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Employment of Georgian seafarers and prospects in the world labor market

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Abstract. Seafarer has been recognized as a key profession by world organisations, which means that seafarers play an important role in world socio-economic and other accompanying processes. Despite the efforts of the Council of Europe countries, the flow of European seafarers in the world maritime labor market is still declining. This article discusses the current state of qualifications of Georgian seafarers and the prospects for their employment on the basis of theoretical and practical results, research of current problems in the labor market and practical analysis of ways to solve them.

Keywords: World labor market, Georgian Seafarers, employment, work force.

1. Introduction

Today, the key role of seafarers is clear to everyone at the international level. The presence of highly qualified seafarers, whose performance is regressing in the current labor market, is important for the safe and quality transportation of the growing flow of goods.

The maritime industry is global, so the maritime labor market should also be viewed in a global context. The profession of a seafarer is complex, in addition to knowledge of professional skills, it also involves the mastery of various cultural and social aspects. The world maritime labor market is differentiated and saturated, although a country like Georgia manages to occupy its own niche and compete with representatives of other countries.

March 19, 1876, when the first naval classes opened in Poti, can be considered the starting point of naval education in Georgia. These training programs were focused on training seafarers and navigators. The history of Georgian sailors and their entry into the international labor market dates back to the 19th century. ([1], pp. 5)

The maritime market has undergone a number of changes in the context of technological evolution and economic globalization. After World War II, the transformation of the industry began, which led to the improvement of this profession and raising it to global significance. At the same time,

a unified legal framework and international organizations were created to regulate the activities of the maritime industry, the qualifications of seafarers and safe navigation. ([2], pp. 15-27)

Another key development was the privatization of the navies of Eastern Europe and the former Soviet republics in the 1990s. The Romanian and Georgian navies, which included ineffective and old ships, eventually went bankrupt. Others (for example, the fleets of Yugoslavia, Poland and Germany) faced serious obstacles. The Ukrainian and Russian fleets were looking for a way to refinance and restructure the fleet. As a result, seafarers from the aforementioned countries were forced to find employment on ships flying the flags of other countries. As a result of these processes, up to 60% of Georgian seafarers lost their jobs due to lack of knowledge of foreign languages, which did not allow them to work in international companies.

In the world labor market, there is a tendency towards a reduction in the number of officers and highly qualified seafarers in developed countries. By 2026, a shortage of qualified personnel in the labor market is expected, namely, a personnel shortage of up to 5%. The main reason for this is the less attractiveness of the seafarer profession in developed countries. In the labor market in the same countries, there is a growing demand for marine agents, marine consultants, shipbuilding workers. [3]

These global trends have highlighted the role of Georgian seafarers and their demand in the world labor market. Despite a number of obstacles, maritime education in Georgia is developing more and more. It is important for Georgia to respond to the expected global shortage by 2026 and offer more qualified employees to increase the export of the country's seafarers to the world labor market.

2. Current situation and Global challenges

The maritime sector is global and complex. It is considered one of the fastest growing sectors, which is directly related to world economic processes, since 80% of the world's cargo, about 12 billion tons, is transported by sea. (UN) Therefore, the growth rate of this sector is directly proportional to the world economic indicators, although the representatives of the maritime industry are often not visible in the world arena. Therefore, it is important to advance their role and promote career development.

Notably, the growth of international maritime trade is much higher than the growth of the world population, and it is also interesting to compare maritime trade with the growth rate of the world

economy (see Figure 1). [4] Seaborne trade is clearly in line with global economic growth, according to a Clarkson's Research report. The global demographic picture and market demand directly affect the growth rate of shipping.

Figure 1. World Seaborne Trade & the World Economy correlation

Source: Clarksons Research

The phenomenological model of the global maritime labor market also clearly describes the factors influencing the demand for seafarers in the maritime labor market (see Chart 1).

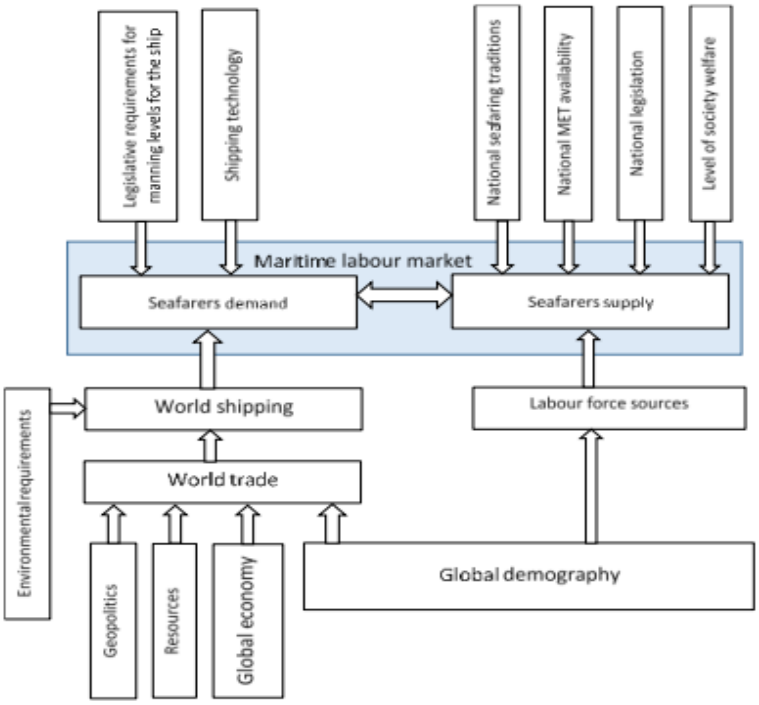

Chart 1. The Phenomenological Model of a Global Maritime Labour Market

Source: Viktoras Sencila, The Phenomenological Model of a Global Maritime Labour Market

According to the above model, the demand of seafarers depends on the types of ships and their number. The number of seafarers and their skill level must meet the requirements to ensure the safety of the ship and its efficient operation. The recruitment of ship crews depends on international and

national legislation, as well as on the automation and development of shipboard technologies. ([5], pp. 3) The cost optimization process has led to a reduction in the number of crews. There were positions on the ship, such as a doctor, a radio operator, etc., that were removed for reasons of efficient operation of the ship.

In the process of globalization and technological evolution, the maritime market has undergone a number of changes: the creation of international organizations, a unified legal framework, criteria that regulate the demand in the maritime labor market. ([6], pp. 15-27) Moreover, in addition, ongoing efforts to optimize costs in the maritime sector have led to the creation of specialized organizations and agencies, which has led to the regulation of the seafarer recruitment process.

Many international organizations and consulting companies, such as Drewry, ECSA, BIMCO, ILO, etc., disseminate statistical information on the state of the world maritime labor market. According to the BIMCO (MANPOWER REPORT), the global seafarer supply increased by 34% between 2005 and 2010, and in 2010-2015 it decreased to 24%. At the same time, according to the report, the world supply of seafarers in 2010 was 1,371,000 (of which: 624,000 officers and 747,000 privates) seafarers, while at that time the world demand was 1,384,000 seafarers. [7]

The geographical distribution of demand for seafarers is as follows: Eastern Europe. Far East and Southeast Asia. The following nationalities are mainly distinguished on the labor market:

Chart 2. The origins of sailors in the World Merchant Fleet for 2015

The origins of sailors in the World Merchant Fleet for 2015

N	Country	Total:	Officers:	Ratings:	% Of total
1	China	243635	101600	142035	14,78
2	Philippines	215500	72500	143000	13,08
3	Indonesia	143702	51237	92465	8,72
4	Russia	97061	47972	49089	5,89
5	India	86084	69908	16176	5,22
6	Ukraine	69000	39000	30000	4,18
7	Turkey	38985	18568	20417	2,36

8	Malaysia	35000	6313	28687	2,13
9	Italy	34486	12988	21498	2,08
10	Norway	33701	14768	18933	2,06
	Total:	997154	434854	433600	60,5

As of 2020, the total number of seafarers working on international merchant ships is 1,647,500, of which 774,000 are officers and 873,500 are private seafarers. [7]

For developing countries, the seafarer profession is attractive primarily because of the high wages and favorable working conditions compared to their countries, as international maritime organizations support the improvement of the proper working conditions for seafarers. As for the average salary of seafarers, it looks like this: (See Chart 3).

Chart 3. Monthly pay for seafarers on dry ships.

Positions	Asian Nationals	Eastern Europeans	EU Nationals	US Nationals
Deck/Engine Cadets	300 - 500	400 - 500	400 - 800	500 - 900
OS/Wiper	700 - 1100	800 - 1100	-	-
AB/Oiler	800 - 1200	800 - 1200	-	-
Cook	1200 - 1600	1800 - 2500	-	-
Bosun/Fitter	1400 - 1800	2000 - 2200	-	-
Electrician	2000 - 3500	2000 - 5000	3500 - 6000	3500 - 6500
4E/3O	1300 - 2800	1300 - 2900	2000 - 4000	2400 - 4200
2O/3E	2000 - 3800	2000 - 4000	3800 - 4800	4000 - 5000
2E/CO	3500 - 7000	3800 - 7000	4200 - 8500	5500 - 11000
MA/CE	5000 - 9500	5500 - 9500	7000 - 11000	8000 - 12000

Source: The Center for Transport Strategies

Chart 4. Monthly pay for sailors on tankers.

Positions	Asian Nationals	Eastern Europeans	EU Nationals	US Nationals
Deck/Engine Cadets	500 - 1000	500 - 1000	700 - 1200	900 - 1200
OS/Wiper	900 - 1500	1000 - 1500	-	-
AB/Oiler	1200 - 1800	1200 - 1800	-	-
Cook	1200 - 2400	2000 - 2500	-	-
Bosun/Fitter/Pumpman	1400 - 2400	2000 - 2200	-	-
El. Engineer	2500 - 4000	3000 - 6000	4000 - 6000	4500 - 7000
4E/3O	2000- 3800	2800 - 4500	2800 - 4500	4000 - 6000
2O/3E	2500 - 4200	4200 - 4300	4000 - 5500	4500 - 7500
2E/CO	6000 - 10000	7000 - 10000	8200 - 11300	8500 - 13000
MA/CE	8000 - 14000	9000 - 15000	9000 - 15000	10000 - 17000

Source: The Center for Transport Strategies

According to a study by the Maritime Zone of the International Maritime Employment Portal, there is a significant pay gap between seafarers around the world. As we know, 90% of the world's fleet operates under a Flag of convenience as shipowners are taxed less and thus reduce operating costs. It was also a positive development in the sense that the seafarers' wage rate was not regulated, which facilitated the employment of low-skilled seafarers. All this led to the recruitment of unskilled personnel on the ships, which, in turn, interfered with the safe operation of the ship. That is why the International Transport Workers' Federation, the ITF, was created, which began to regulate the wages of seafarers on ships floating under such a flag.

According to BIMCO, the world's largest international shipping association, future global demand for seafarers depends on a number of factors, including:

1. A change in the age of the world fleet, which will lead to a change in the number of crew members;
2. Change in the crew formation process, which will be regulated by national and international conventions;
3. The growth of world trade and the global maritime fleet;
4. Improving the efficiency of future ships, which will lead to ship automation and crew reduction

5. Changes in the composition of flags in the world fleet, which will affect the number of crew members.

6. Other.

The global maritime labor market faces a number of challenges related to the future shortage of officers. Moreover, cultural discrimination against seafarers and the protectionist policies of a number of countries are still an obstacle to the seafaring employment process.

