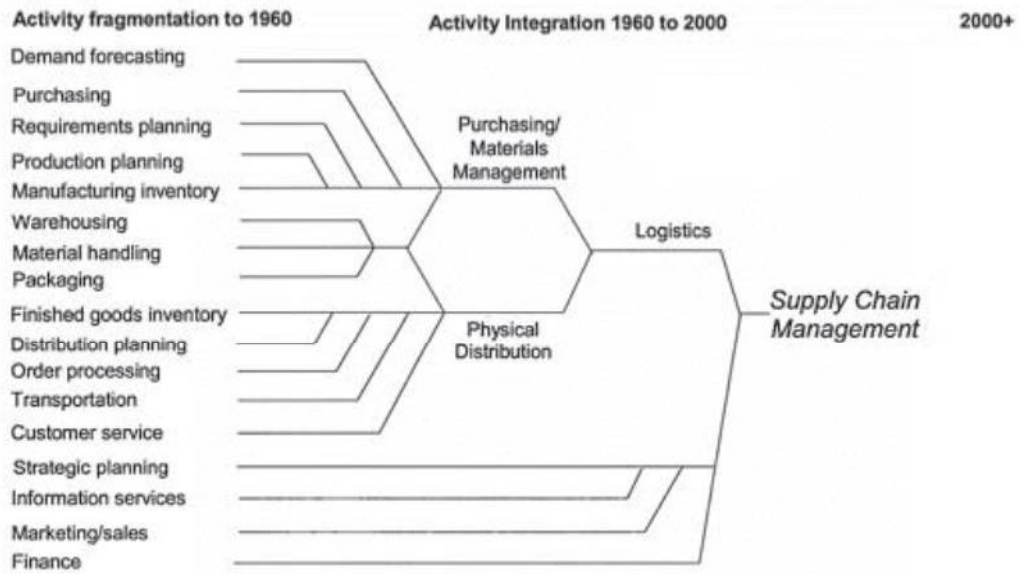
information. The total cost of delivery is 54 billion dollars. Sea transport accounts for 80% of world trade. According to the economic crisis, shipping companies lost \$ 6.5 billion. For the first 20 years, between 2008 and 2013, the total cost of the auto industry in the United States is \$ 2 trillion. Ground transportation transports 8 billion tons of material per year. The modern economy prefers 85% of ground transportation to less than 150 km. Ground transportation is growing in Eastern Europe. In 2016, the global logistics market exceeded \$ 5 trillion, and logistics accounted for at least 25% of the value of every dollar in the world. The EU market is about 627 billion euros. Changes in these reports are shown in Table 2.

**Table 7: World Transportation Changes (Platou, 2017)**

Years	World Transportation Rates	Change
2008	10,86	-
2009	9,56	-12%
2010	10,82	13%
2011	11,54	7%
2012	11,83	3%
2013	12,19	3%
2014	12,58	3%
2015	12,88	3%
2016	13,18	4%
2017	13,55	3%

Geographical regions that will grow in the logistics market and will appear in important years; Asia-Pacific, Latin America, Africa-Middle East, and Eastern Europe. From the perspective of our country, Turkey, in the region of our logistics sector, which turned out to be a significant market share, this should be the place in which its strategic position is at the crossroads of three continents. Historical changes in the logistics industry are shown in Figure 1 (Ballou, 2006).

**Figure 1: Evolution of Logistics (Ballou, 2006)**



## 1.4. Logistics in Europe

The volume of world freight traffic in 2008 reached 10.86 billion tons, and in 2016 - 13.18 billion tons. The estimated amount for 2017 is 13.55 billion tons. In the EU, 3.7% of freight traffic is inland waterways, 11.2% of railways, 37.8% of ships and 37.8% of trucks and 47.3% of trucks. These costs are estimated to increase by 50% in 2050. It is generally accepted that freight traffic in the EU will increase by 4% in 2030 and by 80% in 2050. In addition, passenger traffic will increase slightly less than freight traffic (34% in 2030, 51% in 2050). It is expected that this situation will lead to blocking, especially in cities. The estimated cost of congestion in 2050 will be 200 billion euros. The need for EU infrastructure in the period 2010-2030 is 1.5 trillion euros (Fee 2017).

### 1.4.1. The dynamic logistics market in Europe

Germany is the highest in Europe with 25 logistic clusters (logistic zones). The following 8 clusters with the United Kingdom. This is followed by France (7), Spain (6), the Netherlands (6) and Poland (6). € 3.51 / m<sup>2</sup> is the cheapest logistic area in Poland with basic rent. The primary profitability of the Polish logistics cluster in the third quarter is 7.08%. The highest logistics rents in Europe have to be paid by

companies in Switzerland. The first rental price is 10.71 € / m<sup>2</sup>, and the average rental price is 7.68 € / m<sup>2</sup>. The Greater London Cluster around Heathrow remains the most expensive logistics hub in Europe. The first rent was 15.75 € / m<sup>2</sup>, and the first net profit was 4.00%. The cheapest is in Katowice, Poland, and the main rent is 3.10 € / m<sup>2</sup>. Of particular interest are investments in logistics facilities in Oulu, Finland. The net primary yield is 9.25% and is the highest in Europe. The average yield in the Netherlands is 5.10%. Since returns vary between 4.75% and 5.75%, this is clearly seen from the region. The most expensive ones are Nord-Brabant, Tilburg, and Eindhoven. The net primary income in both positions was 4.75% (catella.com, 2018).

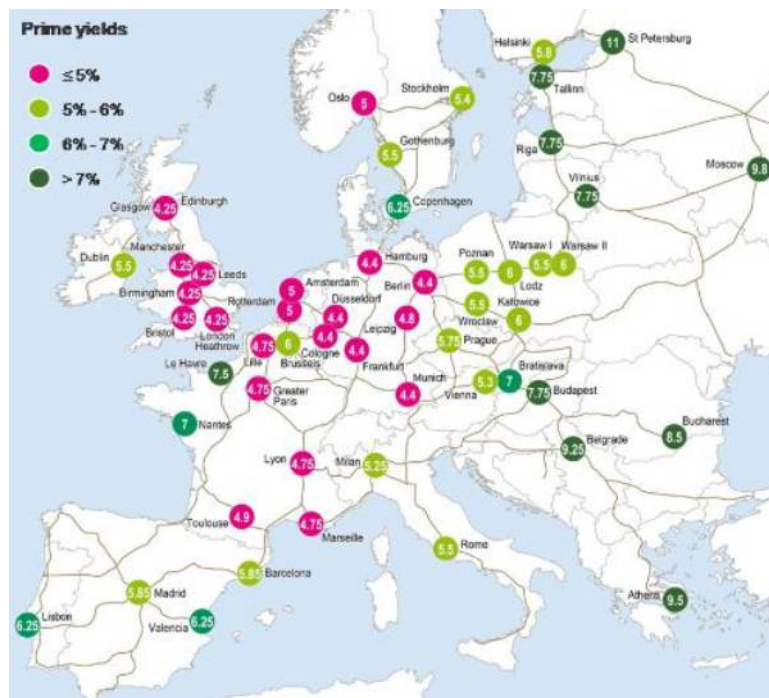
#### **1.4.2. Logistics map in Europe**

The global economic recovery strengthens the European logistics market. Technology and consumption E-commerce supports the demand for modern and urban logistics facilities. Urbanization requires intelligent logistics solutions and city storage on the same day. With an average yield of 6.1% in Europe, logistics offers a significantly higher rate of return than in other sectors.

**Table 8: Logistics transaction volume per country in EUR million, H1 2018**  
*(catella.com, 2018)*

United Kingdom	3,633.5
Germany	3,060.0
France	1,692.6
Denmark	1,500.0
Switzerland	1,476.0
Netherlands	988.2
Norway	480.0
Sweden	382.5
Poland	315.3
Finland	260.0
Spain	300.0
Italy	395.5
Czech Republic	104.9
Belgium	45.0
Austria	30.1
Portugal	42.0

**Map 1: Prime Yield in 2018** *(catella.com, 2018)*

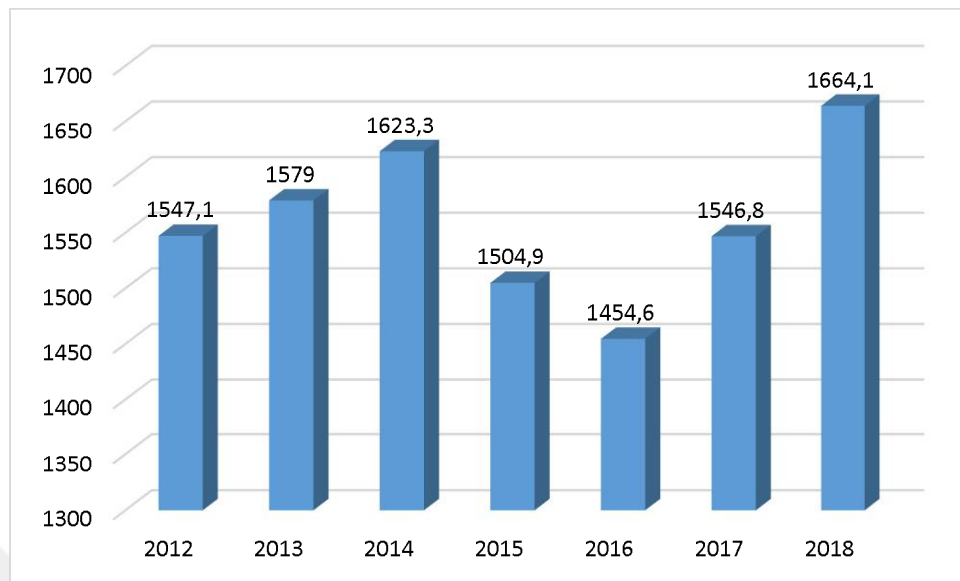


Primary income detection: made for top-notch field positions for high-quality features. The property must be 99% blue for the tenant in the rental market, it has a typical lease term for the original property on the market. Profit should be expressed as the average investment value and the expected value of the purchase and the net profit of the investor (realestate.bnpparibas.com, 2018).

### **1.5. Logistics in USA**

The shipping and logistics industry in the USA is very competitive. The movement of goods can be facilitated for those involved, whether they are drivers, leaders or owners. Depending on the company, some offer international and national services, and some only work in North America. In both cases, they sell to consumers when they buy imported goods. For success in the US shipping and logistics industry, this requires a large amount of skilled labor. However, the potential for success is high. For example, in 2012 alone, US spending in this sector exceeded \$ 1.3 trillion, or 8.5% of GDP. The combination of producers and consumers with different modes of transport is a highly integrated supply chain. To provide effective customer service, national and multinational companies offer special transportation and logistics services to ensure that products are delivered on time and not detrimental to the end user (MGA, 2016). Road transport is an important part of logistics in the United States and is widely used for domestic and land transport. In 2017, there was good revenue growth in the tanker industry. In 2017, the volume of traffic in tanks increased by 2.3% in real gross domestic product. In 2017, the volume of trucks increased by 3.7%. Every month in 2017, it is faster than cargo (Mordor, 2019).

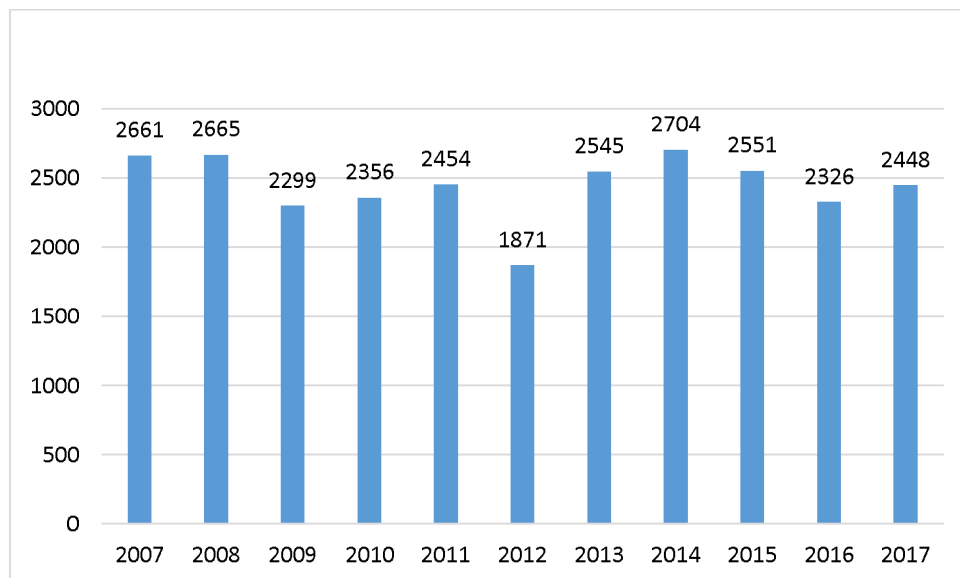
**Figure 2: Value of USA exports to all destination from 2012 to 2018 (in billion USA dollars) (Mordor, 2019)**



### 1.5.1. Rail Freight in USA

Figure shows trends in railway ways in the USA during 2005–2016. In 201, rail transport in the US was about 3.5 km (satrac.com, 2017).

**Figure 3: Rail freight changing trends in USA**



## **1.6. Logistics in Asia**

Over the past decade, the logistics sector has deteriorated significantly. Automation and new logistics efficiency technologies are stronger than ever. In response to this question, the industry has adapted to the era of change more quickly and strategically. Asia remains the fastest growing region in the world, and its participation in the global value chain continues to grow. (Christopher, 2018)

### **1.6.1. The essence of the ASEAN logistics industry**

The ASEAN region has attracted a lot of attention from the global logistics community. Some of these reasons are:

#### *Strong economic growth*

The region has more than 600 million people in the third largest country in the world after India and China. The population is larger than North America and the European Union. (Mou, 2016) In addition, the GDP growth forecast for the next decade will be 4.9% per year - this day and age will be good for enviable and economic growth.

#### *Demographic profile*

ASEAN Young Demography continues to attract multinational companies to invest in the region. The population participating in the ASEAN study makes up 65% of the total population, which is 45 million more in the next decade.

#### *Growing middle class*

The ASEAN middle income group is expected to increase by 10.9% between 2012 and 2023. Approximately 84.4% of households are in a group that earns \$ 10–15,000 a year. It is expected that by 2023 a higher share of this group will be transferred to the income group of 15 to 50 000 dollars per year.

It is estimated that ASEAN will grow by 130 percent and is estimated at 4.999 billion dollars by 2023. Expansion of trade will be mainly due to increased demand for goods and services in China. Expand the consumer base that promotes trade in the region.

The recent crystallization of the ASEAN Economic Community in 2015 and other free trade agreements now see them as a single market and manufacturing base that allows them to produce and supply more goods. In addition, ASEAN has led to the creation of an increasingly transparent ASEAN regulatory framework for trade.

#### *Marine network*

Given the geographic location of the ASEAN countries, quality delivery methods are essential to ensure an efficient supply chain. Changing global maritime transport requires large ports with improved performance.

The quality of the port between ASEAN-7 is ideal for achieving the greatest number of products in Singapore. Although ports in Indonesia and Vietnam have grown, ports in Malaysia and Thailand are not left behind. According to the ASEAN General Plan for Connection, 21 ports will be built in Indonesia to service 2100 twenty equivalent units (Sukaesih, 2015).

#### *Road and rail transport*

Some ASEAN countries are located in the Sea Archipelago. However, railways and highways are still important. Currently, the planned investment in the ASEAN rail network is \$ 200 billion (since 2013).

It is expected that in 2016 (as of 2016), ASEAN, which in 2016 will amount to \$ 60 billion, will provide future demand for investments in water, electricity, rail, road and other infrastructures. (Petrushka 2016)

#### *Air Transport*

ASEAN Joint Investment Plan - we have invested \$ 34 billion in air transport (since 2013). In addition, the clear sky policy eliminates fares and allows air carriers to operate freely in the ASEAN market. This has led to an increase in the number of low-cost carriers from the private sector: 101,000 technicians and 95,000 pilots, by an estimated 2034 (Hermansyah, 2016).

### **1.6.2. Reasons for the expansion of the ASEAN logistics sector**

ASEAN shows the growth of the middle class with increasing purchasing power. This will increase the demand for logistics, as consumers often need more, better and



more diverse products and services. Factors that will increase the growth potential of logistics players:

*Low outsourcing costs*

China's transition to local consumption has led to a shift from ASEAN, a supplier of low-cost manufacturing processes.

ASEAN Supply Chain Efficiency. Research and development of weak points, technical knowledge and skilled human capital have led to inadequate ASEAN supply chains and logistics infrastructure.

*Demand for sophisticated Third Party logistics (3PLs)*

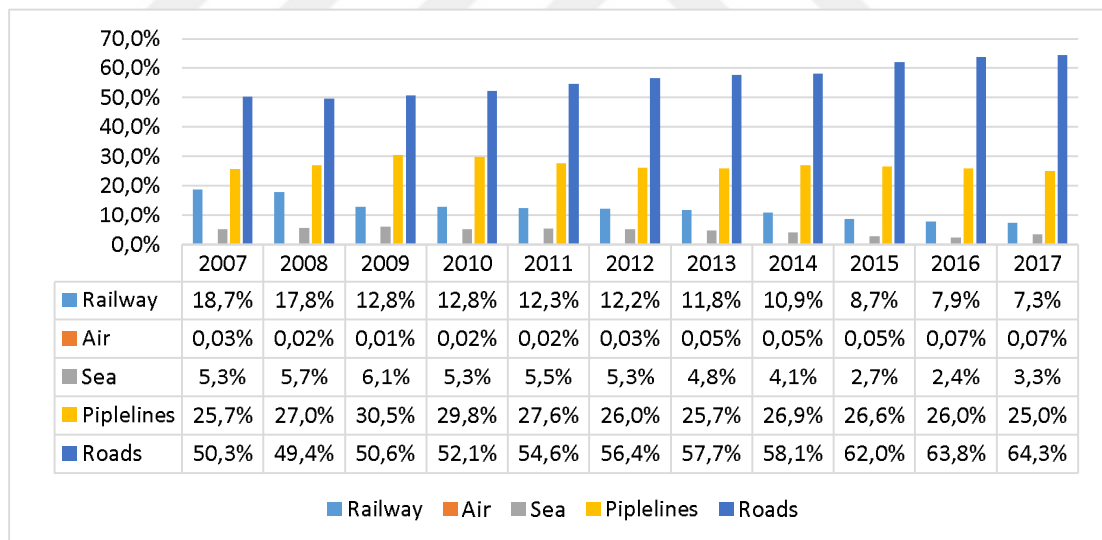
Third Party Logistics Service Providers (3PL) offer innovative solutions to logistics problems. The creation of more brands and individual brand brands in the region has led to the demand of professional logistics service providers to provide a fast and secure procurement process. The most active and promising players in the region are Panalpina, Toll, Sinotrans, UPS International, Fedex and Yamato Transport. (Spire, 2016)

## CHAPTER 2

### LOGISTICS SECTOR IN AZERBAIJAN

In addition to strategic road transport between Azerbaijan, Central Asia, and Europe. Azerbaijan has 24,000 km of roads which play an important role in the transport infrastructure in the Caucasus. Approximately 5,000 km of this network consists of 1,725 km of the national road, classified as an international route, and 15,000 km of small local roads. Since 2007, the share of highways in the total freight traffic in the country has remained at 49%. In 2017, 250 million tons of cargo transported, of which 65% transported by motorways. Transport Corridor in 2009, passenger and freight transportation through Europe - the Caucasus - Asia amounted to \$ 145 million in road transport, contributing \$ 479 million to the state budget in 2009 and \$ 99 million for passenger transportation.

**Figure 4: Distribution of Cargo Shipments in Azerbaijan by Transport Mode (2007-2017) (in %)**



**Source: State Statistics Committee of Azerbaijan (data includes total cargo transported in transport and non-transport sectors)**

National roads are highways along east-west and north-south corridors. Transport connects Azerbaijan with its neighbors - Russia, Georgia, and Iran. Azerbaijan is a country which with narrow border Turkey and the Nakhchivan Autonomous Republic, which separated from path of Turkey and has ties with Turkey.

The Armenian-Azerbaijani conflict, as well as relations between Azerbaijan and Armenia, as well as Armenia of the Nakhchivan Autonomous Republic, are currently not working. On the way to the Nakhchivan Autonomous Republic, but from the south to Iran is possible. There are approximately 4,500 km of Azerbaijani highway and 240 km of railway on occupied Azerbaijani territory. The vast majority of these roads are inaccessible. (Ziyadov, 2011, p. 23-24)

**Map 2: Main road networks of Azerbaijan (M1-M8) (Ziyadov, 2011)**

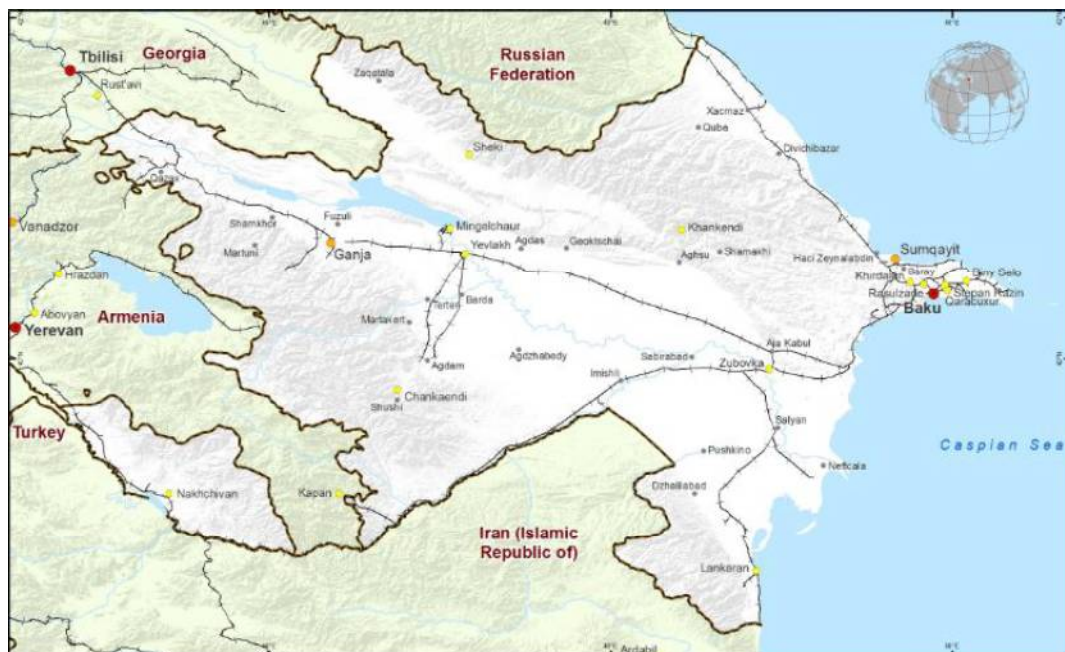


### **2.1. Azerbaijan Railway Transportation**

The foundation of the railway in Azerbaijan was laid in 1878, and its construction was completed on January 20, 1880. It was only 20 km from the Sabunchu-Surakhani railway in Baku. Since this historical period, Azerbaijan has developed in accordance with the needs of rail transport. The total length of the main roads is currently 2,910.1 km, and the length of sections is 2,079.3 km and 802.3 km. Electricity is 1241.4 km or 59.7% of the total length of the road, and 837.9 km - 40.3% using a relay. Equipped with an automatic alarm system 1527.7 km. First, in 1847, mainly due to the abolition of the trading system in the early 1970s, it increased dramatically as a result of increased oil production. In a situation when oil production increased, a real picture was given to improve the transportation of oil. The transfer of

crude oil from the main oil fields (Sabunchu, Surakhani, Balakhansky) to Baku refineries and from the Caspian Sea to the Caspian Sea was a very primitive and caravan method, and wooden barrels and drums reached 10,000. This method was relatively expensive and was a serious obstacle to the development of future oil trade. Baku's oil industry was more interested in laying railways and pipelines to get more profit. Therefore, it is not an exaggeration to say that the main cause of the construction of the railways of Baku and Azerbaijan is the problem of oil, and Baku is industrial processing. On several occasions, the applicants from the Committee of Ministers made a statement about the construction of railways between oil refineries and gas processing plants. In the end, urgent demands bear fruit. At a meeting of the Committee of Ministers on June 16, 1878, King II with the participation of Alexander, a project for the construction of a railway in the area was approved. The railway will receive a length of 25.2 tons of the Poti-Tbilisi railway. The group is responsible for building the lines for six months a year. It was built by the construction engineer Krubets. Soon materials and equipment for construction are sent to Baku. In December 1878, Krubetsin wrote that the city government needed more storage space in the Black City. (A.A.Rayev, 2010, p. 125)

**Map 3: Main railway network of Azerbaijan (A.A.Rzayev, 2010)**



The development of the transport system is of great importance for the Republic of Azerbaijan. Our country is geographically located in the Caucasus. This provision has resulted in many projects aimed at increasing the transit potential of the Caspian littoral states. Since Azerbaijan will soon become the main transit country for transport and railway transport, Azerbaijan Railways CJSC has established a new division of ADY Express. ADY Express serves Internet operators and wholesale customers to increase traffic in our country, especially transit traffic. ADY Express seeks to provide integrated rail transport for the entire sector of the Caspian, Black Sea, Europe, the Persian Gulf, Central Asia, and the Far East, as well as to provide favorable conditions for logistics and a transparent environment. The company's main goal is to increase transport costs between Asia and Europe and the Persian Gulf, Russia and Europe, to provide customers with the opportunity to revitalize the historic Silk Road in order to offer cost-effective, affordable and reliable logistics solutions. (day express. az, 2019)

## **2.2.Road transport of Azerbaijan**

The length of public roads in Azerbaijan is 24.981 km. The path length is 191 km and is suitable for driving in all 4 directions. The total density of roads in the country is 288 km / 1000 km<sup>2</sup>.

The main roads, cargo, and passengers are intergovernmental; The border between Baku-Alat-Gandja-Gazakh-Georgia is 503 km long, the border between Russia and Iran is in Baku-Astara road part of Azerbaijan for a long time with the illegal corridor of Azerbaijan is 521 km. Road transport in Azerbaijan has been fully privatized. Transportation of people and goods is carried out mainly by enterprises and the private sector. The 2006 estimate shows that about 70% of the roads and highways of Azerbaijan are in poor condition and require urgent maintenance. Since then, the State Program for Restructuring and Development of the State Road Network of Azerbaijan has developed a plan to meet these immediate needs. There are two stages in the reconstruction of the state road and the road network: Phase 1 and Stage 2. Under this program, Azerbaijan will repair and build more than 10,000 km of new roads by 2014. 4000 km of national roads and 6000 km of local roads are included. As a result of increased government and international investment in infrastructure projects, more than 5,500 km of roads and highways have been improved. approximately 07 km of these roads and highways are of national and international importance. International

organizations are funded from 459 km of these roads and 345 km from the state budget. Currently, construction and restoration work, including 750 km of international credit, is continuing on a highway of 870 km. International highways and highways along the east-west and north-south axis will be completed in accordance with international standards by the end of 2011.

Map 2 below shows the duration of important trips to Azerbaijan and parts that still need rehabilitation. 53% of roads need to be modernized on the NSTC road from the Azerbaijani-Russian border on the Azerbaijani-Iranian border. The construction and installation of NSTC from Baku in the northern part of Baku were completed in 2011, and the length of transportation was reduced to 10 km in 2011. Modernization of the route of the South Azerbaijan state from ASTTO Astara (construction of Iran-Iran began in 2006) was completed in 2013. The M3 is a quad highway connecting Iranian and Azerbaijani routes to the M2 highway, 503 km in length, east and west. Up to M2 (Styles & Trigona, 2019). The daily average daily traffic map 4 clearly shows the importance of the road network in Azerbaijan for transit traffic. The Asian Development Bank (Azerbaijan) is a busy part of the CAREC corridor. will provide a loan to modernize the border.

### **2.3. Sea transport in Azerbaijan**

Transportation by water is the cheapest way to transport. Baku is the largest part of the Caspian Sea, where all the sea routes of Azerbaijan begin. From Baku to Astrakhan you can go to Makhachkala in Central Asia, the port of Anzali in Iran. Azerbaijan Caspian Sea → Volga River → Volga - Don Canal → Don River → Sea of Azov can reach the oceans of the world. Azerbaijani ships can go to the World Ocean through the Volga-Don Canal, as well as through the Volga-Baltic Canal and the Baltic-White Canal. The railway ferry between Baku-Turkmenbashi, Baku-Aktau, and Baku-Bekdash connects two banks for 11 hours. Oil is transported by tanks in the Caspian Sea. In the winter months, the north of the Caspian Sea froze and the Baku-Astrakhan road was cut off. Meanwhile, many vessels operating this line deliver cargo to the Black Sea and Mediterranean ports and bring the main currencies to the budget of Azerbaijan. The Azerbaijan State Khazar Shipping and the Baku Sea Trade Port play a special role in water transport in Azerbaijan. The official date of the company of the Caspian Navy is May 21, 1858. The Caucasus and Mercury Joint Stock

Company was established by decree of the Russian Senate. The Caspian Maritime Company was one of 17 US Navy maritime transport companies in 1992. After the collapse of the USSR, seven of the 15 Soviet republics were inherited by the Soviet Navy. This legacy in the Caspian was only for Azerbaijan. The fleet consists of 71 transport ships and one baggage. Of these, 36 tankers, 7 vessels, 2 universal RO-RO, 26 dry cargo ships, total 375 thousand tons. A fleet of 23 shipping companies operates in the fleet of commercial vessels in the Black Sea and the Mediterranean, while the rest of the vessels operate in the Caspian sea. Transport plays an important role in the transport corridor Europe-Caucasus-Asia in the Caspian Sea. We currently transport trucks and passengers on ferry and cargo tankers. The Caspian fleet is the strongest in the Caspian Sea. The European corridor runs from the port of Lianyungang in China to the Austrian capital Vienna. Cars are transported by different types of transport through different countries, customs, and border procedures. Euro Corridor is the main cargo base of the Caspian Shipping Company in the Caspian Sea. The transport tanker in the Caspian Sea transports Aktau-Absheron, Relevant-Absheron, Alaska-Baku, Oskar-Absheron, Oskar-Baku, Aktau-Baku and Turkmenbashi-Baku.

In 1902, the Baku International Sea Trade Port was established. The independence of the Republic of Azerbaijan was independent on January 1, 1992, independent of the structure of the Caspian port vessel. The port is open 24 hours a day. The port consists of 5 terminals: 1. Main load terminal; 2. Container; 3. Ferry terminal; 4. Fat terminal Dubendi; 5. Passenger terminal. The main cargo terminal consists of 7 bridges with a total length of 858 m, and one of these bridges is specially designed for ro-ro ships. The depth of the bridge is 7 meters. There are 16 crane winches with carrying capacity from 5 to 40 tons per ton, various types of carriers from 1.5 to 10 tons, 100 bottles and lifting tractors Sisu. Parts, stakes, and lines, such as scaffolding, cars, and containers, were destroyed in the terminal. The terminal has a capacity of more than 2 million tons. It is also possible to load 3 containers, about 150 wagons and 100 wagons and perform lifting operations. The total length of the railway line is 8 km. For maneuvering, there are 4 locomotives, warehouse, railway, and wagon scales. The terminal has an open warehouse with an area of 24,000 m<sup>2</sup> and 5 warehouses with an area of 10,000 m<sup>2</sup>.

The container terminal has a capacity of 15,000 containers per year. The terminal has a covered storage area of 1250 m<sup>2</sup> and a service area of 1600 m<sup>2</sup>, in which you can place concrete and cars. The computer system is specifically designed for a delivery

point for managing container operations. All works in the terminal are carried out with 2 modern Kalmar container ships, 2 Terberg elevators, 6 container ships and 2.5 t 3 Hamsters with each lifting capacity. The ferry terminal has two 87-meter lifting bridges. In addition to bridges, the water depth is 8-10 meters. The ferry can hold up to 28 vehicles or 45 vehicles, 202 passengers and 50 vehicles per vehicle. The terminal has a capacity of more than 8 million tons. The oil terminal has 4 bridges with a total length of 582 meters. Two have been used. It can also be served from 4,000 to 12,000 tons in four tanks. Near the bridges, the water depth is 9.6 meters. The oil terminal has a capacity of 10 million tons per year. The terminal has a ship management service. For example, two ships in 600 and 1600 provide safe ships. At the passenger terminal, the length of the bridge is 130 meters. Passenger ships serve at the terminal and serve guests of Baku. Employees of the state oil company leave the passenger terminal outside the Caspian Sea. The port of Baku also has a port fleet. 20 ships in the fleet. These include transport ships, oil waste collectors, firefighters, Losman waste, sewage and feces, cane cats, crane ships, tourist ships, tankers (azerbaijans.com, 2019).

**Map 4: Main Seaways network (Salimov, 2012)**





## **2.4. Azerbaijan Air Transportation**

After Azerbaijan first met with aviation, it took 15 years for a new type of air transport in the region to acquire official status: in 1923, the Transcaucasian Civil Aviation Corporation was founded. Its founders are Mugan Melioration Construction, Khazar Primorsky and Azneft. ZAKARIA is designed for aircraft, aircraft operation, express freight, and postal transportation. In April 1923, the Baku-Tbilisi-Baku aircraft were used by junks, and two years later an airport was built at Kashtad and a civilian airport was created. In 1926, the regular route Mineralnye Vody-Grozny-Makhachkala-Baku-Yevlakh-Tbilisi began. On 2 June 1938, the first aviation group was established in Azerbaijan. This date was announced in 2006 on the Day of Civil Aviation of the Republic of Azerbaijan. After the start of World War II, the airline faced a lot of military problems. The history of civil aviation in Azerbaijan dates back to the 1970s and 1980s. During this period, Ganja, Yevlakh, Naftalan, Nakhchivan, Zagatala, Lankaran, Aghdam, Agstafa, and Sheki were equipped with an artificial strip. They took the Yak-40. Currently, 11 regions are connected with Baku Air (azerbair.com, 2019). The construction of the Baku Cargo Terminal, which was completed in March 2005, allowed Baku to become a landing platform for trucks moving from west to east and from north to south. In the same year, the Baku Cargo Terminal became a member of the International Air Transport Association (IATA) and participated in the World Partnership Program of the Council of the International Association. Azerbaijan Airlines are part of Azerbaijan Airlines. Headquarters in Baku. Heydar Aliyev International Airport is located 20 km northeast of Baku. Azerbaijani airlines transport passengers to Europe, the CIS countries, the Middle East and Asia. Since 2014, the new part of the Boeing has been flying long-distance flights to North America and Southeast Asia. Azerbaijan Airlines, the national carrier of Azerbaijan, is the leader of the International Air Transport Association (IATA) and the leader of the CIS. Azerbaijan Airlines is one of the leaders in the number of new airlines in the region and in the CIS countries (Azal. Az, 2019).

**Map 5: Azerbaijan Airports (azal.az, 2019)**



## 2.5. Azerbaijan Pipeline

Thanks to oil and natural gas, pipeline transport in Azerbaijan has improved significantly. The efficient transportation of oil inside and outside the country requires the development of oil pipelines throughout the year. For the first time, the pipeline was built in the Absheron region as a result of oil production in the country. The total length of the pipeline is more than 1499 km. 70% of the pipeline is concentrated in the Absheron economic zone. Shirvan, Baku, Shirvan-Dashgil, Dubendi-Boyuk Coastline-Dubendi-Keshle, Dubendi-Surakhani-Beyuk-Shari, Dashgil-Sagachal-Keshle, Buzovna-Sabunku, Binegedi-Keshle were considered important in the pipeline and worked in diameter. At the beginning of the X century between Baku and Batumi, a 799 km pipeline was commissioned. As for gas production in the Czech Republic, the second stage of pipeline transportation development will be created. In general, natural gas production allows us to divide the development of the pipeline into four stages: the first stage is the laying of new pipelines in connection with the discovery of gas fields on the Absheron Peninsula. The second stage is the development of a new gas pipeline in connection with the commissioning of gas fields in the Kura-Araz regions, including in Absheron. The third stage is characterized by the development of old gas pipelines and the laying of new gas pipelines in connection with the gasification of Azerbaijan. The fourth stage is characterized by the construction of an international gas pipeline. The first stage was the 1950s and 1960s;

the second 1960s – 1970s; the third 1970-1985; The fourth stage covers the years 1985-2000. An analysis of the total number of gas pipelines showed that gas pipelines in the Czech Republic were in the first place - 15.2%, 33.8% in the second, 35.7% in the third and 15.3% in the fourth. Pipeline transport through the Absheron economic zone is different from the historical parts or other centralizations of the country. 14% of the total natural gas pipeline in the country is concentrated here. At the same time, the construction of large economic pipelines from this economic zone began. The DRS Kory and Orcanikidze stations were commissioned in 1931, 12.6 km long and 400 mm in diameter. On October 19, 1995, two pipelines were installed in the Caspian Sea to supply oil to the world market of Azerbaijan. The first is the Northern Road. The total length of the Baku-Grozny-Tikhoretsk-Novorossiysk pipeline (BQTN) in Azerbaijan is 1,346 km (230 km). On October 23, 1996, the first oil was pumped through this pipeline. The second pipeline is the Western route. Azerbaijan passes this line 917 km and a length of 479 km. This line was commissioned on April 16, 2000. This pipeline, called the Baku-Supsa pipeline, annually sends 15 million tons of oil to Western countries. At the same time, the launch of the Baku-Tbilisi-Ceyhan pipeline laid the foundation for the Azerbaijani oil market to enter the world market in 2006. Approximately 50 million tons of oil is pumped each year. The total length of the gas pipeline in the country is 5,000 km. (Gurbanzade, 2016)

## **2.6.Liberalization of Azerbaijan Logistics Sector**

Euro-Atlantic integration in its simplest form is the entry of post-socialist countries into NATO and the EU. Washington is a process of stability, democratization and the creation of alliances. In 1989, the process in Southeast Europe, Central, and Eastern Europe are considered a continuation of earlier integration. For example, to add more fields to Georgia and Azerbaijan to the list of countries, most likely to put an end to this trend. Azerbaijan plays the role of a bridge between Europe and Asia and has great transit opportunities. From east to west and north to south is a route in Azerbaijan, it passes through western and eastern countries to return to a combination of large logistics centers and large trade routes from north to south. Several major infrastructure projects have recently been implemented in the transport sector of Azerbaijan. Construction of the Baku International Sea Port, the most modern airports and roads of international importance, the East-West and North-South transport

corridor in the direction of the railway line is being updated. These projects have made a significant contribution to the expansion of foreign economic relations of the country. Azerbaijan's favorable geostrategic position, which is a special advantage as a shopping center, and just as advantageous for the development of the commercial logistics industry, as well as strong logistics capabilities, it should be noted that having the opportunity to use a convenient location. Looking at the logistics industry in Azerbaijan, we can use the basic provisions of a local truck can transport cargo between Asia and Europe and the Asian logistics centers can support as a European production network. Agriculture is another area that Azerbaijan can develop as a long-term economic driving force. Currently, only 6% of GDP, industry, production, can significantly improve with the development of the transport and logistics chain. In addition, Azerbaijan supports the government of Georgia and the Georgian railway system Kars-Tbilisi-Baku a section of the KTB rail line of \$ 199 million to build investments worth \$ 2,000,000,000 to support a soft loan. KTB after the construction of railways and the sea from Turkey transcontinental railway system between Azerbaijan and Turkey will create a railway line. The \$ 2,000,000,000 railroad restructuring program, the new AC electrification system, the new alarm system, new locomotives, and the purchase of new cars will replace most of the existing parts (See, 2009). The liberalization of the logistics industry makes Azerbaijan a key transit point between two continents due to its difficult strategic position. This policy plays a very important role in achieving economic progress, but it is also expensive and creates many difficulties. There are 3 main groups of stakeholders that will be affected positively or negatively. These include logistics service providers, condition-based exporters, logistics services, and then logistics-based importers. The logistics sector is a sector with significant growth potential, but due to the latest government policies, long-term investments in the logistics industry are very rare. For example, a 4% tax and 18% VAT increase the cost of a European truck up to \$ 100,000. As a result, most international transport companies in Azerbaijan. However, there are some local shipping companies, but there are more than 49 small truck owners. In the case of liberalization, access to this zone will be much easier than the initial cost of trucks. Logistics in the country of Azerbaijan, which will lead to higher rates of a more competitive logistics industry, counted 127 out of 149 people. (worldbank.org, 2019). Liberalization will be disadvantageous because it can reduce market share for shipping companies; However, if they use the first movement wisely, they can partially

eliminate these shortcomings. At the same time, the lack of infrastructure is a disadvantage for newcomers and the absence of the previous liberalization, which would mean that the truck is less risky, but in the long run, the government will invest money around the world alongside roads and liberalization policies to achieve this risk will reduce this risk. . (Business Info. Az, 2019)

The liberalization of the logistics sector will undoubtedly affect the government. In fact, the oil and gas industry is the main industry in which Azerbaijan has a competitive advantage and represents a large part of the country's gross domestic product. However, Azerbaijan cannot intervene in world oil and gas prices; At the same time, it was stated that the economy's dependence on these natural resources (inflation in the country increased, caused a significant increase in local currency, the last decline in oil prices led to a double devaluation of the Azerbaijani manat). Therefore, the development of an indispensable sector and diversification of the economy is one of the tasks that must be urgently taken. If the government never declares liberalization, then a negative trade balance on imports could lead to a decrease in investment and risk in the country. This is a comparative disadvantage of Azerbaijan for the majority of enterprises in the hands of the non-profit oil industry, and it is trying to liberalize trade in areas related to foreign producers, which immediately gives comparative advantages. Another disadvantage of liberalization may be the export of economic resources from the country (tradingeconomics.com, 2019). The logistics sector is a particularly important service sector for all domestic economies, and therefore the return of domestic liberalization can be particularly important. In this context, globalization stresses the need for and importance of liberalizing logistics services. As a result of globalization, a large number of perishable and degradable products can be produced worldwide. In this context, the time spent on halogens is a decisive factor for exporters, importers and logistics service providers. The application of the product can determine whether the product has entered the export market Although access to the overseas market is guaranteed, time may affect trade. Current studies show that an increase of 10% over time reduces the size of binary files by 5-8%. When the product is perishable and the shelf life is short and/or when it is necessary for early production, the time costs are further increased. In addition, perishable products must be safe and suitable for consumption in the market. For this reason, it is possible to gradually liberalize areas that help diversify the economy, including logistics. The best political step is to increase the share of gross domestic

product in the non-oil sector, short-term conditional subsidies for local producers, the current government. The government can fully support free trade in this sector, providing a competitive advantage in certain areas or providing adequate protection after the sector has matured (Nordas, Pinali, and Geloso, 2006, p. 7). In the short term, the liberalization of the logistics sector will also lead to increased government spending. Insufficient infrastructure, especially on roads and railways (Sze, 2009). As mentioned above, the liberalization of the logistics sector will increase the number of transport companies and lead to an increase in state tax and customs revenues. Since the export and import costs of exporters and importers of logistics services can be reduced, and more options can be chosen, they will benefit from further liberalization in this sector. Given the current situation, the long-term effect of the liberalization of the logistics sector in Azerbaijan can be useful for the country's economy. A commitment to liberalizing the home logistics sector will provide the desired benefits through the implementation of the following policy options: Fulfillment of market entry obligations. Providing bilateral or multilateral access to suppliers from other countries is a necessary tool for liberalizing the sector in a country. Liberalization through market entry commitments may require a transformation for more foreign suppliers to reduce costs, but will inevitably lead to a reduction in the number of local suppliers. In addition, the dual nature of this policy option should be emphasized; Thus, both domestic and foreign suppliers can benefit from liberalization. The policy of internal competition. To avoid a sudden reduction in the number of local logistics service providers, the government should support them in various ways, such as encouraging short-term subsidies and national contracts, informal competition. It may also include agreements on mergers, alliances, and cooperation between the supply chain and/or service companies. Simplification of trade control systems and related regulations: Azerbaijan should be careful and maintain its competitive advantages make the country friendly to trade and make constant efforts to make its investments in transit infrastructure a good start, but the government should regulate laws. Increasing transparency and competitiveness of the logistics system of Azerbaijan. Trade in goods and various state control bodies regulate services in Azerbaijan and the regulatory laws of various ministries and departments. These include the Ministry of Economic Development, the Ministry of Agriculture, the Ministry of Health, the State Secretary of the Customs Committee, the Committee on Transport Statistics, the Ministry of Environment and Natural Resources, and