BIMCO / ICS MANPOWER REPORT predicts that there will be a shortage of nearly 150,000 employees in the global labor market by 2025. A current shortfall of about 16,500 officers (2.1%), although this figure is growing and lags far behind supply. According to the report, there is also some officer categories are in especially short supply, including engineer officers at management level and officers needed for specialised ships such as chemical, LNG and LPG carriers. BIMCO CEO, Angus Frew, said: "BIMCO and ICS have once again collaborated closely to produce valuable in-depth analysis of maritime manpower trends. The industry can put this report to good use by ensuring we can continue to operate the world merchant fleet with sufficient numbers of qualified and competent seafarers." [8]

The report also mentions the process of development and supporting maritime education, but this was not enough, as if the training /retraining process for seafarers is not accelerated and significantly improved, this will lead to a serious shortage of officers.

3. Current situation in Georgia and future prospects

In November 2014, EMSA - European Maritime Safety Agency, recognized the qualifications and maritime education of Georgian seafarer. This process has led to the popularization of the seafarer's profession in Georgia and the promotion of their employment in the EU countries.

As of today, according to the LEPL - Georgian Maritime Transport Agency, 21,016 seafarers are registered in Georgia, of which 9789 are officers and 11,227 are private seafarers. (See Chart 4.)

Chart 4. Qualified seafarers 2013-2021

Number	***Position***	***Type***
429	Electro Technological Officer (ETO)	An electrical technician for a ship with a main propulsion system of 750 kW or more than 750 kW

965	Captain	Captain of a ship with a total tonnage of 3,000 tonnes or more than 3,000 tonnes
		a total tonnage of less than 500 tonnes
		a total capacity of less than 500-3000 tons
1661	Second Officer	a total tonnage of 500 or more tonnes
		a total tonnage of less than 500 tonnes
845	Second Engineer	a main propulsion system of 3000 kW or up to 3000 kW
		a main propulsion system of 750 kW to 3000 kW
994	First Engineer	a main propulsion system of 750 kW or more than 750 kW
812	Chief Officer	a total tonnage of 3,000 tonnes or more than 3,000 tonnes
		a total capacity of 500 to 3000 tonnes
762	Chief Engineer	a main propulsion system of 3000 kW or up to 3000 kW
		a main propulsion capacity of 750 kW to 3000 kW
6468	**Total**	

Source: LEPL Maritime Transport Agency of Georgia (MTA)

Chart 5. Ratings 2013-2021.

NUMBER	POSITION	TYPE
2		Second engineer of a ship with a main propulsion of less than 750 kw
34		A main propulsion system of less than 750 kw
363		Boatswain
106		Steward
328		Donkeyman
242		Electrician
2863		Ordinary seafarer
309		Cook

1800	wiper
1863	Engineman
3269	Able Seafarer (ab)
48	Fitter
11227	Total

Source: LEPL - Maritime Transport Agency of Georgia (MTA)

It should be noted that Georgian seafarers make a solid contribution to the country's economy every year, as for the year about 381,912,000 million dollars (See. Chart 6).

Chart 6. Income of Georgian Seafarers

Position	***Average salary***	***Working months during the year (average)***	***Average annual income***	***Number of seafarers in Georgia***	***Annual income of Georgian Seafarers***
Captain	12 000	8	96 000	965	92 640 000
Chief Officer	9700	8	77600	812	63011200
Second Officer	4000	8	32000	1661	53152000
Chief Engineer	11 000	8	88 000	762	67056000
Second Engineer	8 000	8	64 000	845	54080000
First Engineer	4 000	8	32 000	994	31808000
Electro Technical Officer (ETO)	5000	8	40000	429	17160000
Total				**6468 Officers**	**286 267 200 $**
Boatswain	2000	6	12000	363	4356000
Cook	2000	6	12000	309	3708000
Ordinary seafarer(OS)	1200	6	7200	2863	20613600
Able seafarer (AB)	1400	6	8400	3269	27459600

Engineman	1400	6	8400	1863	15649200
Wiper	1200	6	7200	1800	12960000
Other	800	6	4800	724	3475200
Total				**11191 ratings**	**88 221 600**
In Total					**381 912 000 $**

The above chart shows that the number of officers and ratings in Georgia is almost equal, 6468 officers and 11191 ratings.

Georgia is a country with a high potential for human resource exports. Public readiness for employment abroad, according to current statistics, in 2021, more than 90,000 people registered for seasonal employment in Germany. Therefore, it is possible to use this potential and popularize the maritime professions, which will direct this flow to higher paid areas such as seafaring.

The results of our research show the following tendency: In the 80% of Crew Manning Agencies operating in Georgia, Most Requested Ranks / Positions of Georgian Seafarers are as below:

1. Captain
2. Chief Officer
3. Second Officer
4. Chief Engineer
5. Second Engineer
6. First Engineer
7. Electro Technical Officer (ETO)
8. Ordinary Seafarer (OS)
9. Able Seafarer (AB)
10. Engineman
11. Cadet

80% of Crew Manning Agencies operating in Georgia have a demand for the following types of ships: Oil Tankers , Chemical Tankers, LPG and LNG, Ccontainer Ships, Bulkers and etc.

Conclusion

Based on the above statistical information and the materials studied, we draw the following conclusions and recommendations:

According to the report of international research institutes, by 2025 it is anticipated that there will be a shortage of qualified seafarers in the maritime labor market, which may be beneficial for Georgia as a shipping country to respond request in a timely manner. For this it is recommended:

1. Maximize the promotion and development of maritime education, especially in the areas indicated by the forecasts (marine engineering / mechanics) and also the increase in the number of qualified personnel.
2. Development of the study of the basic competencies necessary for future officers in order to increase the competitiveness of Georgian seafarers should be strengthened in maritime academies. This can be achieved as a result of the interest of international and Georgian specialists in the educational process and their involvement.
3. In order to develop the educational process, it is recommended to improve the qualifications of the existing teaching staff.
4. The potential of society in terms of employment abroad should be used. It is desirable to popularize the seafarer's profession not only in the region of Western Georgia, but also in the east, which will increase the scale and quality of those wishing to receive a maritime education, which ultimately will contribute to an increase in the number of seafarers in Country.
5. According to statistics, officers bring in Georgia three times more income than ratings, so it is important to increase the number of officers.
6. Due to the process that ships are equipped with more and more modern technologies, the demand for ratings decreases more and the demand for officers increases.
7. Lack of knowledge of foreign languages remains a major challenge for Georgian Ratings and they will try to get jobs in companies with a low reputation, which will damage the reputation of Georgian seafarers.
8. Georgia must sign and join the MLC, which will protect Georgian seafarers and make it more accessible to high-profile shipping companies.

References

[1] Bezhanovi Z. "Illustrated chronicle of Georgia's maritime education" pg.5, 2021.

[2] Bagoulla C., Guillotreau P. Shortage and labor productivity on the global seafaring market. Patrick Chaumette. Seafarers : an international labour market in perspective, Gomylex, pp.15-27, 2016.

[3] Harris R. "Officer shortfall to reach decade high by 2026", Drewry, 2021.

[4] Clarksons Research, "Offshore & Energy, Shipping & Trade, Market Update & Outlook" IUMI 2017.

[5] Sencila V. „The Phenomenological Model of a Global Maritime Labour Market" Pg.3, 2018.

[6] BIMCO MANPOWER REPORT 2015.

[7] BIMCO, Leslea Petersen, "BIMCO/ICS manpower report predicts potential shortage of almost 150,000 officers by 2025" 2016

Problems of Distance Assessment of Students during the COVID-19 Pandemic at BSMA

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Abstract. Due to the restrictions caused by the covid-19 pandemic situation, higher education institutions of Georgia, including Batumi State Maritime Academy, had to move to distance learning within a limited time frame. Remotely was carried out not only teaching (lectures and practical works) but assessment processes as well. The paper discusses the disadvantages of distance assessment based on a one-year survey (done by the authors of the given article), analyses the students' mid-term and final assessment results before and during the pandemic period and suggests possible ways to eliminate them.

Keywords: distance education; distance assessment; preventing cheating.

More than one year has passed since the World Health Organization declared the spreading of Covid 19 as a world pandemic situation (March 11, 2020). Almost every country of the world had to develop and activate restrictions against the fast spreading of the disease. Limitations were carried out in the congregate area as it represents the highest risk of the rapid virus spreading after direct contact with the already diseased person. Free movement was also restricted. Protection people from the pandemic, most countries have tightened and limited the access of foreign citizens to their territories. These restrictions have been carried out even among the EU countries where the citizens of EU member states are allowed to move freely within the EU.

The restrictions caused by the Covid-19 pandemic have created a new, previously unfamiliar reality in the world, which has harmed the economies of citizens and countries and, of course, the education system.

Due to the epidemic situation, the business had to resort and use such tools that minimize the congestion of people in one physical area and provide distance communication while performing professional activities. Existed reality has given a huge opportunity to develop electronic, internet platforms for business management and communication.

Restrictions imposed due to the alarming spread of the Covid-19 epidemic have also affected educational processes. The education system has faced unusual challenges in every country. In particular, the implementation of the educational program, based on the student's industrial training, was at risk. Maritime education is among them where complete and appropriate training of students includes on-board cadet and various simulation training. They are conducted (carried out) in specialized simulation laboratories installed in the maritime academy.

Even the universities having well-developed e-learning resources still consider the traditional, so-called face-to-face learning a more effective form of teaching when a teacher and a student communicate in a classroom, while e-learning is considered as a secondary, auxiliary form. [1].

Professors of Illinois University Bill Cope and Mary Kalantzis critically discuss the weaknesses and negative features of traditional forms of teaching in their scientific paper "COVID-19: Why higher ed may never be the same". They believe that even without the restrictions caused by the COVID-19, forms of traditional teaching would face structural changes, and one of the reasons for this is the increase of the cost [1].

On March 21, 2020, an emergency condition was declared in Georgia to stop the spreading of the COVID-19 pandemic. Based on this fact, the implementation of the traditional face-to-face educational process in classrooms, laboratories, simulation classes, etc., was restricted at schools and high educational institutions. Remarkably, BSMA managed to transfer the educational process (lectures and practical training) from face-to-face to distance learning platforms in very little time.

The methodological side of effective distance learning has been left out of proper attention due to the existence of other immediately solved issues. However, it should also be noted that the Maritime Academy has prepared a distance learning platform and trained its academic staff in a very short period, and the academic staff has also been able to digitize the necessary training resources for lectures and practical works very quickly. The distance learning platform was used to deliver learning materials smoothly to the students. In the process of online teaching, the lecture format has not been changed in general (in fact), while conducting the practice works with students were significantly limited, as there was no opportunity for students to be actively involved in training courses, where practical tasks are solved in writing forms (at the whiteboard) by demonstrating to the group. The problem was mainly caused by 2 reasons: the student was using a smartphone internet to attend the course (most students do not have a proper computer device) or the student was unable to write quickly on the virtual board of the ZOOM platform (BSMA uses the ZOOM platform for distance learning).

The most visible indicator of the effectiveness of any teaching, including the distance learning process, is the assessment of students' knowledge and skills. All courses are designed only with appropriate forms of evaluation, given in the course syllabus. The choice of assessment forms depends on the course objectives and the content of the learning outcomes set in the course. When the assessment forms of student knowledge and skills are chosen correctly, then it is easy for the professor to identify student learning strengths and weaknesses and improve the quality of teaching based on them.