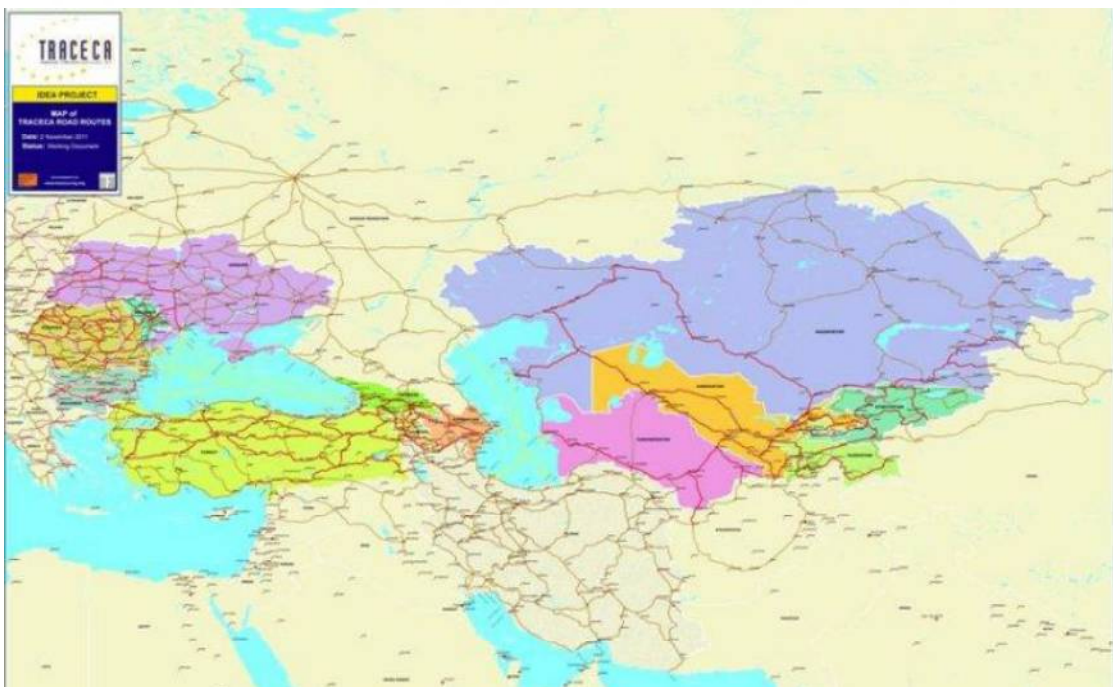
estimated taxes. Due to the lack of transparency in state control and regulation, an extensive network of trade and regulatory regimes increases the complexity of business in Azerbaijan. Economic cooperation and development, Azerbaijani formalities depending on trade facilitation indicators, published on November 6, 2013, cooperation between agencies, Community formalities Costs, and costs may be. TFI in Azerbaijan leads to an improvement in the investment climate. Assess measures in the case of national borders that may affect the provision of logistics services, in particular when there is a threat to security at national borders and where the provision of these services should be assessed in a global context (OECD, 2013). In Transport, Adopt an integrated transport infrastructure strategy. Despite such reforms as the preparation of new laws and regulations in the business world, the regulation of business practices and the modernization of tariffs, in recent years, Azerbaijan has no integrated and autonomous transport infrastructure strategy. By approving one of them, you can get a higher return on your initial investment to ensure smooth integration of aviation/cargo/rail/sea and multimodal cargo equipment, logistics centers and special equipment, which will have a positive impact on investment. The climate in the country. Agriculture to support the development of SMEs, especially those related to agriculture, supply chain services, transport, and logistics: further enhancing the country's logistics potential and providing logistics services for local/cross-border transport. This will protect the market for local logistics providers involved in international transport, expand the market for national and international logistics companies, expand the international freight market and reduce the impact of transport. Strengthen competition and national logistics potential. Sheni Developing a national curriculum on sustainable logistics development in Azerbaijan, as the current state of information on large international organizations and documents seems inadequate, and the implementation of the global 3PL concept is inadequate (Salimov 2012).

## **2.7.Eurasian Transport Corridors**

The European, Caucasian and Asian transport corridor is an international intermodal transport initiative led by the EU. In May 1993, a historic conference held in Brussels between the three countries of the South Caucasus and the five countries of Central Asia. The TRACECA Permanent Secretariat established in the

Intergovernmental Commission in Baku. The original signatories consist of twelve countries: Armenia, Azerbaijan, Bulgaria, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Romania, Tajikistan, Turkey, Ukraine, and Uzbekistan. The Islamic Republic of Iran, which is the 13th member, joined TRACECA in 2009, and Lithuania became an observer (Traceca-programme.eu, 2019). In the TRACECA segment, the cost of rail and shipping accounted for 63% and 79% of the total rail and shipping traffic in the country. In 2010. International transportation, including transit, amounted to 15.5 million tons, more than 10 million tons of oil and oil products. Rail transportation and petroleum products transported along the East-West axis, as a rule, accounted for 49% of total transportation costs in 2011 (den.az, 2019). Azerbaijan, Georgia, and Turkey made up of a sub-region that combines western integration. This dynamism manifested in the development of infrastructure networks consisting of the East-West transport corridor, energy pipelines, highways, railways, and physical connections that physically connect them to Europe in a broader sense. The development and representation of these ties lead to improved governance and broadening ties with Western institutions.

**Map 6: TRACECA** *TRACECA Web Site <http://www.traceca-org.org>*





### **2.7.1. Truck Transit via TRACECA**

Cargo transportation is the most widely used type of cargo in TRACECA and promises to be very useful for Azerbaijan. Unfortunately, none of the big truck fleet of Euro 3 or above Azerbaijan and currently most of the transit vehicles between Turkey and Azerbaijan in European / Central Asian losses. There are several reasons why this is discussed in more detail below. This section also covers the two main transport routes from Western Europe: the southern and northern routes en route from Russia, Turkey, and Georgia. (Ziyadov, 2011).

### **2.7.2. TRACECA and rail transport**

The second main mode of transport on the TRACECA route is rail transport. In the South Caucasus, there are two TRACECA railway lines connecting Europe, the Caucasus, Central Asia, and China: the Baku-Tbilisi-Batumi railway connection and the Baku-Tbilisi-Poti railway connection. Azerbaijan, Armenia, and Turkey, the communication line between Armenia and Turkey are no longer available and Baku-Tbilisi-Batumi / Poti is old and does not depend on the operation of the railway network in the western part of the Black Sea Europe ferry network. Romania and Bulgaria) and East-Kazakhstan and Turkmen Railways networks. Since 2012, the Kars-Akhalkalaki railway, which will connect Georgia and Turkey to Europe. TRACECA railway network will pass through southeastern Turkey. It will also have access to Mediterranean ports. These railways together form a 7000 km railway between Europe and Asia (Starr F.S., 2007). The Georgian border Beyuk Kesik between Azerbaijan and Georgia is one of the main TRACECA railway centers and one of the main railway gates leading to Europe, the largest railway cargo transport in Azerbaijan. According to the official data of the Azerbaijan Railway, in 2010, ADY transported more than 18 million tons of cargo to Beyuk-Kesik. Approximately 93% (10.1 million tons) of outgoing expenses are oil and oil products, reaching 5.5 million tons. transit oil. Production costs are divided into imports and transfers. 7.2% or 66% of the total capacity of Boyuk Kerik, that is, 3.7 million tons or 34%, was exported by rail. In 2017, the TRACECA railways accounted for 87% of the ADY transit traffic (stat.gov.az, 2019). An analysis of existing and potential alternative railway lines between Istanbul and Dosik (on the border between Kazakhstan and China) shows that the shortest rail link passes through Turkmenistan and Uzbekistan (Table 6). The

second and third shortest railways, which are not used as a result of a regional conflict with Azerbaijan, pass through Armenia. In the event of a conflict between Armenia and Azerbaijan, in this case should be resolved immediately, both countries have great potential, because Turkey has two Mediterranean routes the shortest route and Iran-Iraq and provide alternative access points to Syria, When the Kazakhstan government completes the planned train from Bain to Shalkar, Kazakhstan can be the shortest TRACECA route. Such lengthening of the railway will reduce the distance between Dostyko and Aktau by 485 km and shorten the delivery time by 10-11 hours. The estimated annual capacity of Beineu-Shalkar is estimated at 12 million tons. The government of Kazakhstan planned to build this railway in 2016–2020 (Ziyadov, 2011).

**Table 9: Alternative Transport Routes from Istanbul (Turkey) to Dostik (Kazakhstan-China Border) (Ministry of Transport of Azerbaijan.)**

Route	Distance/km
Istanbul-Kars-Akhalkalaki-Tbilisi-Baku-Caspian Sea (ferry)-Turkmenbashi-Ashgabat-Tashkent-Almaty-Dostik	6873
Istanbul-Kars-Akhalkalaki-Tbilisi-Baku-Caspian Sea (ferry)-Turkmenbashi-Ashgabat-Tashkent-Almaty-Dostik	7089
Istanbul-Kars-Dogukapi-Masis-Yervan-Barkhunderli-Baku-Caspian Sea (ferry)-Turkmenbashi-Ashgabat-Tashkent-Almaty-Dostik *	6913
Istanbul-Kars-Dogukapi-Masis-Nakhichevan-Julfa-Baku-Caspian Sea (ferry)-Turkmenbashi-Ashgabat-Tashkent-Almaty-Dostik *	6936
Istanbul-Van Lake (ferry)-Kapikoy-Tehran-Mashad-Sarakhs-Tashkent-Almaty-Dostik	7286
Istanbul-Van Lake (by rail)-Kapikoy-Tehran-Mashad-Sarakhs-Tashkent-Almaty-Dostik **	7545

\* At present, these routes cannot be used when crossing Armenia from Armenia or Azerbaijan occupied by Armenia. There is no connection due to the Nagorno-Karabakh conflict between Armenia and Azerbaijan.

\*\* This route requires the construction of a railway 259 km north of Lake Van.

After the Cold War, the newly independent Caucasian states of Azerbaijan and Georgia used the transport and energy infrastructure and remained in a state of emergency. Each existing infrastructure is located on the northern and southeastern axis of the Czech Republic, which sent to the center of the former Soviet center of Moscow. In the early 1990s, the Turkish government introduced a new concept for the development of the East-West corridor for the transportation of energy and other goods. The new Silk Road, many of which are important in Soviet times, aimed at strengthening regional sovereignty using significant Caspian energy resources and potential Eurasian trade networks. Cooperation and participation of the former Soviet republics in Western integration. (Peterson, 2007)

To understand the impact of EWTC on integration, you must first familiarize yourself with the corridor projects. Although EWTC consists of several large and small infrastructure projects, from the creation of electrical networks to asphalt roads, this article will focus on four main projects of the corridor: the Baku-Supsa Rannaya oil pipeline, the Baku-Tbilisi-Ceyhan pipeline (BTC). The gas pipeline in the South Caucasus (SCP) and the Baku-Tbilisi-Kars (BTK) pipeline. However, this should not ignore in the general understanding of the influence of Western integration on a wider transport corridor.

### **2.7.3. Baku-Supsa pipeline**

The first incarnation of the East-West power line in the region occurred at the end of the 19th century when British and French oil companies began their operations as part of the Russian Empire in Baku and its environs. The main port in the west, which sends a source to the Absheron Peninsula, in Batumi on the Black Sea coast in Georgia. Similarly, when the potential of Caspian energy resources realized in the 1990s, the Baku-Supsa pipeline became the first East-West export route for "the early oil industry or limited oil reserves from the open sea areas of Azerbaijan." The pipeline, built in 1999 from the port of Supsa, a port on the Black Sea coast of Georgia, consists of the Baku-Supsa pipeline of the Soviet era, which partially repaired from BTC until the transitional measure is completed. Azerbaijan, Georgia, and Turkey as an important first step to achieve a common hallway at the entrance to government revenues.

#### **2.7.4. Baku-Tbilisi-Ceyhan pipeline**

The Baku-Tbilisi-Ceyhan pipeline, which is usually considered the cornerstone of the EWTC development, is the first infrastructure project uniting the Caspian Sea and the Mediterranean Sea. Baku, Georgia from Russia, Iran, and Armenia are suburbs, stating that Turkey's banned port of Ceyhan on the southeast coast of Turkey swept the BTC carefully from the longest pipeline in Turkey. From there, Caspian oil is transported by tanker to Western markets. The route, which was the source of many conflicts, was finally adopted in November 1999, and Ceyhan reached its first oil in May 2006. The completion of BTC led to a reduction in the number of Bosphorus tankers to 350 years per year and contributed to the development of Ceyhan as an energy export center (Starr & Svante E., 2005, p.21).

#### **2.7.5. South Caucasus gas pipeline (Baku-Tbilisi-Erzurum)**

Although BTC is the most well-known EWTC project, it may become the most important gas pipeline in the South Caucasus with the expansion of gas expansion. Caspian oil is a strategically important oil for the West because it opens up oil reserves for export from Russia or Iran. At least theoretically, it is sold on the world market and remains good. On the other hand, natural gas is often confused with gas pipelines - and the physical beginning of suppliers in the consumer sector is coming to an end, especially because of its sensitivity to geopolitical problems in Eurasia. (Starr and Svante, 2005). The construction of the SCP began in BTC in Baku in 2004, and in June 2007 the first Caspian gas was purchased in Erzurum. The last two actions have increased the strategic importance of SCP. On July 26, 2007, Turkey, Greece and Italy, the government will be completed in 2012. Turkey and Greece-Italy (TGI) to sign an agreement on a gas pipeline signed between the governments of Azerbaijan will continue on its way from SCP. Georgia and Turkey, the Adriatic Sea in the Western European gas network on August 2, Greece and Azerbaijan, and then explore the energy projects in the Western Memorandum on European Export Report and the two countries are cooperating in the field of production and development signed. TGI, Azerbaijan, Georgia, and Turkey support the further integration of EWTC transit to Western Europe through infrastructure development is one of the key elements that link physically associate with Western Europe.

### 2.7.6. Baku-Tbilisi-Kars railway

The fourth largest EWTC project was first proposed in 1993 in Turkey, but in May 2005, Azerbaijan, Georgia, and Turkey officially agreed to the Baku-Tbilisi-Kars project. According to this scheme, Tbilisi in Georgia Akhalkalaki railway from Baku to Georgia will be restored and will participate in Turkey from the border with the railway network of Turkey and Akhalkalaki will be built a new building Kars. 98 km section of the railway Akhalkalaki-Kars, East-West corridor, the missing link in the shortest route from Shanghai to London, Eurasia.

The BTK project is also very important for the sub region. EWTC a large part of the project provides for a kind of Western funds in the United States and Armenia to strengthen regional cooperation between Georgia and Turkey, Azerbaijan and the European way of making jumps to the challenges of Western funds. Energy revenues from the BTC pipeline to Azerbaijan provided Azerbaijan with a loan of \$ 200 million for the construction of a new Georgian part of Georgia. Despite the limited accession of the US and the EU, they said they supported the project. Railways, for the construction of a railway tunnel under the Bosphorus in Turkey to reach the European pipeline, are expected to transport goods as soon as possible, as soon as possible. The development of petroleum products and a potentially significant source of income may even lead to a reduction in regional cooperation in the West (Peterson, 2007).

**Map 7: Baku-Tbilisi-Kars Railroad (Railways, “The New Caucasus Route”, 2008)**



## **2.8.The North-South Transport Corridor (NSTC)**

Azerbaijan is located at the intersection of several corridors. The North-West Transport Corridor is an ancient road connecting South Asia with Northern Europe for centuries. This route was used by European, Russian, Indian and other foreign traders. In the early seventeenth and early eighteenth centuries, Indian traders were the dominant players in North-South trade. In the Safavid dynasty, the number of Indian merchants scattered throughout the empire was between 10,000 and 20,000. At the end of the seventeenth century, on the outskirts of Shamakhi, the main shopping center of Azerbaijan, there were about 200 Indian merchants. The city has been buying Indian silk from Azerbaijan since 1703 and received 20 Indian caravans in Baku. (Asghaybeyli, 1998). These traders played an important role in the management of trade between Russia and Southeast Asia on the lands of modern Azerbaijan and Iran. Today, Mogul Caravanserai, a trade heritage between North and South India, was once active in the center of the old city of Baku.

The historical cities of Azerbaijan exported various products along the north-south axis and became the center of "center and speech" for the region. Silk, oil, salt, fish, horse, jewelry and natural dyes are among the main products exported by Azerbaijan to Europe, India, the Middle East, and Central Asia. This product was transported by land and sea. Records show that in 1639 a group of Indian merchants went from Astrakhan to Derbent and Shamakhi with Russian goods such as animal fur, fur, leather, canvas, copper and caviar. (Ibid, pp. 42-43) Shamakhi products were often shipped from India to modern caravans through Afghanistan or to the port of Bandar Abbas in the Persian Gulf, as well as to Surat harbor from India. The agreement on the creation of a modern international transport corridor North-South was first closed in 1999 in Russia, Iran, and India. Signed in St. Petersburg. Azerbaijan Agreement, Armenia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey, Belarus, Oman, Syria, and Bulgaria joined. Azerbaijan officially joined the project in September 2004. The original National Science and Technology Center was designed to use the ports of Russia and Iran in the Caspian Sea from Russia to Iran, especially the ports of Astrakhan and Ola, using the ports of Anzali and Amirabad in the south. When new bidders joined the contract, two alternative roads were added. The National Science and Technology Center currently has three alternative transport routes. The first and original route began in Helsinki, Finland. The central route to the National Science

and Technology Center of Astrakhan and Ola from the Caspian Sea from St. Petersburg to the Caspian Sea, from the Caspian Sea to Anzali and Amirabad and from Nowshahr to ports. The route from Iran continues to Iran from the ports of Abbas and Chabahar Bay in Bandar Bay. You can move from Pakistan to Iran, but this option is unlikely to be used in the short term. The second or western road of the National Science and Technology Center intersects with Azerbaijan on the western coast of the Caspian Sea and goes to Iran and India. This is potentially St. This is the fastest and shortest route connecting St. Petersburg and Helsinki with Bandar Abbas by road and rail. However, there is no railway connection between Azerbaijan and Iran, which will be explained in detail later. The Third Eastern National Science and Technology Center moves from Russia, Kazakhstan, and Turkmenistan to Iran and India along the eastern coast of the Caspian Sea. The route is currently under construction, with incomplete rail links between Kazakhstan, Turkmenistan, and Iran. Three alternative routes are intermodal using several types of cargo. For example, a container loaded in Mumbai, India, also arrives at the port of Bandar Abbas, which delivered by train or truck to Iranian ports on the Caspian Sea. Upon arrival, the names of Astrakhan and Ola will sent to the Russian port across the Caspian Sea. The container loaded by train or truck and transported to its destination. Since there is no railway, connection between Azerbaijan and Iran, container transport via Azerbaijan is transferred to the railway line and sent to Russia / Northern Europe, after which the city can be delivered to Astara, only railway transportation is possible. This is an expensive option, so it is not available at this time. From Bandar Abbas to Baku about 10 days and about 2,900 dollars. Currently, annual container shipments between Europe, the Middle East, and South Asia are estimated at 3.5 million TEU. The National Science and Technology Center and some of these markets, Iran, the South Caucasus / Caspian / Central Asia, and Russia seized. Thus, the National Center for Science and Technology, primarily the Russia / Northern Europe and India / South Asia markets include reliable, fast and economical intermodal land and transport must become a bridge. The founders, Russia is ready to prepare the way of Iran and India along the route depends on the successful integration and harmonization of transport networks in the country. Experts from the National Science and Technology Center, Mumbai from Northern Europe / Russia will shorten the delivery time to 17-19 days, and he said that it is a prerequisite for the traditional Suez Canal and the Mediterranean Sea. In 2007, the International Union of Railways conducted a modeling study for preparing a feasibility study for the

construction of the West through Azerbaijan National Science and Technology Center. For this study, the experts provided that the location of the Azerbaijan-Iran Delhi railway section, the duration of deliveries to Helsinki from India and the duration of the proposed measures were in the NSTC way. According to these data, a container from Delhi to Helsinki and 6-12 hours from Mumbai. The transition to St. Petersburg will take about 19 hours and 19hours. The crowd is much shorter than the Suez Canal and the alternative route of the Mediterranean. However, between 17 days and 24 hours, 6 days, the main drawback and restricts the terminals for NTSC transition at the intersection, and it took 19hours or 40% of the total transportation time indicated. In addition, delivery time is only part of shipping costs, and shipping costs are often more important than travel time.

**Table 10: Distance and transit times by rail from Delhi, India to Helsinki, Finland using the North South Transport Corridor via Azerbaijan\* (Ziyadov, 2011)**

Rail Section by Country	Time	Share(%)	Distance (km)	Share(%)
Finish Section	0d 05h	1%	266	3%
Russian Section	3d 08h	17%	3,233	34%
Azerbaijan Section	0d 21h	4%	528	6%
Iranian Section	2d 14h	13%	1,865	20%
Indian Section	2d 02h	11%	1,510	16%
Railway Carriage (Total)	9d 03h	46%	7,402	79%
Terminal And Border Crossing	7d 18h	39%	0	0%
Sea Transport	2d 22h	15%	1,987	21%
TOTAL	19d 20h	100%	9.389	100%

\* The table assumes that the Qazvin-Rasht-Astara rail link between Azerbaijan and Iran is in place.

Rail transport may be “green” compared to other modes of transport, but it is also more expensive. Railway operators in Azerbaijan, Russia, and Iran do not take special measures to reduce tariffs, and railways more than 5,000 km long are expensive if they do not provide carriers with additional incentives to use this route. The NSTC



should work together to develop a coordinated approach to reducing railway tariffs and facilitate customs procedures, especially if the NSTC should become a competitive corridor that can attract large deliveries from India to Europe and Asia. Passes through the border of Bandar Abbas and quickly Shipping to St. Petersburg. They should perceive the National Science and Technology Center as a single supply chain, and not as separate components of national railway networks.

## **2.9.NTSC Western Route**

Azerbaijan is the main bridge between Russia and Iran on the way to the Western National Science and Technology Center. This route connects the railway and automobile networks of Russia, Azerbaijan, and Iran along the western coast of the Caspian Sea. This is the shortest and potentially fastest corridor compared to the other two NSTC paths. (Railway, "New Caucasian Way", 2008)

### **2.9.1. West NTSC Route: Highway**

In 2010, Azerbaijan opened a section of the modern highway connecting Baku and Samur with the Azerbaijani-Russian border. The total length of the Baku-Samur section (M1 road) is 208 km, and only 56 km has not been covered. This 4-lane asphalt road is also a new extension of the M1 Licking, which shortens the distance between Baku and Azerbaijan. In addition, the bypass route to Baku was completed in 2010, and transit trucks and trucks could move from north to south without entering the city. Currently, work is underway on the "Southern Automobile Corridor", which is located 243 km between Alat and Astar (M3). In 2005 and 2006, the Asian Development Bank (ADB) conducted a series of studies, including a feasibility study and a technical assessment. 221 km of the Alat-Astara road will be modernized, and the building will be co-financed by the Azerbaijani government and international organizations. After the completion of the entire Azerbaijani-Russian border on the Azerbaijani-Iranian border, the NSTC road will meet international standards and ensure a quick and comfortable transition from the entire Azerbaijani department. Azerbaijan has two main border crossing points and a customs checkpoint on the western route of the National Science and Technology Center: Samur in the north and Astar in the south. At present, the Licking border crossing is used for the most common railway transport, but it will soon be connected to the M1 road in Baku (Map 5). Bus and freight traffic

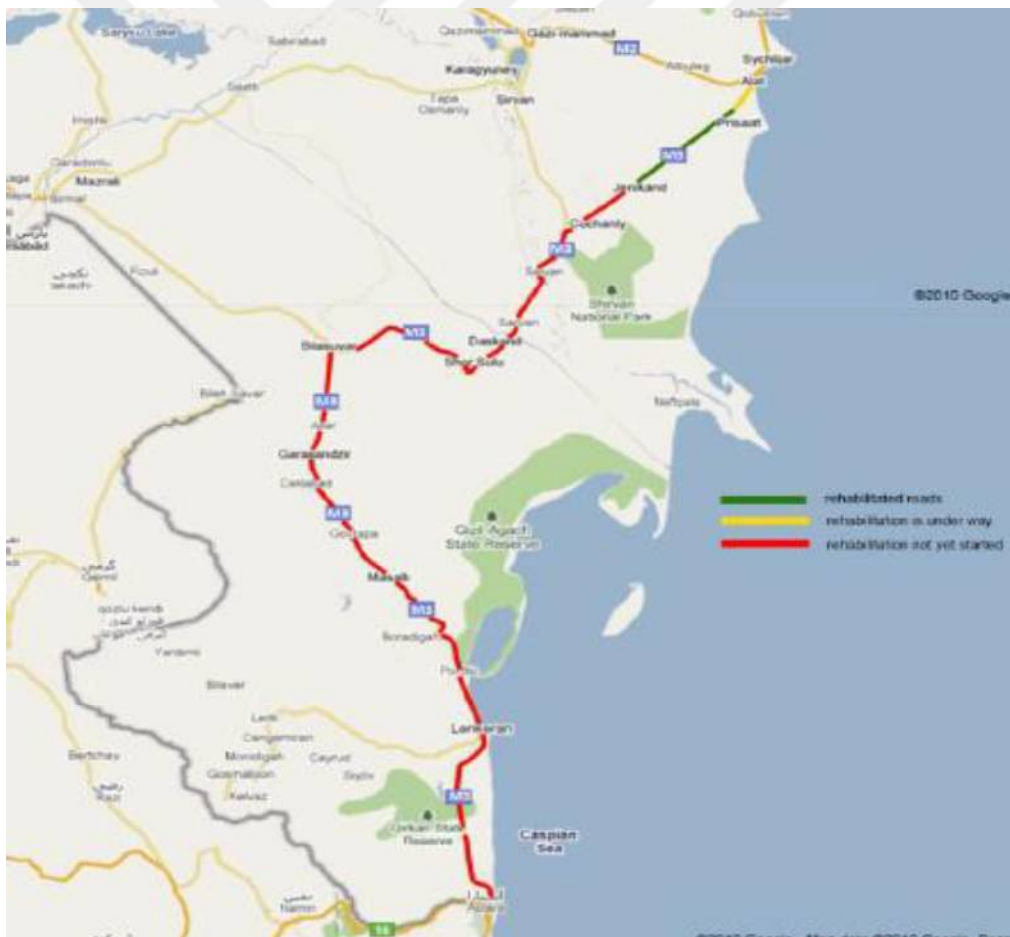
at the Astara and Samur border points have grown significantly in recent years. Iran and Astera Border are currently the largest and largest in terms of cargo transported by road. In 2009, this threshold increased the weight and volume of trucks when they crossed the Red Bridge, the main exit to the east and west. In 2011, more than 65000 trucks crossed the Azerbaijani-Iranian border and transported 2.3million tons of cargo. Approximately 23% of this cargo is in transit. On the other hand, more than 75000trucks carrying only 645000tons of cargo, 12% of which were in transit, crossed the border between Azerbaijan and Georgia. More than 39,000 trucks crossed the border between Azerbaijan and Russia and transported 710,000 tons of cargo, including 33% of transit traffic (Customs.gov.az, 2019). The volume of traffic at the Astara border point was 700,000 tons, with a total turnover of 54%, more than 44500 trucks, followed by transit and exports. Approximately 325000 tons of transit cargo was recorded as transit shipments and 215,000 tons. Most of the cargo handled in the north wing of the Samurais exported, the remaining transit cargo and imports.

**Map 8: M1 Road (From Samur/Yalama, Azerbaijan-Russia Border, to Baku)**  
*(A.A.Rzayev, 2010)*



The western NSTC route is not used, as shown in the transit traffic statistics for the Sable and Primer nodes. The main reasons for this are high transport costs, delays at the border, national restrictions on the number of trucks entering the country, as well as the general problems of carriers when traveling through Azerbaijan-Africa and traveling with Azerbaijan-Iran borders and Azerbaijan. Existing logistics services at the border crossing exacerbate existing problems during the transition period. Based on these considerations, after the construction of the North-South highway connecting Samuray and Astara, Baku needs to develop its own strategy in order to become the most reliable, cost-effective, comfortable and fastest trans-Azerbaijan highway NSTC.

**Map 9: M3 Road (From Baku to Astara, Azerbaijan- Iran Border) (Askerov, 2019)**



### **2.9.2. The western NSTC route: Railways**

Azerbaijan from the Soviet Union delivered more than 3 million tons of cargo in Iran and the Middle East. Located on the Azerbaijani-Iranian border of the Nakhchivan Autonomous Republic of Azerbaijan (NAR), Julfa was the main logistics center of the region and the largest center of the National Science and Technology Center. Julfa, carrying about 150 trains and about 269,000 tons of cargo every day to Iran. Soviet cars and containers did not move far from Iran but were overloaded from the Azerbaijani-Iranian border, along the border with Julfa in the same city, from the Azerbaijani-Iranian border to the city of Juliet, Azerbaijan. Irish logistics companies distribute more goods in Iran and provide more transit. To get to Yule in the NAR, the Soviet railways had to cross a small territory of Armenia. During the war between Armenia and Azerbaijan in the 1990s, this railway line was destroyed and could no longer be used to transport goods from north to south. At the same time, it meant Armenian occupation in some parts of south-western Azerbaijan. Azerbaijan, Azerbaijan, including the 132 km railway line along the border with Iran, lost 240 km of the national railway network. (Starr F. S., 2007) Today all the occupied areas were occupied and the tunnels were closed. Although the reconstruction of part of the Baku-Armenia-Julfa railway line is relatively simple in practice, the fate of the railway or its remains depends on the resolution of the conflict between Nagorno-Karabakh and Armenia and Azerbaijan. Dzhulfinskaya's great railway network after the departure of rail transport is important for Azerbaijan since the country has been significantly reduced. In 2007, Russia, Azerbaijan, Turkey, and Iran with total rail transport of 32.3 million tons, 26.1 million tons in 2009 and in the first eight months of 2010 amounted to 21.4 million tons. (Morozov, 2010) The share of cargo exchange with Russia in Azerbaijan is about 20%; Iran has 17%. According to the official statistics of ADI, the total freight traffic in the NSTC in Azerbaijan in 2010 amounted to about 5.7 million, and in 2010 25% of the total rail traffic of ADY amounted to 4.8 million tons (92% of imports). 8% transit) and 859,600 tons (95% export, transit 5%) were exported. Transit shipments from Iran or Iran have been neglected. Most of the Russian railway transport against Iran, due to the lack of railway connections between Azerbaijan and Iran, and not through the Caspian Sea are transported by rail through Azerbaijan. (Ziyadi, 2011) with 5.2 million tons of cargo and 596,000 tons of them. Transit shipments from Iran or Iran have been neglected. Most of the Russian railway transport against Iran, due to

the lack of railway connections between Azerbaijan and Iran, and not through the Caspian Sea are transported by rail through Azerbaijan. The debate on connecting the Azerbaijani-Iranian railways with Astaroy began in the 1990s, but the political and geopolitical views of the 1990s showed that Russia and Iran supported the development of the National Science and Technology Center across the Caspian Sea and that Azerbaijan is actually circulating. Until mid-2000, the parties understood that the railway communication between Azerbaijan and Iran was the key to the shortest and most suitable alternative to all the NSTC routes. Experts believe that NSTC Western Rail is the best option for long-term Euro-Asian rail transport, especially between Northern Europe and South Asia. In 2014, the annual railway transport through Azerbaijan reached 9 million tons, and in 2029 it is estimated at 19 million tons (Askerov, 2019). It is expected that the delivery time of Qazvin-Resht-Astara will be reduced by 49% and 29% compared to alternative routes (Nazari, 2019). From Helsinki to Azerbaijan Western NSTC railways end 8 km after Azerbaijan and Iran, then continue to Iran in Qazvin and follow to Bandar Abbas in the Persian Gulf. It is 279 km along Qazvin-Rasht-Astara in Astara, 195 km between Qazvin and Rasht in Iran and 254 km between Rasht and Astara. The remaining 7 km will be built between Azerbaijan, Astara, Azerbaijan, and Iran.

#### **2.10. The Eastern NSTC Routes**

The National Science and Technology Center is located on the east coast of the Eastern Caspian Sea, Kazakhstan, Turkmenistan and Iran. As on the Western route of the National Science and Technology Center, there is a long way to go to the Soviet railway connecting Kazakhstan with Iran, Uzbekistan, and Turkmenistan. Due to frequent problems at border crossings in Central Asian countries, it is not advisable to transport cargo from the railway to the north. In 2007, Kazakhstan, Turkmenistan, and Iran proposed to establish a rail link with Kizkaya-Bereket-Etrek (Turkmenistan) and Gorgan (Iran), which will take place on the east coast of the Caspian Sea from Uzen (Kazakhstan). He will be 600-700 km shorter than his Soviet counterpart. The total length of the proposed rail link is 951 km (146 km in Kazakhstan, 723 km in Turkmenistan and 82 km in Iran). The railway was opened in December 2011. (Gudok.ru, 2019)

In March 2010, Turkmenistan Iran Pars Energy launched fertile stations and railway construction of the 257 km border with Turkey in abundance. The construction of this segment is funded by a long-term loan provided by the Iranian Development Bank (IDB) and Pars Energy. The total cost of this segment, including the planned locomotive station to Etrek station, will be 696 million dollars. Bereket and Turkmenistan - 466 km north of the Kazakhstan border were built by the Ministry of Railway Transport of Turkmenistan. The cost of Kazakhstan and Iranian railways is 430 million dollars and 185 million dollars. (Gudok.ru, 2019)

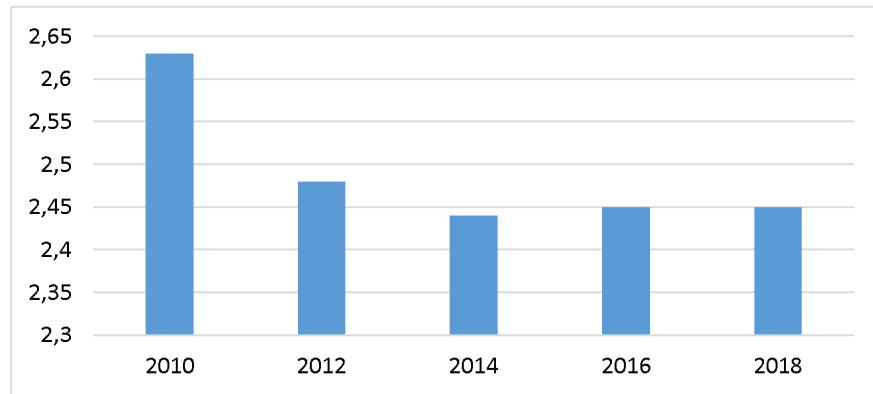
The Gorgan railway connects the main road with Bandar Abbas. The Iranian government has recently given the green light to a new railway project connecting Gorgan with Mashhad (east) and directly to the port of Chabahar. Last year, a railway project with a length of 1,350 km was launched, connecting Mashhad and Chabahar. The Mashhad-Gorgan Foundation was approved in December 2010. (Ziyadov, 2011, p. 86)

Comparing the NSTC rail routes in the west and east, the NSTC east road from Iran to Turkmenistan and the Qazvin-Resht-Astara railway plan is a unique project. Currently, these two railway lines do not compete directly as they serve different markets. On the other side of the Uzen-Bereket-Gorgan railway, it can compete with the routes of the Caspian Sea from China to the Persian Gulf and from Russian ports to Iran for the center of the National Science and Technology Center. Azerbaijan's central strategy depends on the effective use of the East-West corridors and the NSTC. Therefore, Baku should contribute to the construction of the railway connecting Astara (Azerbaijan) and Rasht (Iran), because Europe will be based on an intermodal supply chain in the north and south of India.

## **2.11. World Bank Logistics Performance Index (LPI): Azerbaijan**

Logistics performance index. According to the World Bank's development indicators of officially recognized sources, the total in 2018 (1 = low = 5 = high) was 2.45. Azerbaijan is in the world 123. (worldbank.org, 2019)

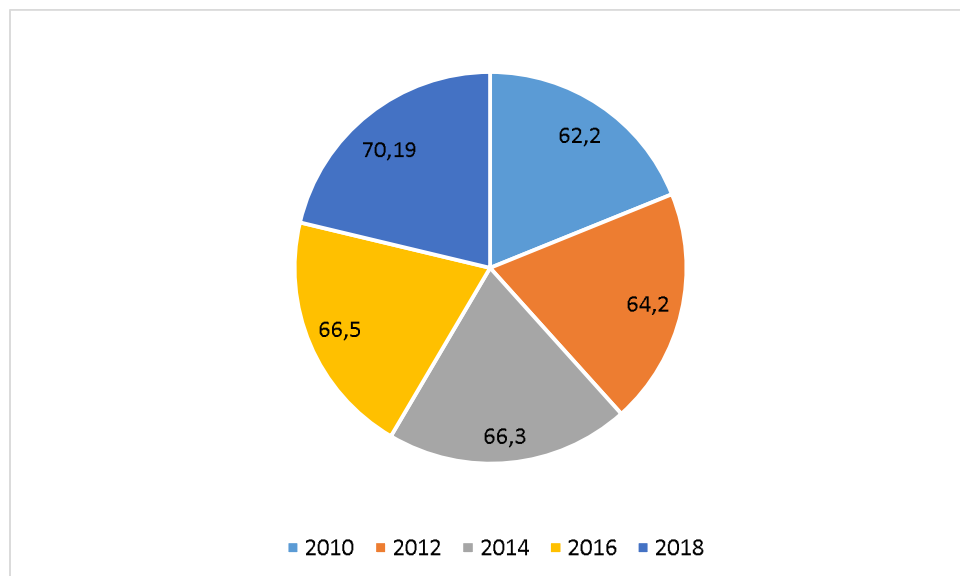
**Figure 5: Rate of Azerbaijan Logistics Performance Index**  
(*tradingeconomics.com*)



### 2.11.1. Azerbaijan Private Sector

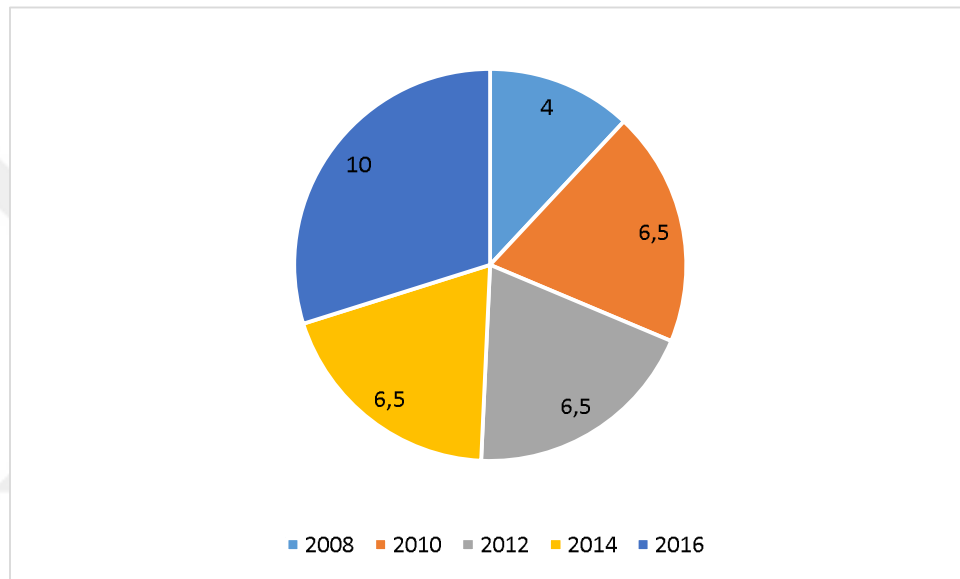
"The distance to the border." According to the data collected by the World Bank to determine development indicators consisting of officially recognized sources, in 2017, 70.19 from the border with Azerbaijan were reported (0 = lowest 100 = limit). The distance to the threshold is the distance between the economy and 2005, which is the best in all countries and in each "Doing Business" communication. The marginal distance is shown from 0 to 100, where 0 represents the smallest power. For example, 75 points in 2012 mean that the economy makes up 25 percent of the best results in all countries and over time. In 2013, 80 points indicate an improvement in the economy.

**Figure 6: Distance to Frontier Score** (*tradingeconomics.com*)



Index of commercial explanations. The level of commercial explanations in Azerbaijan (0 = less than 10 explanations = more information) was 10 in parallel with the officially recognized indicators of the World Bank's development. The publication index measures the level of investor protection by disclosing private and financial information. The index is from 0 to 10, and higher values show additional information.

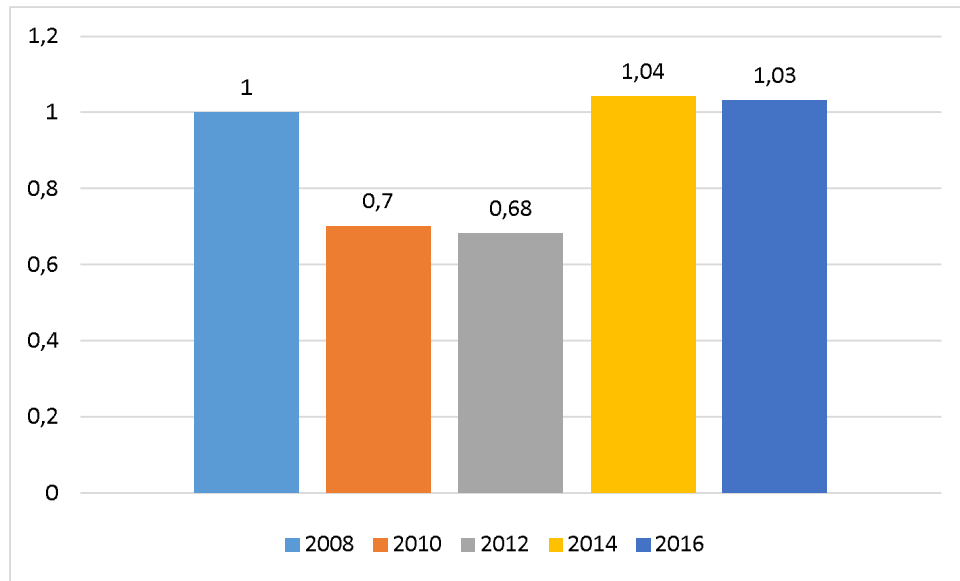
**Figure 7: Business extent of disclosure index (*tradingeconomics.com*)**



New business intensity: in 2016, in accordance with officially recognized indicators of the World Bank's development, a new level of employment in Azerbaijan reached 1,037 people. The number of registered companies of new limited companies registered in the calendar.