The accelerated transfer of the learning process from face-to-face to the distance was carried out without any methodological training at BSMA, i.e., lectures and practical works/training conducted by the teachers took place almost the same way as in the classroom, face-to-face teaching process. Many educational researchers believe that such kind of copping of face-to-face learning modalities is less effective in distance learning: „Often reluctantly and in a piecemeal fashion, many colleges have tried to migrate their traditional practices online. They have made awkward attempts to replicate the traditional classroom with video lectures, e-textbooks, online tests, and learning management systems that look like old-fashioned syllabuses. The result is often a step back into all that was wrong with didactic modes of teaching"[1].

A similar point of view can be expressed about the classroom and distance assessment methods used for evaluating a student's knowledge and skills. Assessment in the classroom is carried out under the overall control of the teacher, while in the case of distance assessment the supervision of the professor to a similar degree is associated with fulfillment of several prerequisites, the first of all, all students should have appropriate computer equipment and good quality Internet, which is practically impossible to a significant number of students due to their economic conditions. Surveys showed that most of the students attending the classes online used smartphones and mobile internet, which means that their possibilities for full-fledged participation in the learning process were very limited. To avoid unwanted disorientation of students in the extreme conditions caused by pandemic restrictions and to minimize their discomfort, the structure of pre-pandemic final assessment has remained for most of the learning courses. In particular, the student's final assessment is formed by summing up the Midterm Assessment and Finale Examination.

A midterm assessment is formed by summing up the rating assessment, performed by the teacher, and computerized adaptive testing - CAT conducted by the assessment and examination

center. A midterm assessment is formed by the student based on the course assimilation during the semester, which is carried out by the course teacher.

At the end of the semester, after the completion of the educational process, the final assessment is obtained by the student only after getting the written examination (Final Examination) score. Exam questions are selected based on the learning outcomes of the study course. A limited amount of time is allocated for the completion of the examination task and the examination is organized by the assessment and examination center of Maritime Academy.

Because of the increasing interest and importance of distance learning, the pros and cons of distance assessment of a student's knowledge are often discussed in the scientific literature, and the most relevant issue is the degree of reliability of distance assessment. Neil C. Rowe from Naval postgraduate School remarks that: "When a student scores well for an online assessment, does that mean that they know the material? This question is becoming increasingly important as online distance-learning programs become popular. While traditional paper-and-pencil assessments of students can be done in distance-learning programs, it is appealing to think that technology can both teach material and assess learning. The traditional assessment also requires costs: the time of human proctors, care in the control of the assessment materials before and after administration, and grading effort, all of which are simplified in online assessment. But can we trust the results?" And there he answers that "Unfortunately, often we cannot" [2]. A similar opinion is expressed by other researchers, for example: Ford believes that everyone lies at one time or another [3].

Some researchers point out that academic cheating is a common occurrence in education [4; 5; 6]. Bushweller presents very alarming statistics in his paper, according to which 70% of American high school seniors admit to cheating on at least one test, and 95% of the students who said they cheated were never caught [7]. Many other studies can be used to prove that academic cheating is a common phenomenon in higher education. Some researchers believe that the cases of cheating are even higher when the communication between the examiner and the student is weakened due to poor internet or poor computer equipment. Unfortunately, such cases are often accessed by unscrupulous students „Cheating also has been observed to increase as the bandwidth (information per second) of the communications channel between assessor and assessee decreases; that is, people who feel more "distant" cheat more" [8, 9].

Cases of cheating in the examination process existed even before the advent of distance learning but were not so many as in distance assessment, and the main reason for this is the weakness

of the examiner's control over the assessment process. The distance assessment in the examination process is much weaker because of the examiner's improper control than face-to-face assessment in the classroom. Due to the inability of the examiner to establish total control, the student may use various prohibited acts for passing the exam:

- in advance prepared, readymade notes for correct answers;
- readymade answers received via internet resources;
- help of a groupmate student either online or through direct communication;
- help of the third person in the same way as given in the previous paragraph;
- help of another person to take an exam instead of him/her (in case if there is not any type of face identification and/or IP control), etc.

Beside the above-mentioned fact, a student also tries to present so-called "unexpected factors" to avoid the already scheduled exam in order not to get an undesirable mark (grade) and asks to retake (repass) it later. These factors are:

- Bad internet;
- Emergency power cutoff;
- Bad or poor-quality internet connection device (smartphone, poor quality computer, no copier, no video camera, or audio device, etc.);
- Poor social or living conditions;
- Illness or incapacity; etc.

Diagrams of 7 different learning courses in the Maritime Education Programme are given below, showing and comparing the assessment process before the pandemic (blue diagrams) and during the pandemic (orange diagrams) period of studies. The data of a large group of students (on average 200 students per course) are used for comparison. The number of students is presented in percentage according to the received points (marks) and categories.

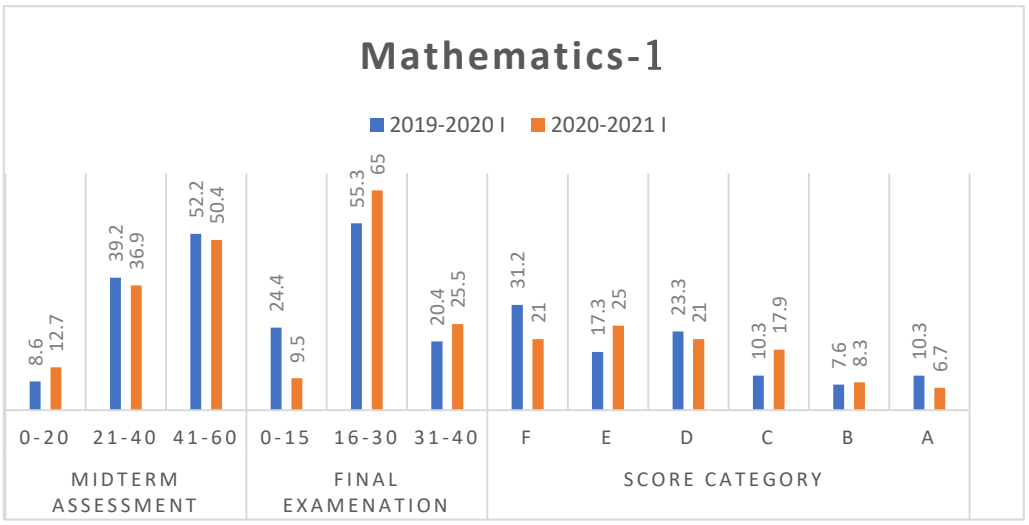

Diagram 1. The number of students not admitted to the final exam increased by 4%; The number of students who failed the final exam decreased by 15%; The number of students who failed the course decreased by 10.2%;

Midterm assessment: 45 points - writing exam; 15 points - CAT.

Final exam: 40 points - Math. tasks.

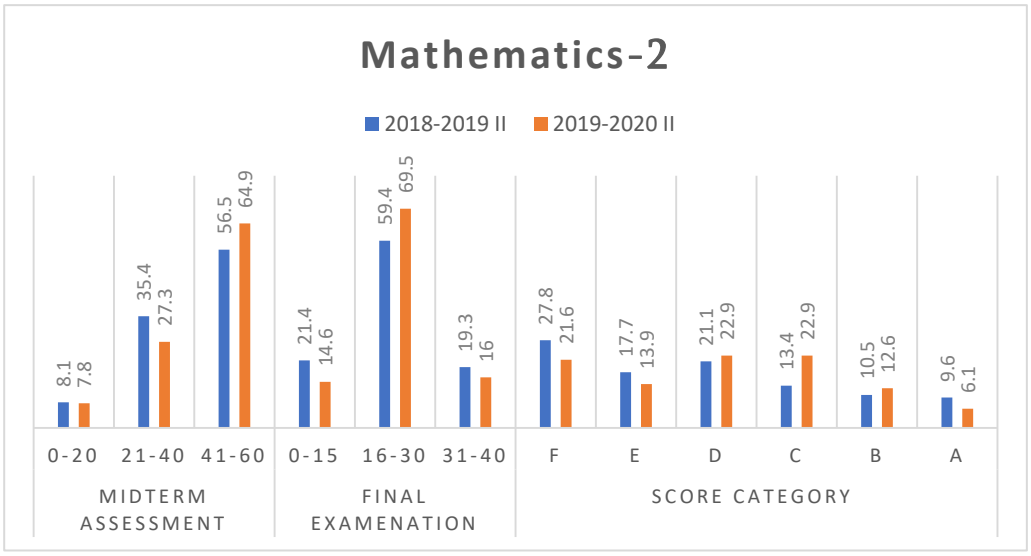

Diagram 2. The number of students not admitted to the final exam has practically not changed; The number of students who failed the final exam decreased by 6.8%; The number of students who failed the course decreased by 6.2%;

Midterm assessment: 45 points - writing exam; 15 points - CAT.

Final exam: 40 points - Math. tasks.

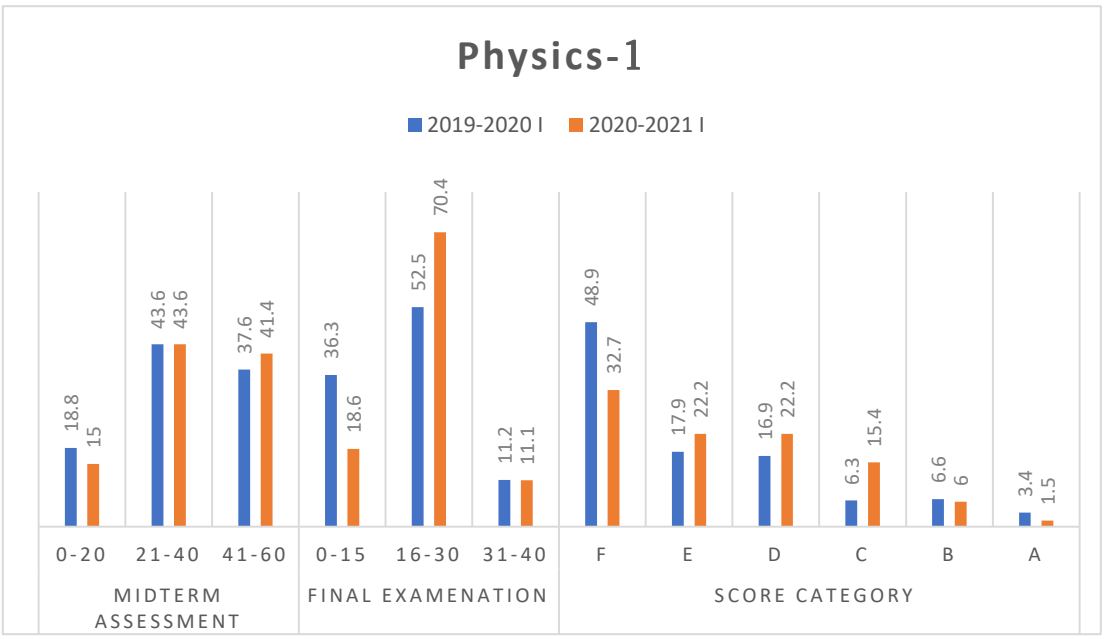

Diagram 3. The number of students not admitted to the final exam decreased by 3.8%; The number of students who failed the final exam decreased by 17.7%; The number of students who failed the course decreased by 16.2%;

Midterm assessment: 30 points - writing exam; 15-point - laboratory work; 15 points - CAT;

Final exam: 40 points - Physics tasks.