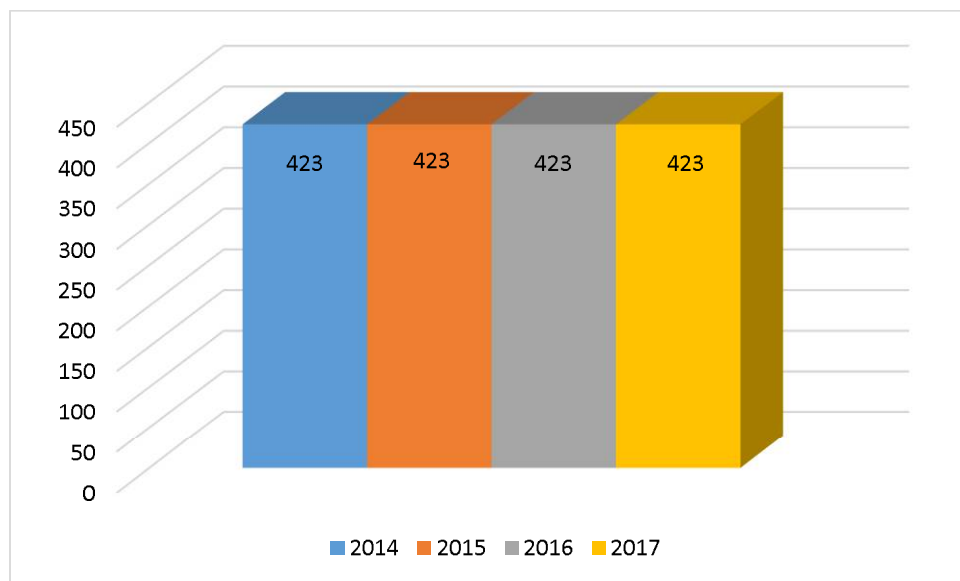


**Figure 8: New Business Density Score (*tradingeconomics.com*)**



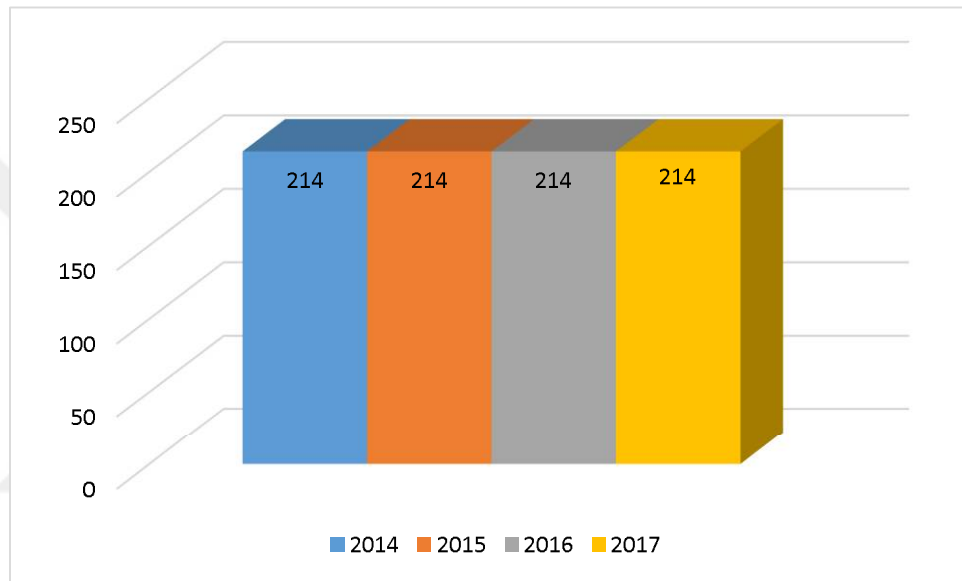
Trade: the value of imports. The cost of imports to Azerbaijan in 2016 was recorded in 423 World Bank reports in accordance with the development of development indicators compiled from officially recognized sources. This indicator calculates the cost of importing standard cargo by the sea - from the port of destination to the port of entry to the cargo warehouse - in US dollars per container. Local carriers, carriers, customs agents, port authorities and banks provide information on the value of each import transaction.

**Figure 9: Cost to Import (*tradingeconomic.com*)**



Export value. According to data collected by the World Bank, in 2016, indicators of export indicators, consisting of officially approved sources in Azerbaijan, the level of export and compliance with borders are 214. The border-monitoring shows the time and cost of compliance of the economy and other inspection rules necessary for the vessel to cross the land, as well as the time and cost of trade in its territory. Segment time and expenses include time and costs for customs clearance and other state control procedures.

**Figure 10: Cost to Export (*tradingeconomic.com*)**



## CHAPTER 3

### DANGEROUS GOODS

#### 3.1. Dangerous Goods Definition

Dangerous substance; Considering the natural state or situation in logistics processes, it is a means of ensuring public safety and its order, public and important public goods, possible threats to life and health of people and other living beings, and the risk of serious damage to the environment. (Delisi, 2006). When hazardous substances are released by chance or for other reasons, people do not pose an immediate and immediate danger to the environment. However, the air is polluted by the environment of water and soil. Human, animal, and environmental health are seriously threatened. Hazardous substances entering the environment primarily pollute the soil, water, and air. Then they begin to negatively affect people's lives. People who breathe air, consume vegetables, fruits, and other nutrients, participate in the human food chain and begin to negatively affect people's lives because of the harmful substances they contain. (Water Heater, 2001). Certain rules have been established to prevent and reduce the risks associated with hazardous substances from one place to another. (UN, 1990). However, these rules are intended to ensure the safety of all logistics operations involving hazardous substances. Therefore, these rules are governed by a proactive approach. (Dani, 2009). These rules include a set of measures and rules designed to minimize the risks associated with the release of hazardous materials. (UN, 2010)

#### 3.2. Inclusion of dangerous goods

Accidents with dangerous goods, eggs can be compared with the gap. If it is impossible to restore the egg after a fracture, it is impossible to correct or compensate for the adverse effects arising from the accident with hazardous materials. For this reason, the parties are obliged to take all necessary measures for their own safety when storing dangerous goods.

The hazards of hazardous substances are related to their classification characteristics. However, the classification by records is divided into the following four categories:

- a) Individual entries, for example, UN 1090 ACETONE, are completely listed.

b) Record type, for example, UN 1133 ADHESIVE is a special group with the same characteristics, but its components may vary.

c) “Special NOS Records” means otherwise. UN 1987 ALCOHOLS, N.O.S. special chemical or technical materials and materials.

d) General records, a very general classification due to certain characteristics, for example, UN 1993 LIQUID HANDLING, N.O.S (UN, 2010). Dangerous goods are divided into 9 major groups. In total in a subgroup of 13 classes of hazardous materials. Listed below. Class 1 explosives also have 6 subclasses and 13 access groups. (BM, 2011)

**Table 11: Classification of Dangerous Goods (ADR, 2017)**

Class 1	Explosive substances and items
Class 2	Gases
Class 3	Flammable Liquids
Class 4.1	Flammable solids, self-reactive substances, polymerizing substances
Class 4.2	Substances liable to spontaneous combustion
Class 4.3	Substances which in contact with water emit flammable gases
Class 5.1	Oxidizing substances
Class 5.2	Organic peroxides
Class 6.1	Toxic substances
Class 6.2	Infectious substances
Class 7	Radioactive material
Class 8	Corrosive substances
Class 9	Miscellaneous dangerous substances and articles

### 3.2.1. Class 1- Explosive Substances

A solid or liquid capable of producing gas at a certain temperature, pressure and speed that can cause an environmental impact at a certain temperature, pressure or speed, or create a non-explosive self-reactive reaction in the presence of heat, light gas, sound or smoke, or a combination or mixture thereof. and more (UN, 2011) These substances can be converted from solid or liquid to gas as a result of sudden explosions. They can make a difference by releasing large and sudden energy. The invention of explosives is usually attributed to the ancient Chinese. The first powder, invented by the Chinese,

cannot be compared with modern military and commercial explosive products that can spread up to thousands of meters per second, creating pressure waves and applying tens of thousands of tons of pressure per square centimeter. The first of the UN hazard classes is one of the most obvious and immediate threats; Explosives (BM, 2010)

Explosives are divided into several units. The first is the separation of explosive and explosive parts. Explosives are described above. The explosive part is simple; one or more explosives. Other class differences are a bit more complicated.

It is created taking into account how something or an object behaves in real terms and consists of six subclasses. Therefore, not only class 1 but also the subsection to which they relate should be included in all packaging for explosive packaging.

Care should be taken to restrict the transport of explosives. The UN has written the classification and restrictions on this issue. These are A, B, C, D, E, F, G, H, J, K, L, N and S. He subjected logistic operations to various types of explosives. For example 1. It is forbidden to transport class materials with other hazardous substances. Loading and/or storage shall be in accordance with the prohibition of general loading during transportation and/or storage of explosives. (BM, 2011)

Another problem with the use of explosives is that explosives contain their own sources of oxygen so that a flammable substance does not ignite and does not explode even under water. Careful storage, handling, and transportation are very important for explosives. (BM, 2011)

*Class 1 explosives are divided into subgroups:*

- 1.1 - substances with mass destruction
- 1.2 - Ingredients and substances with a crunchy effect
- 1.3 - Low content and debris
- 1.4 - Explosives
- 1,5 - substances with low sensitivity
- 1.6 - substances with very low sensitivity

### 3.2.2. Class 2 – Gases

All gases are compressed during the logistics process (for example, during storage and transportation), which saves space and creates potential danger. If this pressure, which occurs without compression, suddenly weakens, it can create a greater force that causes the same pressure and danger to danger as in class 1 (CGA, 2013).

**Table 12: Boiling points of some gases (CGA, 2013)**

Oxygen	Nitrogen	Helium	Carbon Dioxide	Propane	Chlorine
—183°C	—269°C	—196°C	—78.3°C	—42.2°C	—33.9°C

Due to the danger of an explosion, a gradual gas leak causes choking. Storage and transportation should be carried out in the open air. Gas leaks can cause serious heat drops (especially for liquid gases) and harm people. They can also cause the destruction of other substances during storage. (BM, 2010) The following are some types of gas used in logistics operations.

- compressed gases. Example: UN No. 1072 Oxygen is compressed.
- liquefied gases. Example: UN No. 1072 Compressed Oxygen, UN No. 1979 Propane, UN No.. 1011 Butane, UN No.. 1017 Chlorine.
- frozen liquefied gases. Example: UN 1977 Nitrogen, frozen, liquid.
- Dissolved gases. Example: UN No. 1001 Acetylene, dissolved.
- Packages for compressed gas and small gas containers. Example: UN 1950 Aerosols and UN 2037 Small gas containers.
- Gas under pressure. Example UN 2857 Refrigerators.
- Gases under pressure due to certain special rules. Example: UN No. Gas sample 3167, free of pressure, flammable.
- Also empty containers. Example: empty bottles and empty bottles.

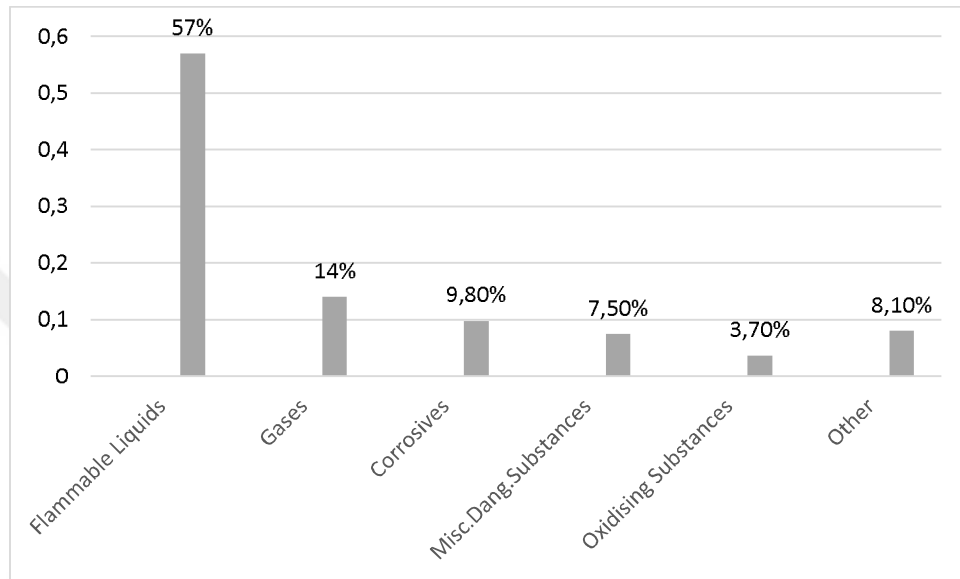
### 3.2.3. Class 3 - Flammable liquids

According to the UN, the most common hazard classes in the world are flammable liquids. Flammable liquids include petroleum products, paints, and adhesives used as fuels, paints, and solvents. As can be seen below, the amount of flammable liquids is important when transported to the EU 27.

If the item meets the following conditions, it will belong to class 3:

- Liquid
- Can withstand pressures up to three bar in closed containers.
- Flashpoint not exceeding 60 ° C

**Figure 11: Transportation dangerous goods and flammable liquids in UE in 2014 (Nowacki, C, & R, 2016)**



*Flammable liquids are arranged as follows:*

- Classification code F: flammable liquid, less hazardous.
- Classification code F1: flammable liquids whose flash point does not exceed 60 ° C or lower than 60 ° C.
- Classification code F2: flammable liquids with a flash point above 60 ° C
- FT classification code: Flammable and toxic.
- Classification code FT1: flammable liquids and toxic substances.
- Classification code FT2: pesticides (agricultural chemicals)
- FC classification code: flammable liquids and corrosive substances.
- FTC classification code: flammable liquids, toxic and corrosive.
- Classification code D: explosives (ADR, 2017)

The hazard ratio of flammable liquids from the packing groups (PG) can be determined by:

- PG I = highly hazardous substances
- PG II = moderately hazardous substances
- PG III = less hazardous substance

**Table 13: Packing group for flammable liquids in accordance with ADR (ADR, 2017)**

Packaging Group	Flash Point	Initial Boiling Point
I	--	≤35°C
II	<23°C	>35°C
III	≥23°C≤60°C	>35°C

All flammable liquids form heavier vapors than air and therefore replace the air in particularly low and/or enclosed spaces. So choking is always the second possible danger. Transportation of flammable materials/storage of flammable materials should be carried out in an open area and adequate ventilation space should be provided. Many flammable liquids, apart from asphyxia, include specific toxic hazards, such as ingestion and/or inhalation of vapors, dilution of skin tissue, and toxic effects, such as eczema.

The danger of burns: substances of the third class can ignite in the event of an explosion. They produce a lot of smoke when they reach the point of combustion. Sources of combustion, sparks, hot surfaces, flames, etc. The weld may contain an electrostatic charge. The point of combustion determines the lowest temperature of the liquid when the air in the liquid creates a flammable mixture when a certain amount of flammable vapor arises. It is important to note that a pair of flammable liquids is usually heavier than air. When there is no wind, they enter the lower regions. These substances may be more likely to burn due to the long time required for loss. There is always a high risk of explosion with flammable liquids. (MAN & Gold, 1998)

*Electrostatic load:* solids, liquids, and gases can be charged by static electricity during fast movement. Subject to appropriate conditions, they can cause electrostatic discharges. Sparks caused by electrostatic discharges are sources of ignition. Because



there is no sense organ that could detect someone's electric charges immediately or before an electrostatic discharge.

*Examples of electrostatic loads:*

Walking shoes can be electrically charged when walking. This is especially dangerous when traveling in areas with explosive mixtures.

Oil and other well-loaded petroleum products should not be transported in replaceable containers. The contact of clothing with such containers may result in fire.

Hazardous situations can occur if there are appropriate conditions for the flow of fluid in the pipeline. In general, hazardous land or contaminated areas can be avoided or destroyed if the flow is restricted.

Liquid consists of droplets of different sizes when sprayed. Small drops are usually charged with negative current, large drops with the positive current. The transfer and discharge of conductive materials, such as metal, can cause electrostatic discharge.

Charges Electrostatic charges can be prevented by grounding (BENEDETTI, 2005)

#### **3.2.4. Flammable solids**

Solids, other than gases and liquids, also pose a fire hazard. The essence of this class is that every fire, including the product, is very strong at high temperatures and difficult to extinguish. Other undesirable hazards may occur, such as toxic and/or aggressive waste gases. For safety reasons, substances of this class should be considered as other flammable substances and should be kept away from sources of ignition. This class consists of 3 subclasses. (IMO, 2010) Now let's look at these subclasses.

This is usually flammable and non-flammable materials. Self-acting substances that can deteriorate when heated; This class contains explosives that have been safely removed from water or alcohol. This subclass requires temperature controlled transportation (UN, 2010)

Substances and equipment class 4.1 are classified as follows:

- Tour F Highly flammable solids, no other hazards.
- FO flammable solids, flammable (oxidative) effect.

- FT flammable solids, toxic.
- Flam FC flammable solids, caustic.
- Native D Reasonable explosives, no other hazards.
- DT Sensitive explosives, toxic.
- D SR Rotating substances.
- 1 SR1 Substances not required for temperature control.
- 2 SR 2 Materials required for temperature control (BM, 2011)

#### *Class 4.2 self-reactive substances*

If it is too low at low temperatures, it contains very little pyrophoric material.

Features require airtight handling and storage.

Substances and equipment class 4.2 are classified as follows:

- Pyrophoric substances do not pose a danger to hands,
- Pyrophoric oxidizers, 135 Linda S.V. Pyrophoric substances that form flammable gases when in contact with water
- Mad ST - pyrophoric toxic substances
- SC-SC Pyrophoric Abrasives (UN, 2010)

*Class 4.3: Ingredients in Contact with Water.* They are known to react quickly with water. The combustible gas generated during the reaction may ignite or explode. Intervention is often associated with fire protection methods; however, this is completely inappropriate for the subcategory. These materials require complete transportation and storage away from moisture.

It is known that components that come into contact with water react quickly with water. Combustible gas generated during the reaction may ignite or explode. Intervention is often associated with fire protection methods; however, it is not quite suitable for a subcategory. These materials require complete transportation and storage away from moisture.

Class 4.3 is one of the most common in transportation. However, it contains some hazardous substances.

- W: flammable gaseous substances in contact with water;
- F WF: combustible gases, combustible, liquid, based on a contact with water

- S WS: substances that contract in water, self-heating substances that form flammable gases,
- : WO: Substances which form flammable gases when in contact with water are flammable,
- T WT: when in contact with water, combustible gas-forming substances are toxic,
- Ever WC: caustic substances that form flammable gases in accordance with the contract with water,
- FC WFC: Substances that are in contact with water may form flammable, corrosive, flammable gases.

Flammable (explosive) gases are formed by contact with substances in water.

4.3. Moisture in the air can release flammable gases at the door when sparks occur and can cause serious burns! For this reason, liquid drum covers must be observed. (UN, 2010)

### **3.2.5. Class 5.1 – Oxidizing substances**

Fires are caused by oxygen in the atmosphere. This class contains oxygen-containing substances that provide combustion. These substances can be separated during the breakdown and release of oxygen.

For safety reasons, Class 5 substances must not be stored or transported with other non-flammable materials, even if they are far away. These substances also have corrosive properties. This class has two subclasses (ADR, 2017)

Oxidizing agents are natural substances present in the daily use of substances in which excess oxygen is beneficial. preservatives, bleaches, disinfectants, herbicides, fertilizers, etc.

Class 5.1 differed as follows:

- O: Flammable (oxidizing) containing or containing substances.
- TUT OF: Flammable (oxidizing) solids may ignite
- OS: flammable solids, self-heating,
- WOW: combustible (oxidizing) solids; combustible gases can form when they come into contact with water.
- TOD OD: Flammable (oxidizing) substances, toxic,

- C OC: Flammable (oxidizing) substances, caustic,
- TC OTC: Flammable (oxidizing) substances, toxic, caustic (UN, 2010)

Class 5.1 substances may release oxygen in an aggressive manner. The release of oxygen can be dangerous in two ways: for example, if these substances are flammable; There may be inflammation on contact with the tree. When mixed with other substances, an explosion may occur.

Since they contain carbon and hydrogen, they contain not only oxygen but also oxidizable synthetic materials. The transportation of some insoluble compounds is dangerous. In some cases, ensure that the transportation conditions are particularly low and/or excessive dilution. Reactive organic peroxides have a natural dissolution temperature. At this temperature, a continuous cycle of spontaneous heating occurs, which causes an explosive source or even an airless explosion. This is a very dangerous subclass.

In class 5.2, substances usually have a corrosive and/or toxic effect. These substances differ in the following:

P1 (classification code): organic peroxides that do not require temperature control

P2 (classification code): organic peroxides requiring temperature control (UN, 2010)

Some substances of class 5.2 can only be transported under thermal control. The temperature controlled in the logistics process should be checked by the service personnel. In addition, substances of class 5.2 may ignite. These substances are dangerous due to the large external weight in very small units due to the high risk of explosion. Peroxides can ignite combustible materials. Serious damage to the eyes may result in contact of peroxides with the skin (UN, 2010).

### **3.2.6. Class 6.1 - toxic substances**

There are two subclasses of this class. These substances often cause sudden illness or death. From a human point of view, substances of class 6 can be taken by one or all of a variety of methods, including respiration, absorption, and ingestion. Hygiene must be important in the logistics of these materials. (UN, 2010)

These are chemical poisons that biochemically affect prey. Many have secondary hazards, such as flammability and/or abrasiveness.

Class 6.1 elements are divided into:

- Nontoxic toxic substances
- TF: toxic flammable substances
- TS: toxic self-heating solids
- TW: toxic substances that form flammable gases when in contact with water,
- TO: substances causing toxic flammable (oxidative) effects
- TC: Toxic Abrasives
- TFC: toxic abrasives (UN, 2010)

Whether a substance is toxic depends not only on the type of substance but also on the number of people. Some substances are toxic, caustic and/or flammable. For example, “UN 1595, dimethyl sulfate, 6.1 (8), PG1”. If the combustion temperature is below 23 ° C, it is classified as class 3, that is, flammable liquids, with the exception of substances that are considered very dangerous, less dangerous and toxic.

#### *Class 6.2: Infectious Substances*

The risk of infectious substances is caused by living organisms. Because these substances biologically affect the body. Infectious agents are a broad subclass that includes human and animal carcasses, organisms, vaccines, genetically modified microorganisms using medical residues. The most important feature of these substances is the risk of contamination. Our body does not have a system for recognizing infectious substances. Therefore, care must be taken when loading, transporting and unloading these materials! Article leaks; should be recorded in small quantities (BM, 2010)

These items are divided into:

- I1 (classification code): infectious substances are dangerous to humans
- I2 (classification code): infectious substances are dangerous only to animals.
- I3 (classification code): clinical waste
- I4 (classification code): biological agents, category B

The UN classifies infectious substances into two categories:

Category A: These substances are substances that are infectious or life-threatening or life-threatening. (UN, 2010)

Fragmentation occurs when the infectious substance leaves the containment shell and physical contact with people or animals takes place.

Substances that meet these criteria and are dangerous for infectious substances are substances that cause diseases in humans and animals. UN No. 2814 and animals that cause disease only UN No. It must be listed in accordance with 2900 (UN, 2010a). Examples: UN 2814: Infectious substances affecting humans (Lassa virus, Ebola virus and rabies virus, etc.)

Category B: Infectious substances that do not meet the criteria for Category A are included in this definition. Hazardous substances in Category B UN No. 3373't are listed. Examples: This category includes blood or urine samples from people with the hepatitis B virus or polio. They are also referred to as "patient samples." Patients with minimal pathogenicity were excluded. This is an "issued medical specimen" or "veterinary specimen".

The official release of the UN 3373 transport; Biological substance is classified as category B. If such substances disappear, human health can be seriously damaged. Direct contact with human body fluids is possible. All protective measures are very important for human health.

### **3.2.7. Radioactive material**

Radioactive substances are substances that release energy in the form of ionizing radiation that affects other substances. Radioactive substances can vary and can cause serious damage to living tissue. However, it can also contaminate non-living matter. The protection of substances of this class requires technical knowledge. Radiation (without radiation) is small. The inner space in heavy metals and some special boxes (space) can work to maintain radiation. Although this class is only a small fraction of the total tonnage of dangerous goods transport, the number of packages is high. (EPTS, 2008) It is further known fact that the substances and ingredients contained in this class contain extremely important substances for reactors. They also contain isotopes, smoke detectors and even illuminated signs for medical purposes. Radioactive materials can also be found in luminaires and measuring devices (UN, 2010).

There is no organ that detects radioactivity in the human body. In other words, the mechanism of natural protection does not have a chance against radioactive substances. Therefore, it is very important to respect the limit values. The use of radioactive substances should be minimized for the safety of living things. A special training certificate is usually required for the transport of Class 7 hazardous substances.

### **3.2.8. Corrosive Substances**

Corrosive substances are substances that are in danger of entering into a chemical reaction with other substances. These substances affect the transport path, the other load, the other substances around it, and more importantly the human tissue, if it is shed. The main problem in the logistics of these substances is the limitation in the selection of packages that will ensure the effective preservation of the abrasives. Today's plastics are suitable for this purpose (UN, 2010)

*The corrosive materials were separated as follows:*

- A: No corrosive substances without side hazards,
- CF: corrosive substances,
- CS: Abrasive self-heating materials,
- CW: Corrosive substances forming flammable gases in contact with water,
- CO: Corrosive substances (oxidizing)
- CT: Corrosive toxic substances,
- CFT: Non-corrosive toxic liquid substances,
- COT: Toxic substances causing corrosive (oxidizing) effects

Class 8 substances are not only liquid. Some materials are transported as solids in powder form and in granular form. For example, hydrate and potash, etc. These substances are aggressive due to sweat in the hands when they get wet or moist, for example when they get into the eyes, airways or hands when loading or unloading.

The corrosive effect can also arise from the smoke of substances in Class 8. The presence of general attention and protection equipment for substances in Class 8 is always necessary for substance leaks. Because even small droplets of acid can cause severe damage to eyes and skin. Corrosive fumes can internally damage the human body when inhaled.

Hazardous Reactions and Mixtures: In particular, Class 8 substances can cause hazardous reactions. Other dangerous substances may be formed. For example, if the chamber wall is diluted with an acidic reaction, flammable and explosive hydrogen gas may be formed. If many acids are collected in a waste collection shipment, the resulting mixture may be more hazardous than the individual waste acids, thereby increasing aggression in particular against the tank materials. Acids can also show hazardous reactions when mixed with water. This function is important when cleaning tanks. If there is acid waste in the tank, very dangerous drops of acid may occur. In addition, water can cause serious hazards. (UN, 2010)

### **3.2.9. Miscellaneous dangerous substances and articles**

The ninth grade added to the eight basic hazard classes of the UN does not meet the criteria that can be assigned to any other class; but it collects substances and parts that are known to be harmful to humans and / or the environment under the roof (group). Although Class 9 does not initially contain as many items as other classes, the list is expanding. There are different approaches to using Class 9 in different national and international regulations.

Protection of substances of this class requires technical knowledge. Radiation (without radiation) is small. The internal cavity in heavy metals and some special cans (space) can work to provide radiation. Although this class represents only a small fraction of the total quantity of hazardous materials transported, the number of packages is large. (EPTS, 2008) It is also known that substances and components of this class contain extremely important substances for reactors. They also contain isotopes, smoke detectors, and even light markings for medical purposes. Radioactive materials can also be found in lamps and indicators (UN, 2010)

In the human body, there are no organs that determine radioactivity. In other words, the natural defense mechanism does not have the ability to resist radioactive substances. Therefore, it is very important to observe the limit values. The use of radioactive substances should be minimized for the safety of living beings. As a rule, a special certificate is required for the transport of hazardous materials of class 7.



### 3.2.10. Abrasive materials

Corrosive substances are substances that can chemically react with other substances. These substances affect the path of transportation, above the head, on other substances around it and, more importantly, on human tissue, if it spills out. The main problem in the logistics of these substances is to limit the choice of packaging to ensure effective protection of the abrasive. Modern plastics are suitable for this purpose (UN, 2010)

Abrasive materials are divided as follows:

- A: No aggressive substances that are not dangerous.
- CF: abrasive
- CS: Abrasive self-heating materials
- CW: caustic substances that form flammable gases when in contact with water,
- CO: abrasive (oxidizing)
- BT: abrasive toxic substances
- CFT: non-aggressive non-toxic liquids
- COT: toxic substances causing corrosive (oxidative) effects

Class 8 items are not only liquid. Some materials are transported as solid particles to powders and granules. For example, potassium hydrate, etc. These substances are aggressive due to sweat in the hands when they are wet or wet, for example, when they reach the eyes, airways or hands during loading or unloading.

Corrosive effects can also be caused by smoke from grade 8 substances. Equipment for general attention and protection of substances in class 8 is always necessary for substance abuse. Abrasive fumes can naturally damage the human body when inhaled.

Hazardous reactions and mixtures. In particular, substances of class 8 may cause dangerous reactions. Other hazardous substances may occur. For example, if the chamber in the room is diluted with acid, combustible and explosive hydrogen gas may form. If a lot of acids are collected in a waste collection container, the resulting mixture may be more dangerous than the individual acids used; this increases aggressiveness, especially with regard to tank materials. Acids can also be dangerous when mixed with water. This feature is important when cleaning tanks. If there is an acid waste in the

tank, very dangerous acid drops can occur. In addition, water can cause serious hazards. (UN, 2010)

### 3.3. Packaging group of dangerous goods

Hazardous substances are usually divided into three groups. The packing group is determined by the degree of risk of the substance and determines the measures to be taken for packaging.

**Table 14: Dangerous Goods Packing Group**

Group I	High Dangerous
Group II	Medium Dangerous
Group III	Low Dangerous

Explosives of the first class, gases of the second class, 5.2 organic peroxide substances and radioactive substances of the seventh class, hazardous substances are not divided into packing groups. Class 3 is classified into flammable liquids, pyrophoric substances of category 4.2, flammable gases of class 4, in contact with water, flammable properties of class 5, toxic substances of class 6, corrosive substances of class 8, acidic substances. Packing groups. Flammable solids of class 4.1 and nine other hazardous substances are divided into two groups: medium and less hazardous. The class of infectious substances 6.2 shows the average risk of packing.

### 3.4. Transportation of dangerous goods

It can cause various physicochemical effects (heat flow, overpressure, toxic, radiological and corrosive effects, etc.) when handling hazardous substances, emergency conditions, quality and quantity of products transported. (Chollet, Tixier, Dusserre and Mangin, 2013). For this reason, the transport of dangerous goods is regulated under the control of the authorities and specialized organizations within the institutional structure defined by national and international laws. All types of transport in the world comply with the laws. In accordance with the names of the specialized agencies and the mode of transport, international legislation is shown in Table 11.

**Table 15: Expert Organizations and International Agreements by Type of Transport**

Transport Type	Responsible Expert Organizations	International Agreement
Roadway	UN Economic Commission for Europe (UNECE)	ADR
Seaway	International Maritime Organization (IMO)	IMDG-Code
Railway	Office Central des Transport Internationaux (OCTI)	RID
Airway	International Civil Aviation Organization (ICAO)	ICAO-TI
Airway	International Air Transport Association (IATA)	DGR
Local Seaway	Accord Européen relatif au Transport International des Marchandises Dangereuses par voie de Navigation du Rhin	ADNR-ADN

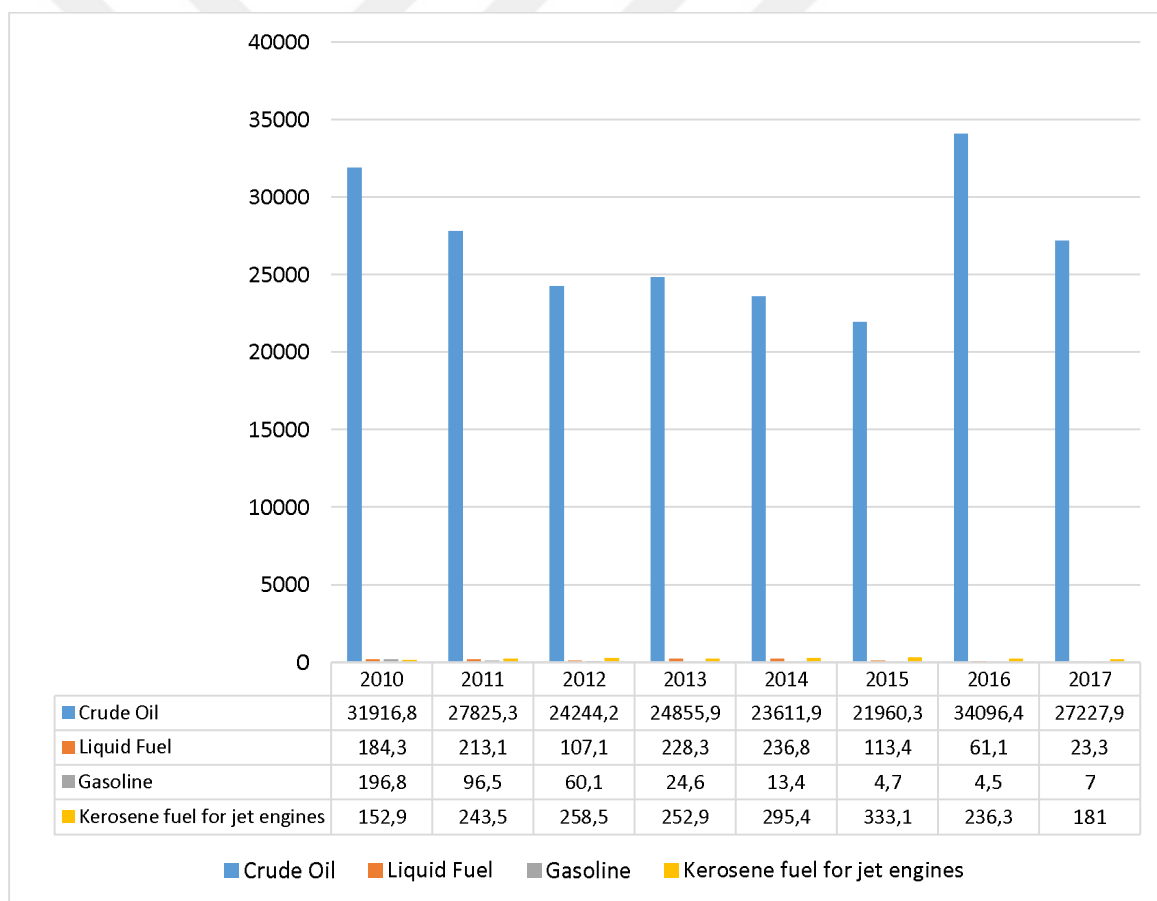
## CHAPTER 4

### TRANSPORTATION OF DANGEROUS GOODS IN AZERBAIJAN.

According to UN statistics, about 50% of the total turnover is dangerous. Proper placement of air, sea and rail transport and the transport of dangerous goods by road is of strategic importance for many industries. Hazardous stocks are commonly used in the chemical, petrochemical, pharmaceutical and mining industries. The regular development of these units and the creation of new economic ties in relevant areas play an important role in ensuring sustainable economic growth.

**Figure 12: Transportation of 4 types of Dangerous goods (2010-2017)**

*(stat.gov.az, 2019)*



*\*The numbers are shown as thousand ton.*

As well as, exports of dangerous substances as natural gas, petroleum coke, acyl alcohol and their derivatives and etc. in Azerbaijan.

**Table 16: Some dangerous goods transportation between 2010-2017 years.**

*(stat.gov.az, 2019)*

Years	Natural Gas	Petroleum coke	Acyl alcohol
2010	1792,9 million m <sup>3</sup>	389880 tons	17714,6 tons
2011	2885,8 million m <sup>3</sup>	262521,2 tons	12604,3 tons
2012	2714 million m <sup>3</sup>	192928,7 tons	5700,5 tons
2013	3035,1 million m <sup>3</sup>	214711,8 tons	14193,7 tons
2014	1825,7 million m <sup>3</sup>	286694,3 tons	38392,3 tons
2015	8432,7 million m <sup>3</sup>	268327,8 tons	177284,5 tons
2016	8396 million m <sup>3</sup>	172677,1 tons	212164 tons
2017	7543,5 million m <sup>3</sup>	257296,3 tons	266305 tons

#### **4.1.Critical Issues in Azerbaijan Transport System**

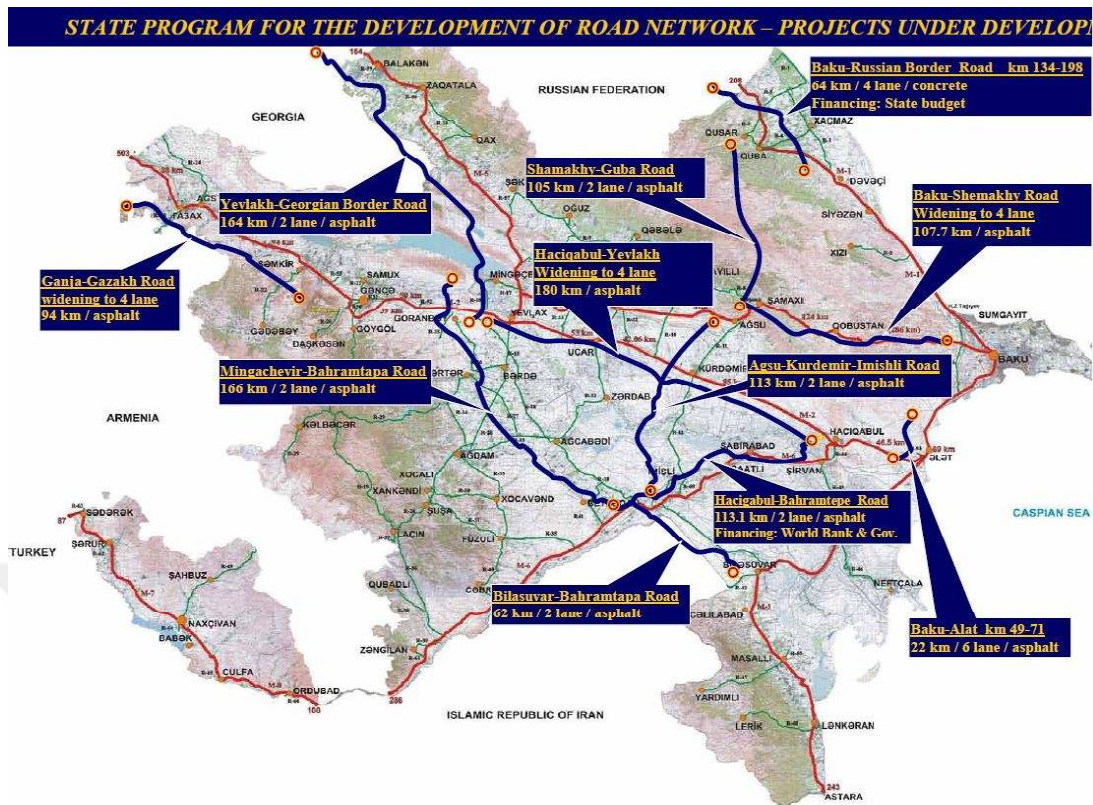
Therefore, a critical transport system is characteristic of Azerbaijan. The following factors:

- The technical infrastructure of the road infrastructure is critical (61% of roads in poor conditions).
- Bad technology on the railway
- The weight of a heavy vehicle is one of the main causes of rapid lateral skewing and damage to the bridge. (Wilson, 2006)
- Smaller port

To optimize the transport system, it is necessary to improve road, rail, and port systems and distribute infrastructure through terminals or logistics platforms. Logistic platforms must rationalize the delivery of goods delivered to various operations (order management, labeling, packaging, etc.). Disadvantages of network infrastructure cannot provide integration between different modes of transport. To overcome this problem, the regional management committee must approve regional goods and logistics plan. (G.U.R.S, 2004)

The most important reasons for the lack of a good road in Azerbaijan are the lack of sufficient financial support from the Azerbaijani Ministry of Transport. Therefore, there may be a shortage of quality products and a lack of personal support.

**Map 10: Azerbaijan Highways (Galandar, 2011)**



On this map, you can see the main roads connected with the Silk Road and Azerbaijan, and you can see the length of these roads and how much money you earn. A significant decrease in the market share of rail transportation was due to inaccuracies and the differentiation of the state transport policy. In recent years, a sufficient number of railways have not been established, the physical and geometric standards of existing railways have not been properly adjusted, and, most importantly, with the daily intervention of political power, the management structure has become cumbersome and enterprises able to adapt to market events can be implemented. New routes should be added to the railways, should be completely modernized, and the speed and standards of developed countries should be achieved, starting with the important routes. When upgrading the existing railway infrastructure, priority areas must be implemented to ensure the operation of the system. It is necessary to optimize the costs of minimizing rail, sea, and road. (Alatash and Somunkiran, 2010)

This problem is the same all over the world. Heavy vehicles pose a great danger to bridges. In Azerbaijan, bridges are often damaged by traffic. Using roads and bridges to solve this problem will reduce this problem due to the weight of the vehicle.

There is only one port in Azerbaijan. This number is really small. Since Azerbaijan occupies a large part of the Caspian Sea, the number of ports will increase in the field of transportation. For example, the opening of the port of Khachmaz in Azerbaijan, close to Russia, will facilitate and reduce the cost of shipping. Azerbaijan is also close to Turkmenistan and Iran. Lankaran has a good geographical location.

#### **4.2.Rules for the international transport of dangerous goods by road**

To reduce the weight of hazardous substances, it is necessary to develop a modern integrated transport of hazardous materials. In this context, the United Nations in 1954 developed specific rules and regulations establishing a group of experts to present the rules and regulations on the transport of dangerous goods. In the case of export of dangerous goods to other countries, the Basel Convention procedures should be observed or carried out only by authorized state bodies after sending written notifications on export, import and transit in accordance with international legislation on cross-border transportation. (Rechkoska, Rechkoski, and Georgiosk, 2012) All EU countries are parties to the European Convention on the International Transport of Dangerous Goods by Road. The ADR agreement is valid for the international carriage of dangerous goods by road, and its provisions, as a rule, do not differ from local regulations. Multilateral agreements on certain issues agreed by the parties may be concluded in accordance with the Agreement. (ADR, 2005). The classification of dangerous goods transported by motorways of the Republic of Azerbaijan of August 25, 1994, and other provisions ensuring the safe transportation of dangerous goods of certain types and categories in accordance with the conditions approved by the State Committee for Mining Audit of the Republic of Azerbaijan are approved by the manufacturer. Or by the beneficiary state, non-state actors and legal entities. (Law on Motor Roads of Azerbaijan, 2000)

The Law on the Transport of Dangerous Goods of the Republic of Azerbaijan and on land and rail transportation and dangerous goods. The law provides for marking of vehicles carrying dangerous goods with orange markings and warning signs. To warn other road users, containers with hazardous materials must be properly labeled. The main requirement for the transport of dangerous goods is a permit issued by the Ministry of Transport and Communications of the Republic of Azerbaijan at the request of the company or the person producing it. In addition to the contract, you must

receive and send the following documents: send the document to the sender (ADR); written instructions for the transport of hazardous substances; Professional qualification of the driver of dangerous goods ADR. Despite the approval of the Ministry of Transport and Communications, the Ministry of the Interior requires an additional permit for Class 1 explosives, depending on the type of substance; Permission of the Ministry of Health to transfer infectious substances for 6 and 6 years; and approval of Class 7 radiation safety for the transport of radioactive materials. (Law on Motor Roads of Azerbaijan, 2000). A team of five or more vehicles with hazardous, radioactive and highly toxic substances is provided by the escort vehicle, which is distributed by the responsible organization along with the carrier to inform the participants about the danger and prevent any collisions. When the width of the transversal light is less than its width, the front part of the passage should be slightly shifted to the left relative to accompanying vehicles. (Law on highways of Azerbaijan, 2000). Dangerous goods must not contain any persons other than vehicles, drivers, driver assistants or other persons who may cause a fire or explosion. Smoking is prohibited when wearing these materials.

When transporting solid particles with liquid radioactive materials, they should be worn with a sufficiently strong ring on a belt attached to a solid device. When using containers that can be opened from above, the filling is easy. However, these containers must be protected from rain by a tarp. The driver must use the vehicle carefully, and in accordance with the rules of the road, the vehicle speed should not exceed 80% of the maximum speed, depending on the type of road; Dangerous substances without toxins more than 60 km / h. The driver should not be aloof from delivery to delivery of dangerous goods. In the event of an accident or fire, the inspector should inform the authorized driver as soon as possible, and if the driver himself is the one who knows about the accident (Rechkoska, Rechkoski, and Georgiosk, 2012). When transporting national vehicles in minibusses, make sure that they are not located next to the vehicle, especially when transporting dangerous goods and in accordance with the law in vehicles, in vehicles with trailers, in trailers. In a vehicle carrying dangerous goods, it is necessary to identify two vehicles with hazardous substances and the identification number of the dangerous substance. If some vehicles are used to transport dangerous goods through a vehicle, they must be labeled with hazardous substances.



### **4.3. Rules for the international carriage of hazardous substances by sea**

These rules define the relevant safety requirements for the transport of dangerous goods by sea in accordance with the legislation of the Republic of Azerbaijan. This manual does not apply to the transport of hazardous substances and substances (with the exception of potentially toxic and explosive substances and materials) in limited quantities, as well as the substances and substances listed in section 9.2, for hazardous purposes. (Təhlükəli malların dəniz nəqliyyatı ilə daşınması qaydaları, 2000).

Dangerous goods, covers, posters, signs packed with safe cargo or containers, the correct name of the cargo in containers should be documented by visible and legible containers in containers. up to three months in seawater. This data should be selected and read. When choosing the appropriate marking, warning and warning signs, you must consider the durability of the materials used and the end of the containers.

Dangerous goods must be properly and safely installed in accordance with their technical specifications. Incompatible costs must be eliminated. Any explosives (other than ammunition) that could pose a serious hazard should be stored in a secure, enclosed area. These explosives should be located outside the explosives. To minimize the risk of fire or explosion, you must use and use electrical equipment and cables in any container (s) where explosives are transported. Emergency fluids or gas cylinders should take precautions against explosion or fire, if necessary. Self-harming or unconscious substances cannot be transferred without the necessary measures to minimize the likelihood of a sudden fire.