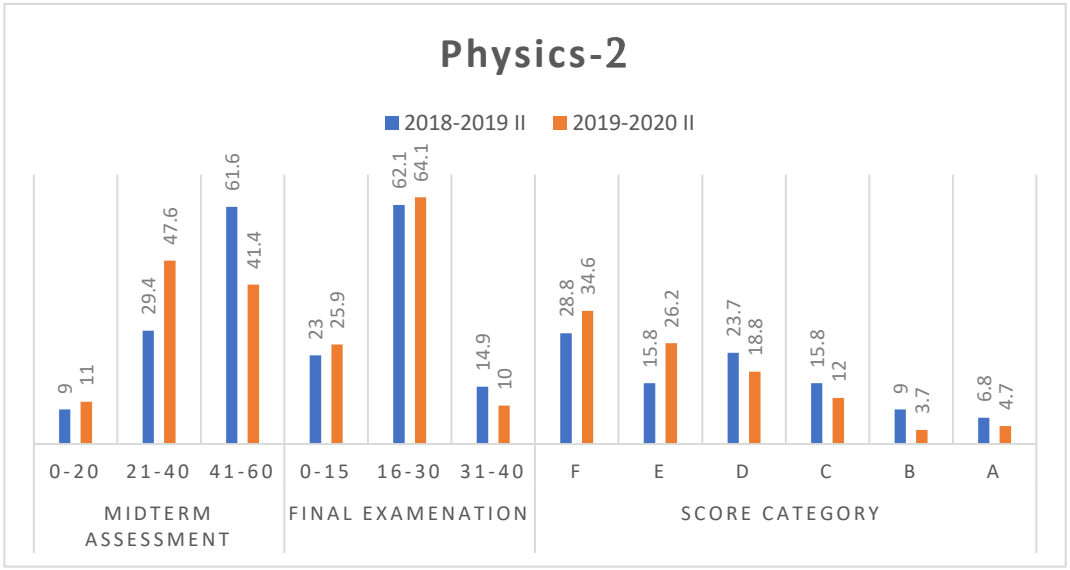

Diagram 4. The number of students not admitted to the final exam increased by 2%; The number of students who failed the final exam increased by 2.9%; The number of students who failed the course increased by 5.8%;

Midterm assessment: 30 points - writing and oral exam; 15-point - laboratory work; 15 points - CAT;

Final exam: 40 points - Physics tasks.

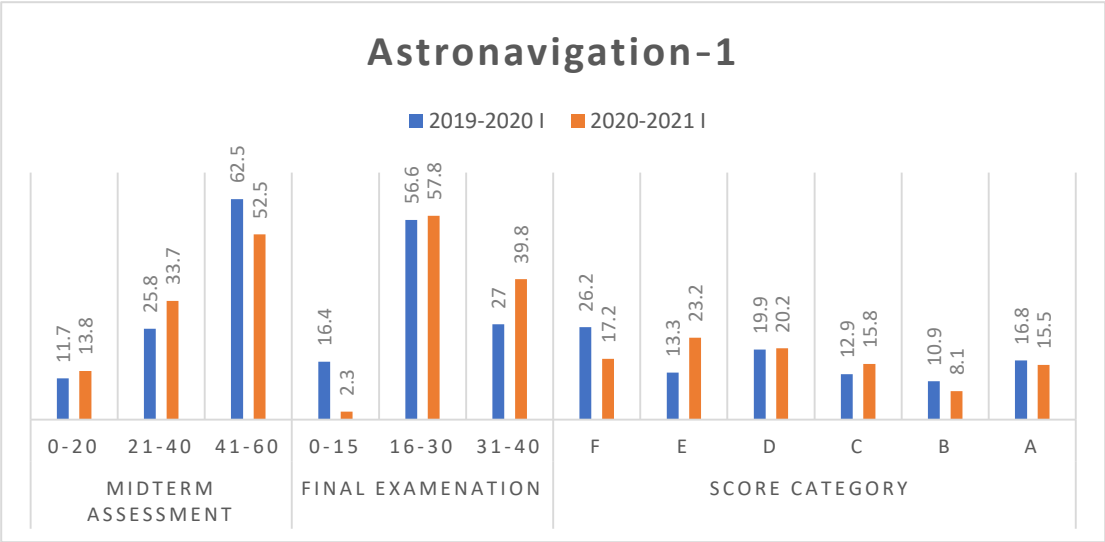

Diagram 5. The number of students not admitted to the final exam increased by 2.1%; The number of students who failed the final exam decreased by 14.1%; The number of students who failed the course decreased by 9%;

Midterm assessment: 45 points - writing exam; 15 points - CAT;

Final exam: 17 points - theoretical question; 23 points - Astronavigation tasks.

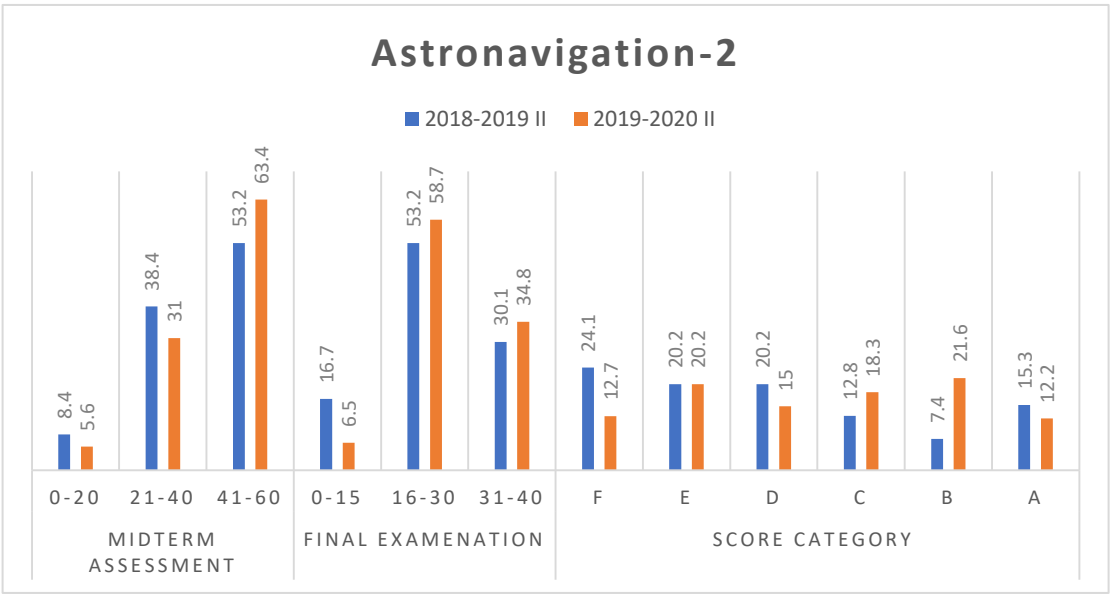

Diagram 6. The number of students not admitted to the final exam decreased by 2.8%; The number of students who failed the final exam decreased by 10.2%; The number of students who failed the course decreased by 11.4%;

Midterm assessment: 45 points - writing exam; 15 points - CAT;

Final exam: 40 points - Astronavigation tasks.

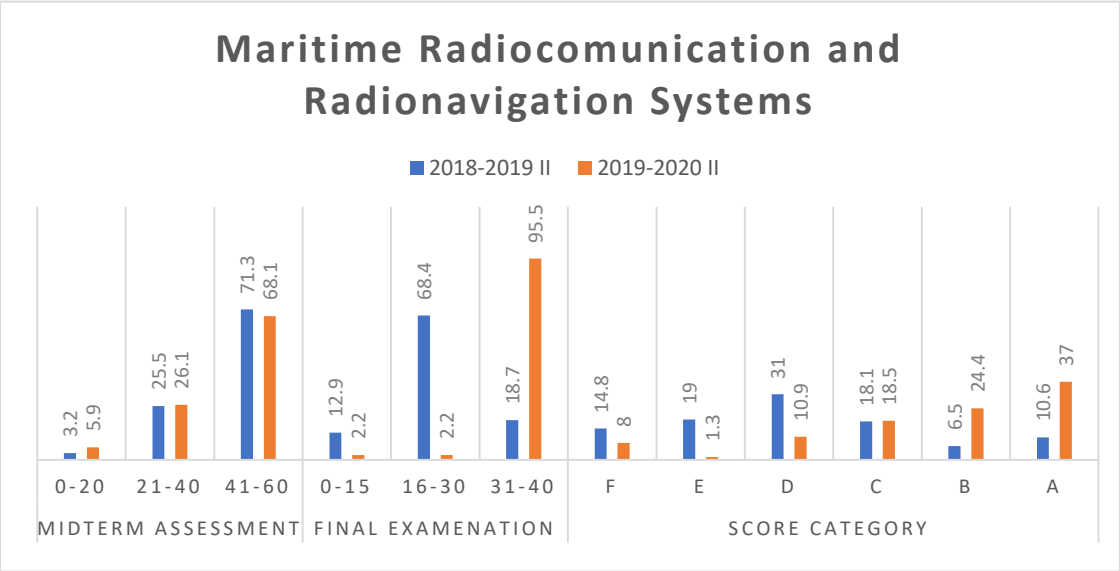

Diagram 7. The number of students not admitted to the final exam increased by 2.7%; The number of students who failed the final exam decreased by 10.7%; The number of students who failed the course decreased by 6.8%; The number of students with 31-40 points has increased.

Midterm assessment: 45 points - writing exam; 15 points - CAT;

Final exam: 40 points - theoretical questions.

Conclusions: The presented statistics brightly show the changes of assessment distribution in the different students' groups before the pandemic, before starting a distance learning, and during the pandemic period, when the teaching and assessment process was conducted (carried out) remotely:

- Decreased the number of students who were not able to take a minimum competency for admission to the final exam (except Math-1, Physics-2, and Astronavigation-1);
- Decreased the number of students who failed the final exam (except Physics-2);
- Decreased the number of students who failed the learning course (except Physics-2)

The improved changes in the distribution of students assessment can be explained:

- During the distance learning, the students assimilated the learning material better and reached proper learning outcomes, which does not seem real;
- In the process of distance assessment, the students used unpermitted resources and achieved the desired points (grades) by using various illegal actions;
- The difference in assessment (marks) is high in the exams, where students' only theoretical knowledge was evaluated, and relatively low in exams where the student was required to solve different types of quantitative tasks;

As mentioned above, the improved changes in the assessment results of students are likely to be caused by uncontrolled usage of prohibited resources during distance learning by students, so to reduce and/or avoid inconsistencies during the assessment process, we consider to:

- Pay more attention to students explaining to them the unacceptability and harm of cheating in examination papers;
- Develop and implement effective mechanisms for cheating detection;
- Use such kind of distance assessment forms, where the effect of cheating decreases to the minimum;
- Use such kind of distance assessment forms that minimize the effect of cheating;
- Develop the combined, interrelated methods of distance learning and assessment;
- If possible, it is recommended to conduct exams not remotely but face to face, under the supervision of an examiner at university.

References

[1] Cope B., Kalantzis M. "COVID-19: Why higher ed may never be the same", April 2, 2020. https://universitybusiness.com/covid-19-why-higher-ed-may-never-be-the-same/;

[2] Rowe, Neil C. "Cheating in Online Student Assessment: Beyond Plagiarism". On-Line Journal of Distance Learning Administration, Summer 2004. http://hdl.handle.net/10945/36015;

[3] Ford, C. (1996). Lies! Lies!! Lies!!! The psychology of deceit. Washington, DC: The American Psychiatric Press;

[4] Cizek, G. J. (1999). Cheating on tests: how to do it, detect it, and prevent it. Mahwah, NJ: Lawrence Erlbaum;

[5] Dick, M., Sheard, J., Bareiss, C., Carter, J., Joyce, D., Harding, T., & Laxer, C. (2003, June). Addressing student cheating: definitions and solutions. ACM SIGCSE Bulletin, 35(2), 172-184;

[6] Lathrop, A., & Foss, K. (2000). Student cheating and plagiarism in the Internet era: a wake-up call. Englewood, CO: Libraries Unlimited;

[7] Bushweller, K. (1999, April). Generation of cheaters. The American School Board Journal, 186(4), pp. 24-32;

[8] Moore, M., Lockee, B. & Burton, J. (2002). Measuring Success: Evaluation Strategies for Distance Education. Educause Quarterly, 25-1, 20-26. Retrieved November 17, 2013 from http://www.editlib.org/p/92835;

[9] Burgoon, J., Stoner, M., Bonito, J., & Dunbar, N. (2003, January). Trust and deception in mediated communication. 36th Hawaii Intl. Conf. on Systems Sciences, 44a.

Prospects of Georgia becoming EU member in context of economic development trends

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Abstract. In this article we discuss accession criteria for EU membership - the Copenhagen Criteria. We largely focus on and critically analyze Georgia's the economic development level and modern trends. Using the recent data published by international, regional, and local institutions we analyzed macroeconomic measures and international rankings of EU countries and Georgia.

Based on qualitative and quantitative research approaches, we conclude that Georgia's recent economic levels and economic development trends, unfortunately, don't satisfy the Copenhagen economic criteria and it can be a delay factor for Georgia's EU integration. In this paper, we present recommendations, a satisfaction of which will facilitate fulfillment of the Copenhagen Criteria by Georgia and speed up the process of Georgia joining the EU.

Keywords: European Union (EU), Integration, Copenhagen Criteria, GDP, GDP per Capita, Unemployment Rate, Inflation, Human Development Index.

One of the main aspirations of Georgia at this stage of state-building is to occupy a worthy place in the civilized world. The main objective of the Georgian society - full integration in the European and Euro-Atlantic space - is clearly stated in the constitution and remains an unshakable position. The latest poll published on January 16, 2020, by the US National Democratic Institute once again confirms that 82% of the Georgians support EU membership [1]. For this reason, despite the several government changes over the last 30 years, Georgia's foreign policy has not changed. Every government promises the Georgian society to join the European Union as soon as possible.

Since its independence, Georgia has moved forward toward EU integration. The main achievements are the signing of the Georgia-EU Association Agreement on June 27, 2014. including its key component - the Deep and Comprehensive Free Trade Area and visa liberalization, supported by the European Parliament on February 2, 2017, based on which the visa-free travel in the EU/Schengen Zone was introduced on March 28, 2017 [2]. Nevertheless, the timing and dating of

full-fledged EU integration (EU membership) are still unclear for several reasons. The final decision on whether to admit new members is made by the EU itself. Nevertheless, it largely depends on the willingness of the candidate country (in this case, Georgia) to meet the eligibility requirements. Among such requirements, the most important is the accession criteria (the so-called Copenhagen Criteria), agreed at the Copenhagen Convention of the European Council (Denmark, Copenhagen June 1993). The Copenhagen criteria are divided into three groups: political, economic, and legal. In this article we will focus on the economic criteria, which evaluates [3]:

- ✓ Functioning market economy;
- ✓ A level of economic development with the capability to cope with competitive pressure and market forces within the EU market

A functioning market economy requires:

- ✓ High quality of economic governance;
- ✓ Macroeconomic stability (price stability, as well as the sustainable public finances and foreign accounts);
- ✓ Proper functioning of the market of goods and services (including business environment, state influence on the product market, as well as privatization and restructuring);
- ✓ Proper functioning of financial markets (financial stability and access to finance);
- ✓ Effective functioning of the labor market

As for the second group of economic criteria related to being competitive in the EU market, it requires:

- ✓ a sufficient human capital, education, research, innovation, and future developments in the field;
- ✓ a sufficient quantity and quality of infrastructure and physical capital;
- ✓ relevant enterprise structure in the economy and changes in the sector, including the role of Small and medium-sized enterprises;
- ✓ a sufficient degree and pace of economic integration with the EU and price competitiveness.

It is crucial for the country wanting to join the EU to approximate its economic indicators to the EU countries. Therefore, to study Georgian economic development trends, comparative analysis of economic indicators, and the assessment of the degree of compliance of Georgia with the Copenhagen criteria based on economic development indicators is a very important issue.

To assess Georgia's economic development trends and prospects for EU membership, we used macroeconomic indicators such as gross domestic product (GDP), GDP per capita, core inflation, and unemployment, also, analysis of Georgia's positions in the rankings published by authoritative international institutions, such as the United Nations Human Development Index.

First, we analyzed macroeconomic indicators of EU member states and Georgia from 2015, to 2019.

Table 1. Macroeconomic indicators of EU countries and Georgia (2015,2017,2019)

country		**GDP, billion USD [4]**			**GDP growth, Annual % [5]**			**GDP per capita, USD [6]**		
Year		2015	201 7	2019	2015	201 7	2019	2015	201 7	2019
1.	Germany	3361	3666	3 846	1.7	2.5	0.6	45 321	46 916	47 628
2.	France	2438	2595	2 7 16	1.1	2.3	1.5	41 793	43 015	44 317
3.	Italy	1836	1962	2001	0.8	1.7	0.3	33 961	35 086	35 613
4.	Spain	1195	1313	1394	3.9	2.9	2.0	30,550	32 283	33 350
5.	Netherlands	765	834	909	2.0	2.9	1.8	51 871	53 942	55,690
6.	Poland	478	526	592	3.8	4.9	4.1	14 646	15 845	17 387
7.	Sweden	505	515	5 31	4.5	2.6	1.2	56 340	57 467	57 975
8.	Belgium	462	504	530	2.0	1.9	1.4	45 503	46 638	47 540
9.	Austria	382	418	446	1.0	2.3	1.6	47 789	49 112	50 654
10.	Ireland	292	336	38 9	25.1	8.1	5.6	65 433	71 756	79 703
11.	Denmark	302	329	3 48	2.3	2.0	2.4	60 402	62 733	65 147
12.	Finland	234	255	269	0.5	3.1	1.0	45 657	45 087	49 241
13.	Romania	178	212	2 50	3.9	7.1	4.08	9 712	11 029	12 131
14.	Czechia	187	216	24 7	5.3	4.4	2.6	21 382	22 755	23 834
15.	Portugal	199	221	238	1.8	3.5	2.6	22 018	23 381	24 590
16.	Greece	197	204	21 0	-0.4	1.5	1.9	22 615	23 053	24 024
17.	Hungary	125	142	1 62	3.8	4.3	4.9	14 746	15 810	17 466
18.	Slovakia	89	96	105	4.8	3.0	2.4	18 897	19 830	21 039
19.	Luxembourg	58	64	71	4.3	1.8	2.3	107500	109,000	111062

20.	Bulgaria	51	59	70	4.0	3.5	3.4	7 661	8 351	9 026
21.	Croatia	50	55	61	2.4	3.1	2.9	14 112	15 350	19 906
22.	Lithuania	41	48	54	3.5	4.2	3.9	15 350	16 855	18 427
23.	Slovenia	43	49	54	3.1	4.1	2.4	23826	25 722	27 152
24.	Latvia	27	30	34	3.3	3.8	2.2	14 347	15 430	16 697
25.	Estonia	23	27	31	1.8	5.7	4.3	17 634	19 109	20 742
26.	Cyprus	20	23	25	3.4	4.4	3.2	27 898	30,650	32 093
27.	Malta	11	13	15	10.9	6.5	4.5	25 898	27 751	28943
28.	**Georgia**	**15**	**16**	**18**	**3.0**	**4.8**	**5.1**	**4 186**	**4 512**	**4 986**
29.	**European Union**	**13547**	**14736**	**15932**	**2.1**	**2.7**	**1.5**	**34357**	**35 890**	**37 104**
30.	**World**	**75199**	**81229**	**87698**	**2.9**	**3.2**	**2.5**	**10247**	**10817**	**11 429**

GDP. In terms of GDP, Georgia is ahead of Malta, a territorially small country located on the Mediterranean islands, and has a 7.5 times smaller population than Georgia (Table 1; Fig 1A). (514,564 and 3,720,392 people in 2019, respectively) [7,8]. The GDP of the second smallest EU state, Cyprus is 7 billion US dollars more than the GDP of Georgia (39% smaller). Georgia lags the former Soviet republics, Estonia, by $ 13 billion (72.2%) in terms of GDP, Latvia - by $ 16 billion (88.9% smaller), and Lithuania - $ 36 billion (3 times smaller). Not to mention the large EU states, the lag is even more striking in relation to other small member states.

GDP annual growth rate. Georgia's annual GDP growth rate constituted 5.1 % in 2019, thus surpasses many EU countries (Table 1). A relatively high GDP growth rate is satisfactory but translated to the actual growth, the Georgian economy grew by only USD 2 billion from 2017 to 2019, and in four years, from 2015 to 2019 by only USD 3 billion (Fig 1B). In the same period, Estonia's economy grew by USD 8 billion (2.7 times more), Latvia - USD 7 billion, Lithuania - USD 13 billion, Bulgaria - USD 18 billion, Romania - 72 billion US dollars. The growth rate of most EU member states is even higher. Poland's economic growth rate is the same as in 2015-2019 amounted to USD 114 billion.

We conclude that Georgia's economic development trends aren't sufficient to meet the EU economic accession criteria.

GDP per capita. GDP per capita measures a product value per person and is considered one of the best measures of prosperity. According to the data presented in Table 1, Georgia's GDP per capita was USD 4986. It is currently a fraction of what it is in the leading EU countries. Comparing to Bulgaria, with the lowest GDP per capita in the EU with USD 9,026 in 2019, the GDP per capita of Georgia is two times smaller. Georgia has 2.4 times smaller GDP per capita than Romania, 3.3 times smaller than Latvia, 3.7 times smaller than Lithuania, 4.2 times smaller than Estonia, 9.6 times smaller than Germany, 13 times smaller than Denmark, 22.3 times smaller than Luxembourg, and 7.4 times smaller than the EU average (in 2019, GDP per capita was USD 37,104). Georgia also lags far behind the world average (according to 2019 data, world GDP per capita was 11,429 USD).