#### **4.3.1. Requirements for Ships which Transport Dangerous Goods**

Systems, structures, and requirements for vessel maintenance and storage should comply with the requirements for the type of vessel, as well as the type of cargo and the degree of danger. Cargo tanks must be equipped with a fixed automatic system approved by the fire alarm registrar. In systems based on the principles of climate control, measures must be taken to prevent airflow or to mix residential or office space. In the warehouse where the controller is installed (in the field), the test mass will have an indication that it should be released into the atmosphere after the test (analysis) (Təhlükəli maddələrin dəniz nəqliyyatı ilə daşınması qaydaları, 2000).

#### **4.4. Rules for the international transport of hazardous substances**

In accordance with the Law of the Republic of Azerbaijan "On Aviation Aviation" in accordance with the Law of the Republic of Azerbaijan "Transport Day" and other Legislative Act of the International Civil Aviation Organization (ICAO), in accordance with the Chicago Convention, safety requirements for air transport of hazardous materials are established.

Relevant certificates for training the crew of the airline for the transportation, loading, unloading, and storage of dangerous goods on board, as well as aviation companies, airlines, airports and airline crews, increase the level of knowledge in accordance with the requirements of technical safety rules. According to the standards, the Civil Aviation Administration of the Republic of Azerbaijan must be approved in the prescribed manner.

Obligations of persons involved in the transport, evacuation, loading, and storage of dangerous goods:

- Comply with the requirements of technical and regulatory documents defining the rules of operation, rules of accidents and incidents at hazardous facilities;
- Medical examination and certification are carried out in accordance with the regulations;

In the event of an accident at a potentially hazardous facility and an incident, stop work provided for by the legislation of the Republic of Azerbaijan, immediately inform the administration or other employees involved in accidents or incidents.

The cargo will be transported in any case:

- Flammable or explosive explosives under the influence of 75 ° C for 48 hours;
- Ammonium Explosives and Salts;
- Explosives containing a mixture of phosphorus trichloride;
- Solid explosives are classified as extremely high sensitivity to mechanical shocks;
- Explosive liquids are classified as less sensitive to mechanical shocks;
- Any substance in the air that can dissipate heat and gas in hazardous conditions under normal conditions;
- Highly flammable radioactive liquids;

Experiments have shown that high-speed solids and organic peroxides should be packaged since they can explode according to the explosion hazard classification. Transportation of dangerous goods, aircraft, customers, and citizens to the place of destination is accepted under the contract. In this case, the sender and the recipient must have a special permit to work with dangerous goods. Dangerous goods must be issued a copy of a special permit issued by a traffic safety inspector upon presentation of a contract for storage, loading, unloading, and transportation of dangerous goods by civil aviation organizations carrying dangerous goods. (Təhlükəli maddələrin hava nəqliyyatı ilə daşınması qaydaları, 2000)

#### **4.5. International rules for the transport of dangerous goods by rail**

These rules determine the conditions for the transport of dangerous goods within the borders of the Republic of Azerbaijan in accordance with the Law on Roads of the Republic of Azerbaijan. Carriers (buyers), legal entities and individuals, service and transport companies must comply with these Rules and technical safety rules. Transportation of dangerous goods between contracting parties International agreement on the carriage of goods, special conditions for the carriage of dangerous goods by international railways and the transport of dangerous goods between non-railway countries and the storage of dangerous goods must be carried out in accordance with the requirements of the Railway Transport Committee.

##### **4.5.1. Rules for the safe transport of dangerous goods by rail**

- a) installation, manufacture, and repair of locomotives, wagons, tanks, acceptance, shipments, and trains;
- (b) the preparation of dangerous goods for transport;
- (c) the usefulness of containers and packaging for the transport of dangerous goods;
- (d) the organization of highways and industrial rail transport;
- (d) create general conditions for the safe transport of dangerous goods.

These rules are designed to protect the lives and health of people, protect dangerous goods and protect the environment and property. The rules for refueling dangerous goods, the choice of means for their transportation, the technical and commercial determination of their usefulness for these purposes, as well as the

provision of goods in wagons will comply with the Azerbaijan Railway Rules, Rules for the Transport of Dangerous Goods and other regulatory documents. Private cars specially separated from trucks or wagons can be used to transport dangerous goods to private leased vehicles. For handling dangerous goods transport companies can use special containers in accordance with the standards and technical safety requirements for this product. The design and construction of private cars and containers for the transport of dangerous goods will meet the standards and requirements of technical safety and ensure the safety of goods and transport. After the release of toxic and corrosive substances, the washing and utilization of vehicles are monitored by the head of the station by representatives of technical safety and hygiene bodies in railway transport with the participation of the buyer responsible for the disposal of wastewater. After exhaustion and neutralization, the buyer, who is responsible for cleaning the car, must issue a special certificate of the station, representing Technical and sanitary supervision, for the removal, washing, and removal of people, animals, vovs, food, and other goods. This connection is stored at the station. If there is no detergent and no standard detergent, the station is not accepted. Determination of technical control and utility of cars, working parts, wheelsets, bus connections, rails, brakes and pusher vessels belonging to the sender, is carried out by rail carrier at the station. Warehouses, housing, and equipment of the sender are suitable for the transport of dangerous goods by the sender in writing or in the order of the registered telephone numbers. Before loading a tank or tank container, the contractor must issue a certificate, including fasteners and equipment, to the station and to the store personnel of the cargo or container when leasing the property or property. The certificate number is assigned by vehicle personnel in VU-14, and the sender must indicate the word “yes”, the fasteners and equipment must be in good condition and meet the requirements specified in the fourth column of the Certification. (According to the Ministry of Foreign Affairs of the Turkish city of resettlement, 2000)

#### **4.6. Customs regimes of transportation of dangerous goods in Azerbaijan**

To prevent the possibility of leakage, fire, dangerous goods or other disasters associated with hazardous substances and their physical and chemical properties, as well as the import of dangerous goods in Azerbaijan in accordance with the agreement of ADR. In other words, preventing, managing and transporting dangerous goods

means preventing, transporting vehicles, other people, as well as transporting dangerous substances, direct or indirect contact with the environment or property. When importing hazardous substances into the Republic of Azerbaijan, the transport document must be accompanied by a transport document in cooperation with the Ministry of the Interior (ADR). For some hazardous substances approved by the competent authorities. Transport or packaging of dangerous goods, vehicles or goods must be labeled with the relevant international risk signs at the beginning of this section. Heads of internal and border customs authorities should inform the responsible persons about the customs terminals.

#### **4.7. Accidents in Dangerous Goods Transportation**

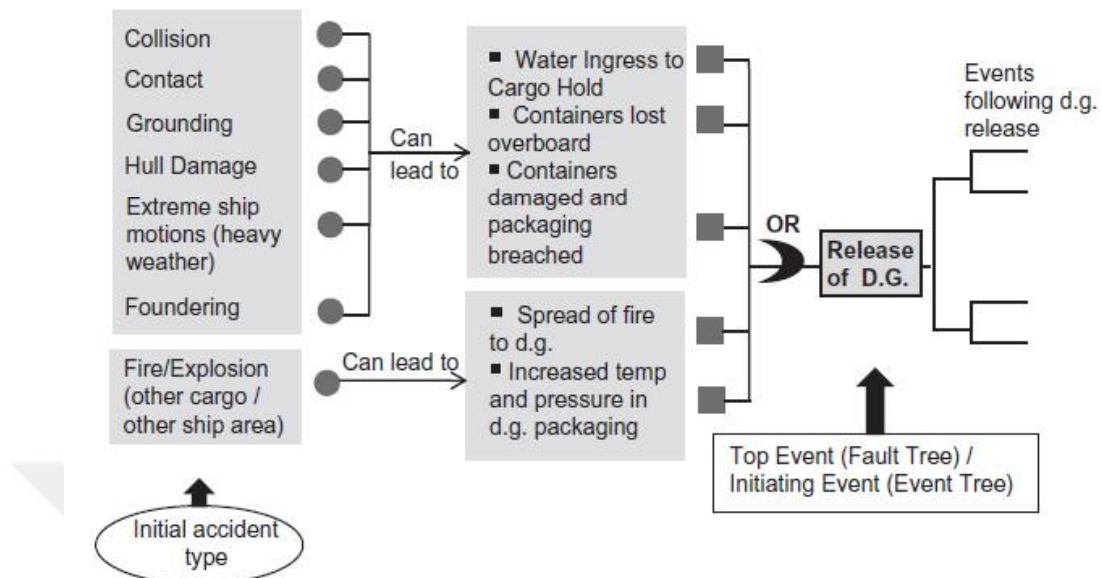
Accidents involving the transport of dangerous goods can cause serious harm to the environment and human life. Therefore, he constantly makes efforts to minimize accidents. Transportation of dangerous goods is by far the largest accident in the world. Some accidents are listed below.

##### **4.7.1. Sea Accidents**

*Israfil Huseynov:* An accident occurred during the second phase of the development of the Shah Deniz gas condensate field in the Azerbaijani sector of the Caspian Sea, which is operated by Italian "Saipem", "Israfil Huseynov". 14 people were injured in the incident. Among the wounded there were citizens of Azerbaijan, Italy, England, Romania, Malaysia and Croatia. The initial cause of the accident was a fire in the pipe production line due to the failure of the equipment. As a result, 14 crew were injured. 7 of them were heavy injured. (azadliq.org, 2019)

*Azərbaycanın 60 illiyi:* In 1983, the so-called "60th anniversary of Azerbaijan" was flooded in the boggy Caspian Sea. According to Kazakh researchers, there are 187 tonnes of diesel fuel and 29 tonnes of oil in the world. In addition, there are other chemicals. If all of them are not removed from the water, the Caspian Sea shores will soon be poisoned. During the monitoring, it became clear that they had already started to infiltrate into smaller quantities of water. (Ekologiya, 2015)

**Figure 13: A simple sequence of events in which dangerous goods are released is followed by another type of primary accident. (Elis, 2010)**



**Table 17: Sea accidents**

Year	Ship name	Cause of accident	Cause Factor	Results
2019	Israfil Huseynov	a fire was caused by the failure of the equipment	Equipment	14 crew were injured
2002	Merkuri-2	Big wave hit the ship, as a result accident was happened	Nature	42 people were died and make a threat to the environment
1983	Azərbaycanın 60 illiyi	Buried in the Caspian Sea	Equipment	there are 187 tons of diesel fuel and 29 tons of oil

The largest shipwreck in Azerbaijan occurred on October 22, 2002. Merkur-2 from the Caspian Sea in Azerbaijan plunged into the Caspian Sea. Most of the 2,100 tons of oil on the ship hit the Caspian Sea. This led to a deterioration in the ecological balance. Oil tanks that remain closed inside the ship may cause a serious environmental problem in the future. The biggest cause of the crash was the onset of a strong wind in the Caspian Sea. The wind blew into the back of the ship, and the front of the ship exploded. Before the launch, the ship was in Kazakhstan in Aktau with good weather

conditions, but all ships were told that the weather would be worse. However, ignoring and separating the captain is a serious problem. 9 crew members were rescued from 42 crew members. There is information about others. The disaster occurred about 130 km from Baku, where the Caspian Sea belongs to Azerbaijan (Ismailov, 2017). As a result, this accident has become the largest accident in Azerbaijan and is still operating due to oil. In this accident, in addition to natural forgiveness, the captain was inexperienced, and the internal maintenance of the ship was the cause of the accident.

#### 4.7.2. Road Accidents

**Table 18: Road accidents**

Year	City	Cause of accident	Cause Factor	Result
2019	Alat-Astara highway	Strong wind	Nature	there were no serious injuries
2018	Qirmizi Korpu	due to the failure of the car's brake system	Equipment	One person died
2018	Telavi-Qombori	a powerful explosion has occurred	Nature	Gasoline was spreaded out to environment
2018	Baku-Sumgayit Highway	Driver lost control	Personal	Driver was injured, also environment was harmed
2017	Jalilabad	Predicted that driver lost control	Personal	4 people was injured
2018	Baku	fire started in the brake system	Equipment	No damage was done
2017	Gazakh	Fire started in the wheel	Equipment	No damage was done
2014	Baku-Guba highway	Driver lost control	Personal	No damage was done

*Alat-Astara highway:* On this road, vehicles carrying dangerous goods, vehicles carrying people or ordinary vehicles always crash on this road. The main reason for this is that the road is really extremely windy. (Alakbarov, 2019)When we look at it, we see that accidents are mostly in winter and autumn months. Especially for hollow trucks, this road is a disaster because empty trucks start to swing too much in windy weather and therefore the driver is inevitable to lose control.

*Qirmizi Korpu:* According to the news of the Azerbaijan State Border Service, the driver of the TIR truck in the border crossing region of Azerbaijan was called for control. When the driver dropped the truck, the truck's brake system suddenly had a problem and the truck started to move. As a result, he fired a secret service officer of the State Border Service in front of the truck. Service officer died at the scene of his injuries. Truck was transported bitumen substances to Georgia. Due to first predicted that the accident occurred due to a failure of the vehicle's brake system. (reyd.az, 2018)

*Telavi-Qombori:* Gasoline truck which belong to SOCAR company crashed on Telavi-Kumtor highway in Georgia's Kakheti region. According to SOCAR Georgia, driver Ilgar Shamilov was slightly injured in the incident. Located at an altitude of 1,650 meters above sea level, the Qombori part of the route is a challenging path. Uneven relief of the highway and unfavorable weather conditions create an emergency situation. As a result of the crash, about 23 tons of gasoline have been spreaded around. (xezerxeber.az, 2018)

*Baku-Sumgayit Highway:* Heavy traffic accident occurred on the section of the highway connecting the Baku-Guba-Russian Federation to the state border highway (Baku-Sumgait highway). According to the State Agency for Automobile and Road Transport, the truck driver, who was driving along the Baku-Sumgait highway, lost control and crossed the road at Bilajari Hill, about 20 meters high. As a result, the driver was hospitalized with severe bodily injuries. During the accident, the road sector suffered serious damage. The cobwebs on the road were broken, and the concrete on the shoulder part of the road collapsed. As a result of the accident, the diesel have been spreaded out to around. A fire extinguisher was brought to the scene to prevent any accidents that could happen and the diesel fuel dispersed on the road was washed with water. During the crash there were no other cars in the overturned part of the truck. (Ali, 2018)

*Jalilabad:* The incident was recorded at the Alat-Astara highway passing through the Jalilabad region. The VAZ-2107 car, driven by Nazim Gasimov, resident of Maslik village of Jalilabad region, collided with the fuel tanker on the opposite side while moving in Astara direction. As a result, two passengers, including a driver, were taken to Jalilabad Region Central Hospital with various injuries. But major reason of accident is being poor road condition. (gununsesi.info, 2017)



*Baku:* A fire broke out in a car carrying petrol in the Narimanov district of Ziya Bunyadov Avenue in Baku. The fire broke out in the brake system. Employees of the Fire Protection Service of the Ministry of Emergency Situations were involved. Expansion of fire was prevented. As a result, No seriously damage was done. (sonxeber.az, 2018)

*Gazakh:* There was a fire in a Mercedes truck carrying gasoline in Gazakh. According to the Western bureau, the incident was recorded in the section of the Baku-Gazakh-Georgia highway passing through Birinci Shikhli village of Gazakh region. The fire started on the wheel of a car. Firefighting vehicles and ambulance service of the Gazakh District Fire Department of the Ministry of Emergency Situations were involved at the scene. The fire was prevented. As a result, the car was damaged. (report.az, 2017)

*Baku-Guba highway:* The failure of the truck caused a serious crash. According to information, during the accident on the 23rd kilometer of the Baku-Guba-Russian border, a truck with a MAZ truck crashed in the direction of Sumgayit while the front wheel of the car exploded. As a result, the driver lost control of the car and crashed into the barrier, crushing the roadside partitions. Although the time of the accident is fully loaded, the flammable substance, that is, the gasoline has not been dispersed. It also prevented the great tragedy during the accident. (news.milli.az, 2014)

#### **4.7.3. Railway accident**

*Bine village:* As a result of the collision of the bus and the train carrying dangerous goods in the village, two people were killed and 40 people were injured. The cause of the accident was that the lights did not work correctly. However, during the observations, it has been discovered that such events can also occur in other railroad crossings. For example, in Keshla settlement, Narimanov district ... Although the railway line in the area is equipped with all the equipment, the failure of the lights to increase the likelihood of an accident. The same situation is experienced in the railroad crossing near the Baku Oil Refinery, located in Nizami district. In such a situation, drivers are starting to act after ignoring the ban on the banner of the light, which eventually jeopardizes their lives. That is, drivers do not know if the lighting cables

are not working properly. (Ali, ADY dəmir yolunda baş verən qəza ilə bağlı məlumat yaydı, 2018)

**Table 19: Rail accidents**

<b>Year</b>	<b>Place</b>	<b>Cause of accident</b>	<b>Cause Factor</b>	<b>Results</b>
2018	Bine village	Railway traffic lights did not work properly	Infrastructure	2 people died from 42 passengers
2012	Lokbatan	Due to a delay in the dispatcher station	Personal	6 people died and 47 people were injured
2014	Hajigabul	7 wagons came off the rails	Infrastructure	Gasoline and motorin were spreaded out to the environment
2014	Keshle settlement	While the train was on the move, the rails were interrupted, and several wheel pairs dropped off	Infrastructure	As a result, 15 wagons filled with fuel were released from the rails
2015	Shamkir	Due to lack of technical equipment, the train collided with a car	Equipment	One person were died and 2 people was injured
2016	Heybat-Buta	As a result of dispatcher irresponsibility, car collided with train	Personal	3 people were injured

*Lokbatan:* The bus "Daewoo" on the route # 124 in Lokbatan collided with the train. 6 people were killed and 47 injured in the incident. Dangerous accidents have occurred in the dispatcher station because of a delay in the shutdown.

*Hajigabul:* An accident occurred on the train train consisting of 43 wagons moving along the Baku-Ujar route in Garasu settlement of Hajigabul district. As a result of the accident, 7 wagons were on the rails. The fuel leaking from the top of the petrol tank was burnt. 62 tonnes of fuel from the rails fueled on the edge of the road. (sonxeber.az, Azərbaycanca baş verən dəhşətli qatar qəzaları, 2018)

*Keshle settlement:* Approximately 15 wagons full of fuel-stuffs have been dropped off and there is a danger of wagons. Located in the village of Keshla, the wagons are located near the houses. But fortunately, there was no other serious problem. (Azmmamedov, 2014)

*Shamkir:* One of the accidents that resulted in the tragedy occurred in Sabirkand village of Shamkir region. The train collided with a minivan in the unprotected crossing of the Baku-Greater Kesik railway line. As a result of the accident one person was killed and two were injured.

*Heybat-Buta:* The transit passage of the railway line of the Azerbaijan Railway closed the railway crossing. However, the female driver of the car of the KIA asked him to hurry and asked to open it. When the dashboard opened, the freight train approached the passage when passing the trolley. The KIA driver has lost his fears and has kept his car on the railway line. As a result, the train hit the car. As a result, 3 people were injured in the car. (xeberle.com, 2018)

#### **4.7.4. Air accident**

*Ganja airport:* On January 25, 1965, the An-8 military transport aircraft crashed while was landing to the Ganja airport. An-8 burned on Ganja oil-and-gas storage facility. As a result, six members were killed. (atv.az, 2015)

*Qakh airport:* Vitaly Gavrilov, the commander of the An-2 aircraft carrying out aviation and chemistry work in the Gakh-Zagatala region, has caused seven more deaths on his own and on board. On May 11, 1974, a cocktail party was set up at the Gakh airport on the runway and with local residents, who were allowed to enter the airport. After that, they went to Zagatala, riding the An-2 plane for a ride. Having returned to Gakh airport at night, Gavrilov crashed into the ground because of the drunkenness. As a result, eight people were killed in the crash. (modern.az, 2015)

**Table 20: Air accidents**

5. Year	Place	Cause of accident	Cause Factor	Results
1965	Ganja airport	the plane crashed into the warehouses of Ganja and burning was happened	Personal	6 staffs died
1974	Qakh airport	Pilot was drunked, as a result he lost control	Personal	7 people died
1995	Nakhchivan airport	the plane started to burn up after taking off	Equipment	48 passenger and 4 crew were died
2005	Heydar Aliyev airport	the right engine of the aircraft has been disrupted	Equipment	19 passengers and 4 crew were died
2011	Afghanistan	hit by terrorists	Attack	9 crew were died

*Nakhchivan airport:* The biggest aviation accident in the history of Azerbaijan's independence was registered on December 5, 1995. On that day, the Tu-134 passenger plane operating on Nakhchivan-Baku fired completely into the open space after a few minutes from the Nakhchivan airport. Four crew members and 48 passengers were killed in the accident. Subsequently, the international commission consisting of Russian and Azerbaijani experts concluded that one of the engines of the TU-134 crash was wrong and the pilots made mistakes during the crash.

*Heydar Aliyev airport:* An 140-100 aircraft belonging to Azerbaijan Airlines (AZAL) crashed several minutes after the Heydar Aliyev airport. It has been determined that the aircraft's right engine has been malfunctioning. Four crew members and 19 passengers were killed in An-140-100 plane crash near the Nardaran settlement.