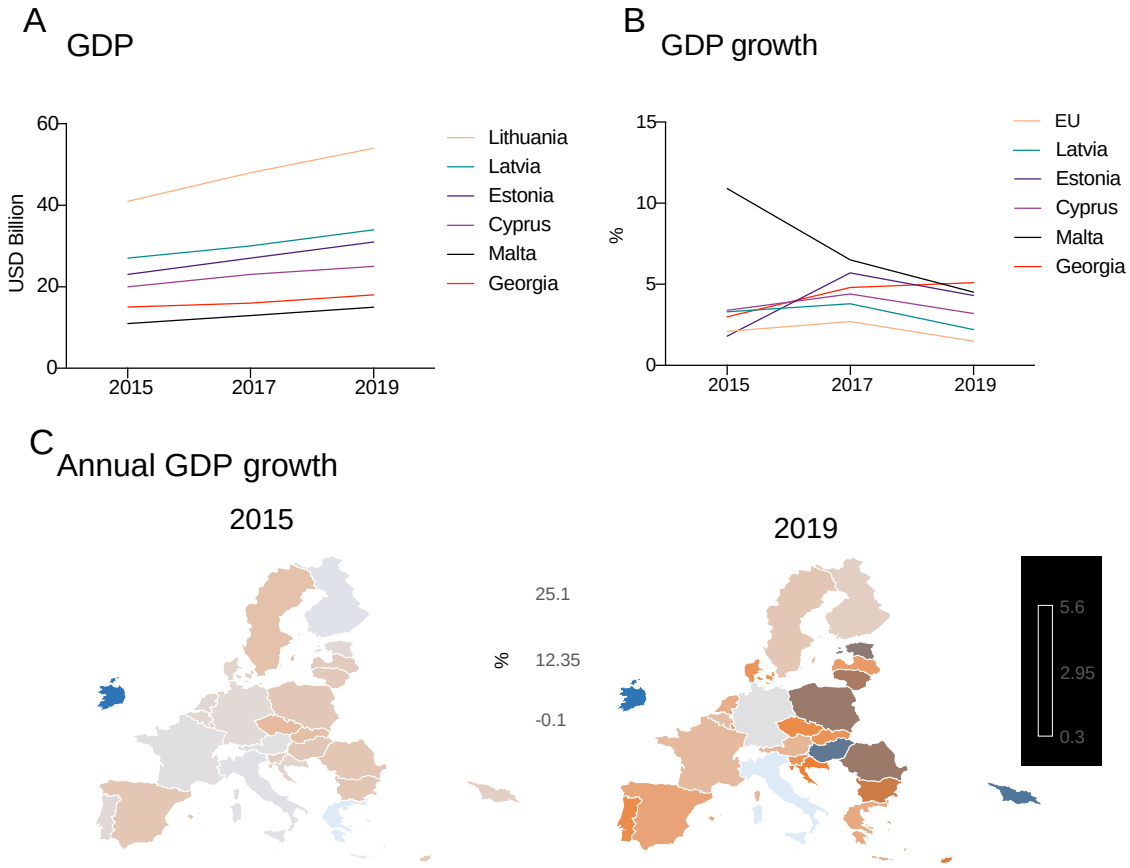

Fig 1. GDP and annual GDP growth in EU and Georgia. A. Comparison of GDP between Georgia and EU states in 2015-2019. B. Graph represents annual GFP growth of Georgia and EU states in 2015-2019 years. C. Annual GDP growth geographic heatmap in 2015 and 2019.

The GDP per capita in Georgia increased by $ 800 from 2015 to 2019, while in the EU it increased by an average of 2747 USD (3.4 times more than in Georgia), and the world average - by 1182 USD.

The presented materials show that the values of GDP per capita and growth rates are significantly lower than the EU, its member states, and the world average.

Table 2. Some macroeconomic and human development indexes of EU countries and Georgia (2015,2017,2019)

country		**Unemployment rate [9]**			**Core inflation, %**		**Human Development Index [10]**			
Year		2015	2017	2019	2020	Place	2015	2017	2019	Place
1.	Germany	4.6	3.8	3.1	0.6	15	0.933	0.938	0.939	4
2.	France	10.4	9.4	8.5	0.5	17	0.888	0.890	0.891	26
3.	Italy	11.9	11.2	10.0	0.3	19	0.875	0.881	0.883	29
4.	Spain	22.1	17.2	14.1	0.4	18	0.885	0.891	0.893	25
5.	Netherlands	6.9	4.9	3.4	1.9	6	0.927	0.932	0.933	10
6.	Poland	7.5	4.9	3.3	4.3	1	0.858	0.868	0.872	32
7.	Sweden	7.4	6.7	6.8	0.3	21	0.932	0.935	0.937	8
8.	Belgium	8.5	7.1	5.4	1.2	7	0.913	0.917	0.919	17
9.	Austria	5.7	5.5	5.4	1.2	10	0.906	0.912	0.914	20
10.	Ireland	10.0	6.7	5.0	-0.6	24	0.926	0.939	0.942	3
11.	Denmark	6.3	5.8	5.0	1	13	0.926	0.929	0.930	11
12.	Finland	9.4	8.6	6.7	0.3	19	0.919	0.924	0.925	12
13.	Romania	6.8	4.9	3.9	2.3	5	0.806	0.813	0.816	52
14.	Czechia	5.1	2.9	2.0	2.65	3	0.882	0.888	0.891	26
15.	Portugal	12.6	9.0	6.5	-0.18	23	0.843	0.848	0.850	40
16.	Greece	24.9	21.5	17.3	-1.6	27	0.868	0,871	0.872	32
17.	Hungary	6.8	4.2	3.4	4	2	0.835	0.841	0.845	43
18.	Slovakia	11.5	8.1	5.8	1.2	9	0.849	0.854	0,857	36
19.	Luxembourg	6.7	5.5	5.6	1.2	8	0.899	0.908	0.909	21
20.	Bulgaria	6.2	6.2	4.2	1.1	11	0.807	0.813	0.816	52

21.	Croatia	16.2	11.2	6.6	1.1	12	0.830	0.835	0.837	46
22.	Lithuania	9.1	7.1	6.3	2.3	4	0.855	0,866	0.869	34
23.	Slovenia	9.0	6.6	4.3	0.9	14	0.885	0.899	0.902	24
24.	Latvia	9.9	8.7	6.3	0.6	16	0.842	0.849	0.854	39
25.	Estonia	6.2	5.8	4.4	-1	26	0,871	0.879	0.882	30
26.	Cyprus	15.0	11.1	3.6	-0.9 [11]	25	0.864	0,871	0.873	31
27.	Malta	5.4	4.0	3.6	0.2	22	0.877	0.883	0.885	28
28.	**Georgia [12]**	**14.1**	**13.9**	**11.6**	5.2	**-**	**0.771**	**0.783**	**0.786**	**70**
29.	**EU**	**10.7 [13]**	**7.6 [14]**	**6.3 [15]**	**1.4**	**-**	**-**	**-**	**-**	**-**
30.	**World**	**5.64**	**5.57**	**5.4 [16]**	**2.3 [17]**	**-**	**0.722**	**0.729**	**-**	**-**

Unemployment rate. According to the 2019 census, the unemployment rate in Georgia was 11.6% (Table 2, Fig 2A). Georgia's unemployment rate is lower than only two EU member states - Spain and Greece, according to 2019 data, 14.1 and 17.3% respectively. The unemployment rate in Georgia was high compared to all other EU member states, almost two times higher than the EU average (6.3%) and the world average (5.4%). In 2015-2019, the unemployment rate fell by 2.5%, from 14.1% to 11.6%. In the same period, in Spain it decreased by 8%, in Greece - by 7.2%, in the EU - by 4.4%.

The study of unemployment rate indicators and trends shows the unfavorable situation in the Georgian labor market. Unfortunately, this figure still does not meet the requirements for EU membership.

Core inflation. In 2020, the core inflation rate in Georgia was 5.2% (Table 2, Fig 2C) . It is higher than the corresponding inflation rate for most EU member states. Deflation occurred in some EU countries: Greece (-1.6%), Estonia (-1%), Cyprus (-0.9%), Ireland (-0.6%), Portugal (-0.16%), and in most EU member states (in 22 out of 27 states) the core inflation rate is below 2%. Georgia's rate is about four times higher than the EU average (1.4%) and about 2.5 times higher than the world average (2.3%).

As mentioned above, one of the requirements for a country wishing to join the EU is the stable financial markets. The presented data show that at this stage of economic development, Georgia

doesn't meet the criteria of the proper functioning of financial markets of the country wishing to join the European Union.

Human Development Index (HDI). To compare and evaluate the level of economic development and trends of the country with similar indicators of EU countries, it is important to assess the capabilities, living standards, and well-being of citizens. For this purpose, we use Human Development Index (HDI), developed by the United Nations Development Program (UNDP) [18]. According to the 2019 report, Georgia lags far behind all EU countries and ranks 70th among 189 countries (Table 2, Fig 2D). Georgia currently qualifies as a country of high human development. At the same time, all EU countries are in the very highly developed group. If we look at the numbers, Georgia's human development index is 0.786. Bulgaria and Romania, EU member states with the worst performance, both with the same HDI of 0.816, rank 52nd. Even more alarming is the inequality-adjusted figure, which shows a decrease of 12% and an HDI value of 0.692. As for the trends, in 2010-2019 [19], Georgia improved by only four positions (according to the 2010 report, Georgia ranked 74th with a value of HDI 0.689) [20]. According to Louise Winton, Head of the United Nations Development Program (UNDP) in Georgia, "Georgia's performance in improved living standards for its citizens is being undercut by inequality." [21]

Thus, by analyzing the Human Development Index, we can conclude that one of the challenges of meeting EU membership criteria remains the low level of living and welfare of citizens, as well as the high degree of inequality of living standards.

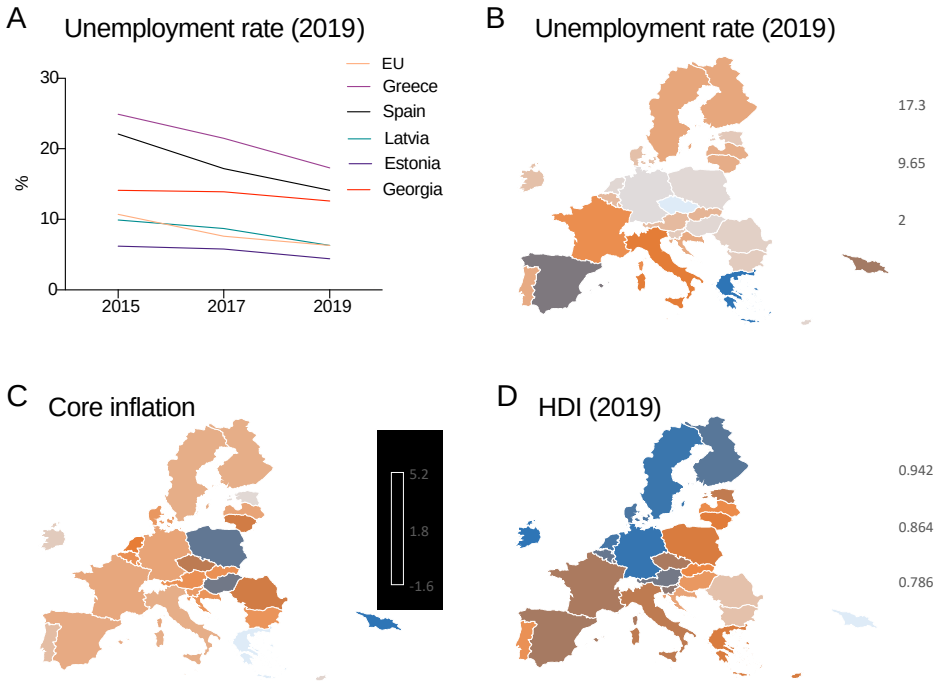

Figure 2. macroeconomic and human development indexes of EU countries and Georgia. A-B Graph representation and geographic heatmap of unemployment rates of EU countries and Georgia. C. Heatmap representation of Core inflation rates (2020) in EU and Georgia. D. Human Development index values.

The present paper does not include the analysis of the other important factors in the country's macroeconomic stability, such as national debt, government deficit, foreign trade balance, and other indicators. Georgia's struggle in this area may become a barrier to meeting the criteria for Georgia's accession to the European Union and full integration into the union.

The data presented in the paper provides an opportunity to draw some conclusions. In particular:

- ✓ terms and date of Georgia's main aspirations of EU membership, depend on our country's rapid economic development capacity, along with the fulfillment of other requirements.
- ✓ Georgia's current state and trends of economic development, unfortunately, still do not meet the Economic criteria for joining the EU.
- ✓ The Government of Georgia, with the involvement of the general public, scientists, Georgian and foreign experts, should develop a concrete strategic model of economic development, which will not change in parallel with changes of government and ensure real results in terms of both general and inclusive economic development.

Georgia must use the unique opportunities for progress in European integration (Association Agreement, Free Trade Agreement, visa liberalization) more effectively.

Reference

[1] National Democratic Institute, "Public Attitudes in Georgia. Results of December 2019 survey". press release, 16 Jan 2020, available at https://www.ndi.org/sites/default/files/NDI%20Georgia_December%202019_Public%20Presentation_ENG_VF.pdf

[2] See "Chronology of major events of EU-Georgia cooperation" available at

[3] ევროპული-და-ევრო-ატლანტიკური-ინტეგრაცია/საქართველო-ევროკავშირი.aspx?lang=en-US https://mfa.gov.ge/

[4] “Economic accession criteria” available at https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/international-economic-relations/enlargement-and-neighbouring-countries/enlargement/economic-accession-criteria_en

[5] Worldbank, “GDP”, available at https://data.worldbank.org/indicator/NY.GDP.MKTP.CD

[6] Worldbank, “GDP growth, annual (%)”, available at https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

[7] Worldbank, “GDP per capita”, available at https://data.worldbank.org/indicator/NY.GDP.PCAP.CD

[8] NSO, “Regional Statistics MALTA 2021”. Available at https://nso.gov.mt/en/nso/Media/Salient-Points-of-Publications/Documents/2021/Regional%202021/Regional%20Statistics%202021_full%20publication.pdf

[9] National Statistics office of Georgia, “Demographic Situation in Georgia, 2019” Available at https://www.geostat.ge/en/single-archive/3346

[10] Eurostat, “Eurostat regional yearbook, 2020 Edition”, available at https://ec.europa.eu/eurostat/documents/3217494/11348978/KS-HA-20-001-EN-N.pdf/f1ac43ea-cb38-3ffb-ce1f-f0255876b670?t=1601901088000

[11] United Nations Development Programme, “2020 Human Development Report”, available at http://hdr.undp.org/sites/default/files/hdr2020.pdf

[12] Trading Economics https://tradingeconomics.com/cyprus/inflation-%20cpi#:~:text=Inflation%20Rate%20in%20Cyprus%20averaged,percent%20in%20October%20of%201961

[13] National Statistics office of Georgia, “Employment and Unemployment”, available at https://www.geostat.ge/en/modules/categories/683/Employment-Unemployment

[14] Eurostat, https://ec.europa.eu/eurostat/documents/2995521/7091248/3-01122015-AP-EN.pdf/772e30b0-2308-45ab-a712-6b3039b632bb#:~:text=The%20euro%20area%20(EA19)%20seasonally,euro%20area%20since%20January%202012

[15] Eurostat, https://ec.europa.eu/eurostat/documents/2995521/8830865/1-26042018-AP-EN.pdf/bb8ac3b7-3606-47ef-b7ed-aadc4d1e2aae#:~:text=The%20long-term%20unemployment%20share,in%20the%20EU%20in%202017

[16] Eurostat, https://ec.europa.eu/eurostat/documents/2995521/10064439/3-31102019-CP-EN.pdf/20825ac8-e75f-6ca4-59ea-6b9e8d04f07c#:~:text=The%20euro%20area%20(EA19)%20seasonally,euro%20area%20since%20July%202008

[17] Worldbank, "Unemployment", available at https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS

[18] Worldbank, "Inflation, consumer prices", available at https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG

[19] Planning for an Uncertain Future, https://www.undp.org/

[20] Human Development Report, http://hdr.undp.org/en/2020-report

[21] United Nations Development Programme, "2010 Human Development Report", available at http://hdr.undp.org/sites/default/files/reports/270/hdr_2010_en_complete_reprint.pdf

[22] UNDP, Press release, December 9, 2019, available at https://www.ge.undp.org

Challenges of the Modern Technical Translation and Maritime Education

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Abstract. Thirst for innovation and novelties is an integral part of establishment and development of the modern society, providing sharing of experience via effective communication means.

Lightning-fast development of informational technologies of the XX century totally removed the existed boundaries and multicultural relations between the nations, informational exchange and share of consciousness is a common lifestyle of Euro Atlantic space.

Translation is a major mediator for correct perception of information. In line with the rise of the volume of information, amount of new words, word combinations and/or phrases especially in marine technical fields, is constantly increasing.

Thus, the aim of the presented paper is to detect peculiarities of maritime technical terminology with the purpose of its adequate translation provision and appropriate application within the frame of maritime education and training.

Keywords: Maritime education, special terms, multicultural, translation, training, learning, teaching.

The pursuit of innovation is a key factor in human development and the formation of individuals and societies. A relationship is impossible without mutual communication, sharing of information, and experience. The education sector has the most significant role and function to fulfill all these above-mentioned factors. Without unification of the higher education system, the use of a unified assessment (credit) system, and the existence of student exchange programs, it would not be so simple, and at the same time, so developing.

Recent technological innovations, especially in the field of information and communication we are focusing on (computer, internet, etc.), have changed the whole world as much as possible. It can be said that the concept of "distance" has been deleted. Receiving and transmitting information is done in larger quantities, easily, and much faster. New requirements arose and people have new opportunities to realize their private limitless desires and interests.

Through relationships and the exchange of information between multicultural nations, it is possible to share the cultures and worldviews of different nations to understand better each other and establish proper communication. As we can see, communication has played a major role in the development of the human worldview and shaping it today.

This factor is very important in the maritime field, as sailors have the most frequent, intense, and long-lasting relationships with people of different cultures and interests (crew members) while performing their duties on board. Proper knowledge of communication (in our case English) and maritime technical terms, phrases, word combinations in the native language will help to carry out technical translation correctly and the specific information can be perceived and understood not fragmentarily, but can be understood as a whole.

Technical texts must be translated correctly. They must not be translated word by word, only words without context or conversely, completely superficial so-called "free" translation. In such cases, the content of the text changes and becomes ambiguous. It's inadmissible for a sailor, as the performance of his professional work correctly and safety depends on it.

Technical text is completely different from the literature text. It is free from stylistic means of emotional words, but it does not necessarily make the process of translating the text easier. In order to understand properly the scientific and technical text, it is necessary to have a good knowledge of the existing field and a proper knowledge of both English terms and corresponding Georgian terminology.

The semantic peculiarity of the language, which is different in different languages, causes certain difficulties in translating not only in literature but also in technical translation.

Due to the peculiarities of the languages, the following difficulties may be seen during translation:

• Vocabulary - which means that no corresponding equivalent can be found in the native language. In our case, we meet such difficulties, especially when translating maritime terminology. (Unfortunately, there is no complete and recognized dictionary of maritime terminology yet, but the project is underway to create an English-Georgian and Georgian-English dictionary of maritime terminology).

• Grammatical - which means the difference or absence of any grammatical form in the native language. (For example, an article that does not have the Georgian language. English grammatical tenses, which in some way do not match with the tenses of the Georgian language.)

• Stylistic - which means differences caused by the influence of national or cultural factors of the language.

We must not forget that language is constantly changing and developing. The changes primarily affect words more than other forms of language.

In order to properly understand and convey an idea, it is necessary not only to find corresponding words, terms or phrases during translation, but they must also be used grammatically and structurally correct. The English language is polysemantic, so the translation of technical texts is complicated, as a maritime field has many specializations according to the profession. Terms have different meanings in everyday English and technical English, so it's necessary to find the difference between them and then translate them correctly.

Some nouns express body parts in general English, but they have completely different meanings as marine terms. They express the parts of the mechanisms or the mechanisms themselves (Tab.1) [1, 2, 3, 4]:

General English (body parts)	**Marine terms**
arm –მკლავი	arm - სახელური
Back-ზურგი	Back-დეტალის უკანა ნაწილი
Cheek - ლოყა	Cheek - გვერდითი კედელი
Palm - ხელისგული	Palm - ნიჩაბი
Heart - გული	Heart - მთავარი/ძირითადი ნაწილი
Head - თავი	Head - (დგუშის) თავი
Eye - თვალი	Eye - თვალაკი (ჩაქუჩის) Eye - მარყუჟი (მისაბმელი თოკის)

The same is with the nouns expressing clothes (Tab.2) [2, 3, 4, 6]:

General English (clothes)	**Marine terms**
Pocket - ჯიბე	Pocket - ჩაღრმავება
Coat- ქურთუკი/პალტო	Coat- დაფარვა
Sleeve –სახელო	Sleeve –მილისი
cap- კეპი	cap- თავი/სახურავი
Jacket - პიჯაკი	Jacket - ძრავის პერანგი
Skirt - ქვედაბოლო	(piston) skirt - დგუშის კალთობი

These words express things in general English (Tab.3) [2, 5]:

General English (things)	**Marine terms**
Nut – თხილი	**Nut** – ქანჩი
Cage - გალია	**Cage** - კორპუსი
Bridge - ხიდი	Bridge - ხიდური (ადილი გემბანზე, საიდანაც გემის მართვა ხორციელდება)
Deck - ვერანდა	Deck - გემბანი
Worm - ჭია	Worm (screw/gear) - ჭიახრახნი
Drum - დოლი	Drum - დოლი (მექანიზმის ცილინდრული ნაწილი)
Log - კუნძი, მორი	Log - გემის/სავახტო ჟურნალი

Sometimes we meet with words having several meanings in the marine field itself (Tab.4) [2, 8]:

Pattern	ნიმუში	დიაგრამა
Degree	გრადუსი	ხარისხი
Figure	ციფრი	ნახაზი
Generate (v), Generation (n)	წარმოქმნა (ორთქლის)	გამომუშავება (დენის)
order	შეკვეთა	ბრძანება
Rating	სიჩქარე	სიმძლავრე
run	მუშაობა	ბრუნვა
term	ტერმინი	ვადა
unit	დანადგარი	ელემენტი
bearing	საკისარი	პელენგი
frame	შპანგოუტი	სადგარი (ძრავის)
Drum	კასრი	დოლი

In the technical texts, there are often cases of "double negation", cases where the particle "not" stands in front of an adjective accompanied by a negative prefix (such as “un”). The sentences of this type are mainly translated without negation, in the affirmative form.

E.g. "Emergency is not uncommon at sea."

"Is not uncommon" translates as "ordinary event" (and not "not unusual").

We should also mention the so-called multifunctional words English language, which are different parts of speech in the sentences without changing their form. Multifunctionality is especially characteristics for the following parts of speech: noun, verb, adjective (Tab.5 and Tab.6) [2, 5, 7] :

Noun	Verb
pump - ტუმბო	pump - ტუმბვა
screw - ხრახნი	screw - ჩახრახნა
work - სამუშაო, საქმე	work - მუშაობა
hammer - ჩაქუჩი	hammer -მიჭედვა
saw - ხერხი	saw - ხერხვა
nail - ლურსმანი (zmna)	nail - ლურსმნის ჩაჭედვა
drill - ბურღი	drill - ბურღვა

Adjective	Noun	Verb	Prepositions
Round - მრგვალი	Round - წრე	Round - დამრგვალება	Round - გარშემო, ირგვლივ

It is much more difficult to translate technical terms which have several corresponding meanings into Georgian, e.g.(Tab.7) [3, 6]:

Switch - გამომრთველი; გადამრთველი; კომუტატორი (მოწყობილობა ელექტროწრედში დენის მიმართულების შესაცვლელად)
Engine - ძრავი; მექანიზმი; ლოკომოტივი (მანქანა, რომელიც მოძრაობს რკინიგზის ლიანდაგზე);
Oil - ზეთი; შესაპოხი ზეთი; ცხიმი; ნავთობპროდუქტი.

The above-mentioned circumstances may cause certain difficulties in proper comprehension of the text.

Structurally the term can be classified as follows:

• Simple terms such as turbine, resistance, viscosity.