*Afghanistan:* IL-76 aircraft owned by Azerbaijan's Silk Way airline crashed in Afghanistan's Parvan province. Connection with Baku-Bahram airplane with 18 tons of cargo has been cut off on July 5. It was later discovered that the IL-76 was fired by a Taliban group that fought alongside NATO forces in Afghanistan. As a result, 5 Azerbaijanis and 4 Uzbek citizens were killed on the deck of the cargo plane. (yenixeber.org, 2018)

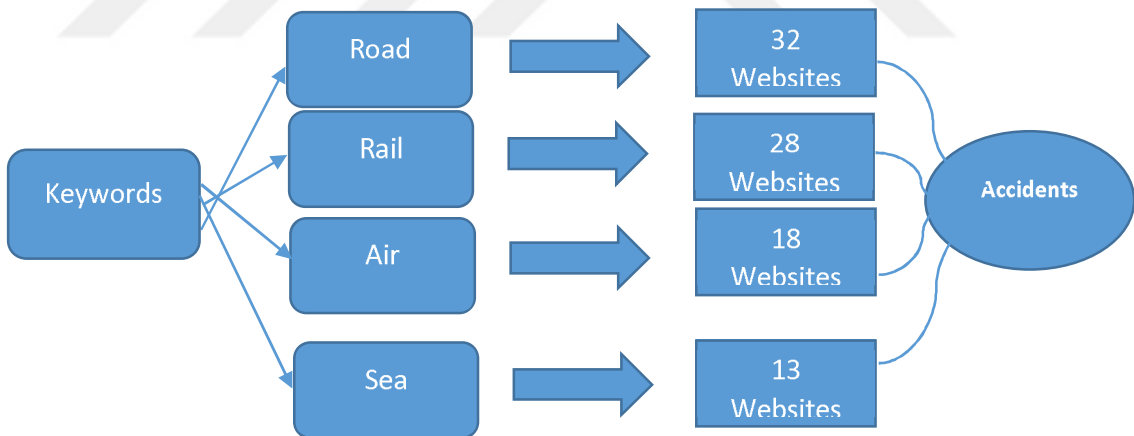
## CHAPTER 5

### FINDINGS

#### 5.1. Results of methodology

In the study, the number of accidents in news sites was taken into consideration by using quantitative method. We can also calculate the number of accidents between years. In the research, we can see which factors cause the accident the most. We can also obtain information about accidents that harm the environment, as well as injuries and deaths. The lowest results are marked in green, and the highest results are marked in red. When we look at the accidents that happened on the railway after 2000, this is due to the increase in rail transport after this year. On the road, the accidents occurred mostly on the Baku-Guba highway, because the highway was not in good condition. The accidents in the sea and the airways occurred especially in 1900 with the lack of good infrastructures. Findings are shown below in 4 transport modes.

**Figure 14: Scheme of Method**



#### *Railway*

While examining railway accidents, 6 accidents were found using a total of 28 sources. In particular, these accidents occurred between the years 2010-2019. Causes of accidents are usually caused by weakness of infrastructure. The number of factors causing these accidents is shown in Table 23.

**Table 21: Numbers of causes of railway accident**

<b>Factors</b>	<b>Numbers</b>
Infrastructure	3
Equipment	1
Workers	2

When we look at the lack of infrastructure and personnel weakness are the most affecting factors. The accidents here have been time to transport dangerous goods. But because of these reasons, the number of accidents in Azerbaijan is increasing during transport of goods and people.

#### *Roadway*

Based on the results I found, road accidents are the most numerous. These accidents were investigated between 2010-2019 as the railway road. For this, 32 sources were used. But the difference between this and the railroad is that there is little human death. Another difference is infrastructure. The road infrastructure is in good condition. However, the factors causing these accidents are shown in Table 24.

**Table 22: Numbers of causes of accidents**

<b>Factors</b>	<b>Numbers</b>
Equipment	3
Nature	2
Workers	3
Infrastructure	2

Considering that Azerbaijan is a windy city, it is a catastrophe for empty trucks on highways and therefore I found 2 accidents. Personal and equipment factors are the most common causes of accidents.

### *Seaway*

Ship accidents are the least accidents. But there have been three major ship accidents in Azerbaijan. These accidents resulted in human deaths. At the same time, the dangerous substances in them are a great threat to the environment. A total of 13 sources were used for these accidents. Two of the accident factors are equipment and one is related to nature. But most accidents are between 2014-2015. There have been 31 accidents in total but there have been minor accidents. These accident factors are shown in table 25.

**Table 23: Ship accidents and reasons between 2014-2015**

<b>Factors</b>	<b>2014</b>	<b>2015</b>
Accident and accident-oriented event	7	9
Fire	1	0
Ship aground	9	5
<b>Total</b>	17	14

### *Airway*

As the Internet results show, 1900. years were the most frequent aircraft accidents in Azerbaijan. The main reason for this can be shown as Azerbaijan being under the auspices of the Soviets at that time. But the cause of the accident is due to most equipment and personal errors.

**Table 24: Air accidents cause factors**

<b>Factors</b>	<b>Numbers</b>
Equipment	3
Workers	3
Attack	1

The number of accidents in the 2000s was only two. One of them was the result of the terrorist attack. As a result, infrastructures of Azerbaijani airways are in very good condition. As a result, the results of environmental damage, deaths and injured are shown in Table 27.

**Table 25: Number of damages**

<b>Damages</b>	<b>Numbers</b>
Environmental damage	7
Deaths	139
Injured	122

## **5.2.Results Of Interview**

Questions were asked under 6 main headings and the results are briefly shown below.

### *Which type transportation type they use?*

According to the results of the survey, railway and road are the most important transportation methods of companies. This is because these types are cheaper than others. Air transportation is the least common method used by companies. This transport is mostly used for the transport of expensive goods.

### *Dangerous goods transportation*

The companies use the transport of dangerous goods very little, mainly because Azerbaijan is under state control. At the same time, since this transportation is from gas and oil, it is rarely used in private companies. Of course it is possible to transport other dangerous goods.

### *Accidents*

There were accidents in transportation in all companies. But most accidents occurred during road transport. There was no accident during the transportation of dangerous goods.

### *New technology*

All of the companies in the survey are using new technologies. What are these technologies? Use of GPS in vehicles, receiving orders over the internet, having information on people's own website to easily obtain transport information, using new vehicles.

### *Workers*

Workers are usually experienced. During recruitment, the CV of the workers is checked, as well as whether they have training in this field or not.

### *Reasons of accident*



Finally, we asked the companies about the reasons for the accident and how they took precautions for this. The causes of the accident were asked under 4 main factors with a 5-point system. These results are shown in table 28.

**Table 26: Result of Questionnaire**

	<b>Transport system</b>	<b>Workers ability</b>	<b>Infrastructure</b>	<b>Equipment</b>
<b>1</b>		✓✓		
<b>2</b>		✓		✓✓✓
<b>3</b>			✓✓	
<b>4</b>	✓✓		✓	
<b>5</b>	✓			

In conclusion, transportation systems and infrastructure are the most common causes of accidents.

In order to reduce accidents, companies often give priority to experienced workers and vehicle maintenance.

## CONCLUSION

Hazardous substances are solid, liquid and gaseous substances which may harm the life spheres and people due to their nature. The development of industrialization day by day increases the use of hazardous substances in this area, thus increasing the production and transportation of hazardous materials in recent years. With this increase, the risks of hazardous substances are handled more carefully and the importance given to this issue is evaluated by many parties such as researchers, enterprises and employees.

The increase in the use of hazardous substances makes the transportation process continuous and regular. However, dangerous goods transport is a matter that should be dealt with more carefully than normal transportation considering the damage to the environment and people in general. The fact that the routes used during the transport of dangerous goods pass through or in the vicinity of the living areas require that the measures taken are more detailed than the other types of transport. Taking the necessary security measures should not be left to the initiative of the people only and use advanced technology in terms of transportation. All measures should be checked regularly in a precise manner. The process of transporting dangerous substances needs to be improved with a calm and advanced management technique. The existing problems should not be evaluated as a whole and a solution should be taken. The only element that needs to be considered for the transport of dangerous substances is not the structure of the product. In addition, many aspects such as distance, cost, personnel training and capability, climate conditions, vehicle structure should be considered. In addition, it is not only the danger of the dangerous substances in the transport process, but also the recycling, disposal or storage of the wastes that occur after the substances used for the production.

Dangerous substances can be transported separately by sea, air, rail and highway transportation modes, or by multi-transport mode which we call intermodal transportation. Despite the presence of a railway with a less risky transport mode in Azerbaijan, a large part of the transport of dangerous goods is realized by road. The availability of road transport in terms of time and controllability is effective for the institutions to choose this type of transportation. In addition, the fact that transportation to many regions can be easily provided by road can be shown as another preferred reason. However, due to the fact that life areas are built around the highways and the

controls in this area are made less than necessary, the existing danger has increased considerably. The low cost of transport of dangerous goods by rail and other transport modes, while providing support for the economic situation of companies, also poses less risk to human and environmental health. However, since the railway infrastructure in Azerbaijan has not reached an adequate level, the fact that there is no access to every desired region in terms of the sender decreases the demand for this form of transport.

During the period from the loading of the substance to the buyer in the transportation of the dangerous goods, all personnel performing the procedures such as sending, packing, loading and unloading are obliged to fulfill the necessary responsibilities. The prevention of potential risks requires sharing of knowledge and experience between individuals and institutions. In this respect, institutions that use both modes of transport should follow a more willing and careful process in order to fulfill their obligations. The loader must be responsible for all stages of the vehicle from the point where the dangerous goods are loaded to the discharge area and ensure that the course is controlled in a controlled manner. Considering that the risk is higher in the transportation of dangerous goods, it is inevitable for the institutions to make a risk assessment. This assessment provides alternative ways of assessing transport standards and flexibility of the carrier, reducing the risk of accidents and improving safety throughout the transport. The most important task in the transportation of dangerous goods falls to the parties who carry out the transport. It is inevitable for the enterprise and the employees to receive all necessary training. All personnel working in the companies producing or transporting dangerous goods should be aware of the risks related to the work done. It starts with knowing all the properties of this conscious substance and being aware of how to intervene in case of any danger. For this reason, it is necessary to raise awareness on the concept of hazardous substances in all employees of the company as well as the training they have taken to receive the SRC 5 (professional qualification certificate) of all dangerous goods carriers. The most basic information on many subjects such as classes of substances, possible damages of these substances, causes and consequences of accidents, national regulations and regulations should be given. All officials who carry out the trade of substances from the bar should carry out their duties in this sense of responsibility.

International regulations on the transport of hazardous substances are in line with international standards in terms of content. However, the lack of adequate infrastructures in our country and the fact that our country is developing economically

makes it difficult to implement the relevant regulations in our country. For this reason, the authorized parties of the state institutions in this field can make a more regular system in terms of the applicability of the rules as well as for the enterprises and by making the relevant regulations suitable for our country. Regulations such as regulations, directives or laws regarding the transport of dangerous substances in our country should be applied more carefully to emphasize the importance of the risk in this area and should make their applications feasible by having serious sanctions. However, the controls and regulations in this field are unfortunately insufficient for our country.

The entire process from the production of hazardous goods to the delivery of the goods is from the beginning to the end of the risks. In particular, the risk assessment of a transportation that could lead to human deaths as a result of an accident can be called the first and most important element of this transportation. When a lot of literature is examined on the world, it is seen that most of the researches in this area are on risk assessment. Unfortunately, the fact that such an important issue in our country as a subject of very little research is an indication that we do not have enough awareness about this issue. The fact that the transport of dangerous goods transported by road in the literature shows less interest in rail transport, which includes less risk and cost. In general, there is not enough research on this subject in the national literature. There is a need for studies to be carried out in this area in order to be a suggestion for institutions and employees by assuming that transport of dangerous goods is possible primarily through education. Prepared by obtaining information from Azerbaijani news sites while investigating accidents.

As a result, it is seen that there is a type of transportation that constitutes a full risk when considering the damages in hazardous material transportation and it should be separated from normal transportation in every field. At this point, the most important task is the employer and the state authorities. If it is thought that the transportation of dangerous goods by highway in our country, the state institutions, which are authorized in the transportation of highways, implement the relevant regulations in detail, by increasing the necessary controls, especially in areas close to the life areas. In order to prevent the slightest errors to be caused by the fact that the relevant documents or the practices that need to be carried out under the control of the state, firms should approach this business more seriously. In terms of companies, employees should not only be limited to the trainings on the concept of hazardous

materials, but also to raise awareness on such issues as seminars and conferences. It is inevitable that the international regulations should have sufficient and detailed contents for this area to be expanded with the help of the state in order to implement them in accordance with the conditions of our country. The establishment of the necessary infrastructure and cost arrangements can help the current demand to be more reasonable. The multiplication of researches not only for the state, but also academically, may provide support for firms operating in this field by offering different views.

### **Suggestions and discussion**

Our study will play an important role in preventing or minimizing possible accidents in the future. The interests of our study can be very important for logistics companies in Azerbaijan. The most important objective of this study is to contribute to the prevention of accidents that cause serious harm to people and the environment. Some suggestions are given according to Incident method and interview results. As we have seen in the research, the most important reasons for accidents are transportation systems, personal abilities, infrastructures and equipment. Therefore, the recommendations will be based on these 4 main reasons. Apart from these reasons, there are also other reasons that cause accidents.

#### *Transportation systems*

Railway and highway are not in good condition in Azerbaijan. There are some precautions to be taken for this. They can minimize accidents even if they are not completely removed. These measures are shown below.

- Use of new technology
- Renovating roads in poor conditions
- Replace road transport by rail
- Establishment of new roads in the mountainous regions of Azerbaijan
- Extend single-sided roads to two and more lane paths
- Improve road lighting

There are disadvantages to replacing the road by rail: the lack of door-to-door access, the lack of access to mountainous areas. But the use of railways in international transport will reduce the risks of accidents.

There are also problems with ports in Azerbaijan. The main problem is that the port is only in Baku. The northern and southern coastal areas of Azerbaijan are suitable for the opening of new ports. The opening of ports here will facilitate transportation in international and local transport, as well as reduce transportation costs.

### *Workers ability*

The inexperienced worker plays an important role in the occurrence of accidents. No matter how beautiful the chauffeur you are, if you do not have the experience of dangerous goods transportation, there is a high probability of an accident. Therefore, there are some options for companies to select workers and to increase the experience of their workers:

- SRC 5 Certificate
- Tests for recruitment of workers
- Tests from time to time to workers
- Researching CVs in recruitment, checking whether they have training in this field
- Workers must be supervised by a certain person
- Young workers upbringing

SRC 5 certificate is a type of certificate which is obligatory for the persons who transport dangerous goods (goods) by road. Every driver carrying chemical, flammable, explosive and similar goods is obliged to drive the vehicle by receiving SRC 5 certificate.

In addition, the equipment of trucks, trains, ships and aircraft should be inspected in a timely manner, correcting the broken parts and checking and replacing spare parts will reduce the risk of accidents.

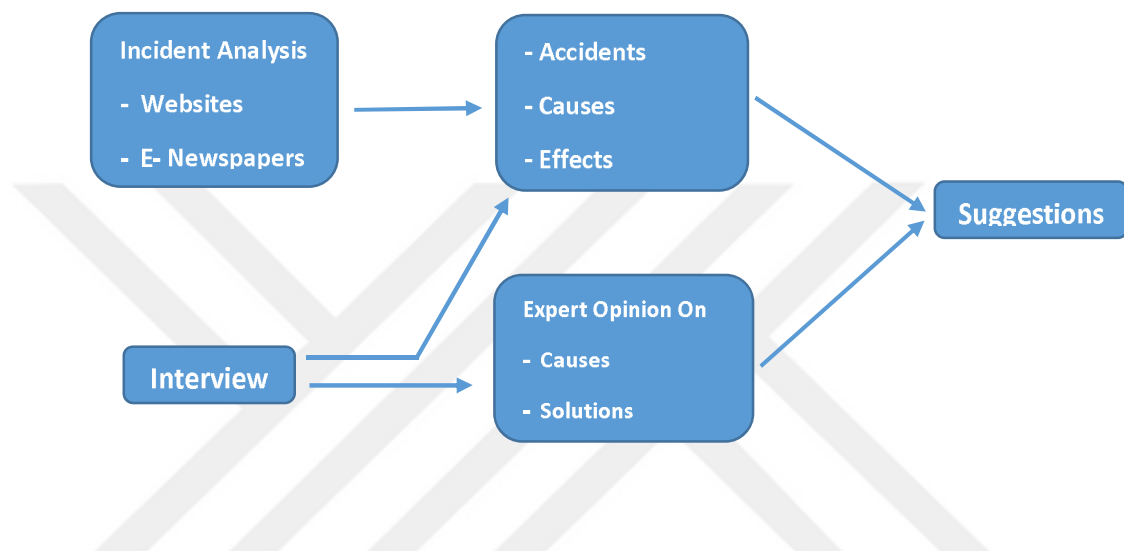
### *Theoretical impacts*

- In this study, firstly the accidents that have been during transportation dangerous goods were analysed.

- Incident analysis method was used to investigate these accidents and their effects as well as the causes of accidents.
- After investigating these accidents, the results of the interviews with experts working in 3 logistics companies in Azerbaijan were verified.

### *Practical impacts*

**Figure 15: Scheme of Practical Impacts**



- The accidents collected from websites and electron newspapers were compiled and their details were emphasized.
- The causes of these accidents will help logistics companies to determine the risks and plans of their operations.
- The solutions and suggestions resulting from the research lead to reducing the accident risks of the stakeholders.

### **Limitation and further research**

There may be some possible limitations in this study. The findings of this study have to be seen in light of some limitations. The first is time constraint. The second limitation concerns the methodological limitations. The results reported herein should be considered in the light of some limitations. The effect estimates in the metologic part of study. There were some restrictions in the news about the accidents. Since there is no detailed information about minor accidents, these accidents are not included in the thesis. In addition, news sites where some accidents published are not trusted and

are not used as a source. There was not enough information about the accidents in the 20th century neither in the electronic newspapers nor in the news sites. Since data interview is done via e-mail, there are restrictions on obtaining the desired results. In addition, because the companies I interviewed belong to Azerbaijan were difficult to access, it was an obstacle for data collection. The aim of the thesis was related to accidents in the transportation of dangerous goods, but the absence of dangerous goods in the companies I interviewed prevented the collection of detailed data in the research. the deadline in the research and the inability to set the appropriate time in the interview with the companies affected the results of the research.

#### *Methodological limitations*

- The records are not regular and reliable, or insufficient,
- Amendment of legislation related to the research topic / title,
- Have a lot of unofficial news sites,
- No interview face to face,
- Most companies do not respond to the e-mail for the interview,
- Not carrying too much dangerous goods by private company,
- Lack of access to some news sites,
- Inadequate information about accidents in the 20th century.

#### *Time constraint*

- Having a thesis deadline,
- To collect data from participants inability to determine the appropriate time,
- The need for the study to be extended over a long period or to be carried out in a short time.

#### *Further research*

Taking into account the limitations, a topic of discussion arises for future work in this direction. Using the Incident analysis method, we were able to find out in detail the causes, when and the consequences of accidents. However, it is possible to conduct



research in a better way by using different methods in future studies. For example, minor accidents that have not been published on news sites in consultation with certain institutions are known. The most important thing to do in this is to control the time well. This time issue is also included in the limitations. Because controlling the time is the most important point that the researcher should pay attention to in each research.



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## APPENDICES

### Appendix-A Informed E-Mail

(The subject e-mail was sent to the selected companies to explain the content of the study and to request a interview appointment.)

Hi, Mr/Mss/Mrs....

I have reached your details on the internet.

I'm trying to complete my thesis. The subject of my thesis is the analysis of accidents during dangerous goods in Azerbaijan.

Purpose of study;

- Researching of Azerbaijan lgistics sector
- Analys of accident during Dangerous Goods Transportation
- Decreasing risk of accidents in Dangerous Goods Transportation

For this purpose, I would like to ask your valuable opinions and experiences in parallel with the attached questions. Since I am abroad, I would appreciate it if you answer the questions on the internet.

Thank you in advance for your cooperation and support, I wish you good work.

## **Appendix B – Discussion Guideline**

- Thanks to participate, we appreciate your taking the time to talk with us again. My name is Namig Asadov, main researcher and my supervisor in Assoc. Prof. Muhittin Hakan Demir.
- Our survey consists of six main questions and I would like you to answer them.
- I want to remind you a bit about the project and what our goal is by talking to you today. Our aim is to understand the problems in the logistics sector of Azerbaijan. In addition to this, it is to investigate the accidents and their causes during dangerous goods transportation.
- I want to assure you that your identity and all information you give us is strictly confidential. We will not attach your name to any comments you make and will change identifying details if we use your information in any report.
- I would also like to point out that this research is not an inquiry that seeks right or wrong, it is a study to understand. Therefore your ideas are very important to us. Please do not hesitate to share your opinion with us.
- Do you have any questions about the project, or about what I have told you so far?

## Appendix C – Questions

### 1) Briefly, please tell us about yourself and your company?

#### Probes:

- What are your company's business activities?
- How would you describe your area of expertise?

### 2) What services does your company have?

### 3) Which transport type do you use the most? and why?

- Airway?
- Seaway?
- Roadway?
- Railway?

### 4) Is there any dangerous goods transportation? Yes/No

- If have, which are them?

### 5) I want to ask questions about accidents

#### Probes:

- How often accidents happen?
- In which type of transport more accidents occur?
- What should be done to reduce accidents

### 6) Do your workers have the ability to work in this company?

- How do you check workers background in hire?
- Do you do exam in hire?
- Are there trainings? If have, how often do you do?

### 7) Which are the reasons of accidents?

- I would like to ask you to vote for the 4 reasons of the accident in the 5-point system

**8) Do you use any special technology in Transportation? And What are them?**

**9) Finally, what do you think about the logistics system of Azerbaijan?**

– Which changes should be?



## Appendix D – List of News sites

Table 27: News sites of road accidents

Road accidents	asiya.az
	bizimxeber.az
	bakupost.az
	avtosfer.az
	faktaz.com
	femida.az
	trend.az
	qaynarinfo.az
	qafqazinfo.az
	bizimxeber.az
	reyd.az
	olke.az
	modern.az
	sputnik.az
	inform.az
	tia.az
	publika.az
	bakupost.az
	deyerler.org
	milli.az
	bakunews.tv
	reyting.az
	gununsesi.org
	musteqil.az
	sonxeber.az
	report.az

**Table 28: News sites of rail accidents**

Rail accidents	bbc.com
	trend.az
	milli.az
	adb.org
	sonxeber.az
	yenixeber.az
	sputnik.az
	deyerler.org
	musavat.com
	fhn.gov.az
	yeniavaz.com
	azadliq.org
	asvision.az
	azadliq.org
	azadinform.az
	xeberagentliyi.com
	azertag.az
	interaztv.com
	azadliq.info
	xeberle.com
faktxeber.com	
aznews.az	

**Table 29: News sites of sea accidents**

Sea accidents	ona.az
	sputnik.az
	amerikaninsesi.org
	musavat.com
	turkiyegazetesi.com.tr
	hurriyet.com.tr
	ens.az
	atv.az
	asanradio.az
	azadliq.org
	alizadeh.narod.ru

**Table 30: News sites of air accidents**

Air accidents	modern.az
	yenixeber.org
	atv.az
	howlingpixel.com
	sfera.az
	deyerler.org
	lent.az
	unikal.org
	emtv.az
	azadliq.info
	azvision.az
	metbuat.az
	azadliq.org
	trend.az
	musavat.com