• Complex terms that are formed by combining different terms. for example (Tab.8):

gas + meter	გაზომეტრი

Some terms define the other terms (Tab.9) [2, 3]:

direct current	მუდმივი დენი
alternating current	ცვლადი დენი
combustion chamber	წვის კამერა
fuel pumps	საწვავის ტუმბო
main engine	მთავარი ძრავა
diesel generator	დიზელ გენერატორი

Some terms that require definition while translating them, in order to give the addressee an accurate idea of the term being translated, for example (Tab.10) [2, 4]:

Switch	კომუტატორი	(მოწყობილობა ელექტროწრედში დენის მიმართულების შესაცვლელად)
Engine	ლოკომოტივი	(მანქანა, რომელიც მოძრაობს რკინიგზის ლიანდაგზე);
Bridge	ხიდური	(ადდილი გემბანზე, საიდანაც გემის მართვა ხორციელდება)

Some terms which are transliterated, don’t require definition (Tab.11) [2, 5]:

Compressor	კომპრესორი
Gasmeter	გაზომეტრი

Terms established under the influence of the Russian language, which were derived from calcification and settled in the Georgian language, for example (Tab.12) [2, 5]:

bridge	Мостик	ხიდურა
run aground	сесть на мель	მეჩეჩზე შეჯდომა
Pliers	Плоскогубцы	ბრტყელტუჩა
displacement	წყალწვა	მოცულობითი

The characteristic feature of a term is the clarity of semantic boundaries, it has much more independence in the context than ordinary words.

As it is seen, due to the peculiarities of marine terminology, it is not easy to translate technical text. In order to carry out technical translation correctly, to perceive and understand specific information as a whole and not parts, fragments we must avoid translation word by word. We must also avoid translation of text out of context or superficial translation, as an incorrect translation of terms can completely change the content of the text and lead to fatal consequences. Correct and safe implementation of professional translation depends on this fact. Therefore, when teaching Maritime English, it is necessary to pay particular attention to the technical text, to contextually process the relevant terminology in both English and Georgian, and not to change the information.

References

[1] „ქართულ-ინგლისური ლექსიკონი“ (Georgian-English Dictionary) ქუთაისის ა. წერეთლის სახელობის სახელმწიფო უნივერსიტეტი, ქუთაისი 2005;

[2] მელაძე გ., და სხვ. „ტექნიკური ლექსიკონი“. თბილისი 2016 (Meladze G., and all. “Tech Dictionary”. Tbilisi 2016) **https://techdict.ge/**

[3] მარგალიტაძე თ. „დიდი ინგლისურ-ქართული ონლაინ ლექსიკონი“ თსუ. 2021 (Margalitadze T. “A Comprehensive English-Georgian Online Dictionary” TSU. 2012) **https://dictionary.ge/**

[4] Maritime Dictionary**.** **https://officerofthewatch.com/tools/maritime-dictionary/**

[5] Maritime Terms Dictionary**.** **https://www.marineterms.com/**

[6] Cambridge Dictionary**.** **https://dictionary.cambridge.org/**

[7] Oxford Learner's Dictionaries. **https://www.oxfordlearnersdictionaries.com/**

[8] Merriam Webster Dictionary**.** **https://www.merriam-webster.com/**

The Prospects of Using an Artificial Underwater Reef in the Maritime Water Area of Georgia

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Abstract. The article discusses the importance of using underwater artificial reefs, the current situation, and prospects. The use of underwater artificial reefs has different purposes, such as strengthening fishery resources, population growth of living organisms in the sea, hydrobiological reclamation, development of diving tourism, coastal reinforcement function, etc.

The use of artificial reefs is discussed within the concept of the “Blue Economy”. Thus, the Black Sea "blue economy" goal is to preserve, protect, and reap the biodiversity of marine resources. The sea has not an unlimited resource and the anthropogenic factors can significantly reduce or increase the economic benefits of the sea. The prudent management of marine resources and the improvement of the ecological condition of the sea are extremely important for sustainable economic development.

The work discusses the importance of artificial reefs for the ecosystem, the diversity of underwater flora and fauna, and the prospect of increasing its inhabitants. The study's goal is to study the economic effects of artificial reefs, their impact on the environment, durable and easily portable design layout for the depth of the sea. And, the aim is to run the production, placement of the artificial reefs at the coastal waters of Georgia, and promote the establishment of the initiative.

Keywords: fishery, underwater artificial reefs, underwater ecosystem, blue economy.

The world climate changes have greatly affected the ecosystem, raise of a sea level and especially coral reef triangle[1] (pic. N1), which are gradually destroyed and lose their main purpose. Temperature growth to more than 2°C endangers coral reef systems. [1]

From ecological point of view importance of coral reefs is incredibly huge for the photosynthesis carried out by their algae that provides food supply in the tropical and subtropical marine food chain and contributes to nutrient processing. Apart from climate changes they undergo

[1] Coral reef triangle – that is the richest centre of the planet sea biodiversity, life and coral diversity, where more than 6000 species of fish are studied. More than 76% of the world coral species are concentration and wildlife array. It covers an area of 6 million km^2 and includes Indonesia, Malaysia, the Philippines, Papua New Guinea, Timor-Leste, and the Solomon Islands. 76% of the world coral species live in this sea "nursery" and 6 species of 7 sea turtles in the world. *https://wwf.panda.org/discover/knowledge_hub/where_we_work/coraltriangle/*

anthropological influence as well, such as degradation of underwater flora and fauna due to illegal fishing, irresponsible procuring production and pollution with various debris and wastes that is the outcome of weak management as a whole. [3]

Satisfying demand with limited resources in the economy is the subject of constant discussion and researches for economists. Humanity with their development are increasingly using natural resources so that in most cases they don't think about consequences of uncontrolled usage of them. The concept of "Blue Economy" is the defense of natural resources and proper use of them that aims to utilize existing resources to meet the economic needs but not to damage nature and ensure that there always are sufficient resources for sustainable development of economy.

Pic. N1. Coral Reef Triangle

Source: WWF (World Wide Fund for Nature) [2]

The concept of the blue economy has existed since 2012 and it aims to merge nature with business affairs. It is based on three main principles:

- ✓ Any resource can be replaced with another resource;
- ✓ Nature does not generate wastes, and thus neither business nor people must generate them;
- ✓ Waste of any production or consumption is the source of consuming new products; [4]

Health of seas and oceans is remarkably decreased due to anthropological works, accordingly changes are reflected on people's welfare. According to future forecasts world population will grow

even more that will naturally increase the demand for sea products, hence “sea health” needs significant changes such as:

- ✓ Strengthening construction/fortification works along the coastline;
- ✓ Changes in climate and quantity of population;
- ✓ Reduced fish stock due to overfishing;

Exactly an underwater artificial reef appears to be a hampering factor for overfishing, the first steps have already been taken toward usage of which. According to the Organization for Economic Co-operation and Development (OECD), the world oceans generate additional 1,5 trillion dollars in the whole economy a year. More than 10% of the world GDP and annual income approx. $ 362 billion.[5]

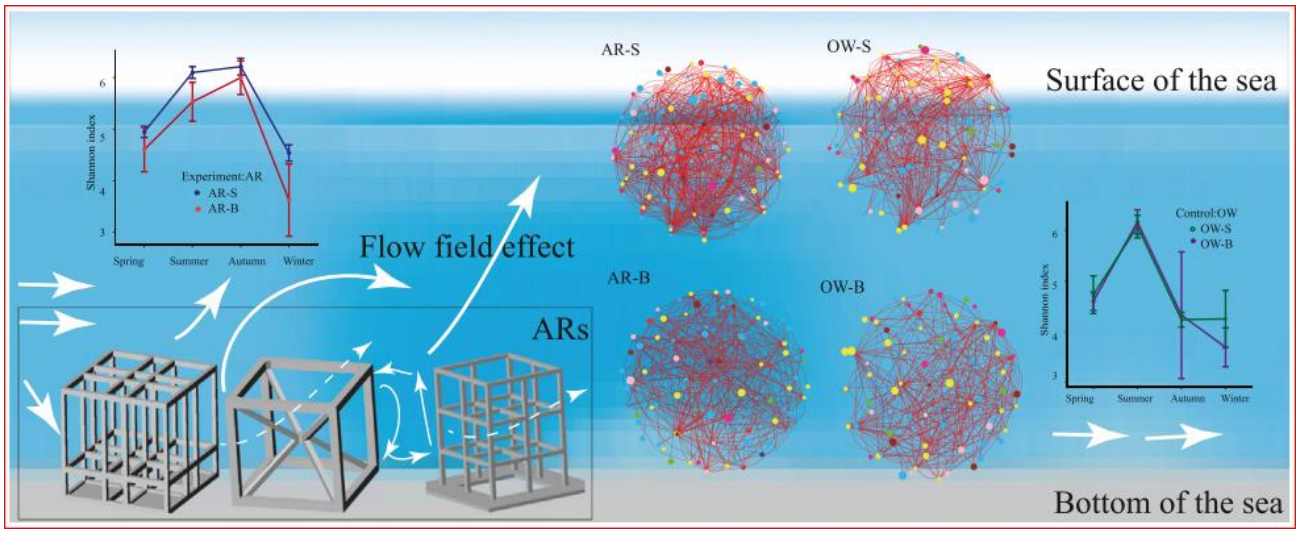
Overfishing has an adverse impact on an ecosystem and devastates natural habitats of fish. Inefficient policy may hinder sustainable development of fishery that will have negative effects on maritime countries and economic state of cities, especially in the areas where population appears to have low income.

An artificial reef is a substrate made of special materials that is placed in the areas where biodiversity is poor and a place is degraded. "It is a mass for the development of new, solid Benthic communities that obviously contributes to the growth of biodiversity and improves water quality (through water filtration). Due to the environment of the Black Sea and the species of fish, it is possible to use a material that does not contain rubber. " [6]

In 2015, in the framework of the European Union project “Research and Restoration of the Essential Filters of the Sea (REEFS)” artificial reefs were made in one of the beneficiary countries of the project in Bulgaria and were sent to Georgia. Four reefs were placed in the Black Sea in Daba Kvariati. They were placed with 25 meters distances in the depth of 12,5-14meters.[7] Similar projects are vulnerable in the Black Sea area and complete researches are not done.

According to the international practice an artificial reef (ARs) (pic. N2.) is considered to be one of the priority directions that is the subject of observation and fundamental studies for many scientists. Reef construction is studied based on researches and a natural reef is in fact an auxiliary system.

Pic. N2. Artificial Reefs (ARs) and Open Sea Water (OW)



Source: ELSEVIER June 2020. Response of protist community dynamics and co-occurrence patterns to the construction of artificial reefs: [8]

Artificial reefs are underwater artificial structures located onshore to mimic the characteristics of natural coral reefs, to attract fish and to improve and restore aquatic ecosystems.

Artificial reefs are currently used to reduce the degradation of marine fish populations and protect endangered species, as well as improving fisheries and restoring biodiversity. Various studies have shown that fish species breed abundantly around artificial reefs and a safe habitat is created for these species. As this field is new, the impact of artificial reefs on the environment is less studied and it is small in terms of evaluating the results of scientific, long-term monitoring (quantitative and qualitative). [9]

Taking into account the example of the Caribbean Sea coral reefs has been declined also degraded and destructed, in order to maintain ecosystem, it's often considered to deploy artificial reefs with structures similar to natural reefs on the seabed. Regardless of the specific purpose, it is important to note that artificial reefs do not have a negative and stressful effect on existing species. Accordingly, in order to evaluate the ecological impact of artificial reefs in the Caribbean, an analysis of 212 artificial reefs already deployed between 1960 and 2018 was conducted.

In the last century, the creation of artificial reefs was mostly spontaneous, and the expected risks and consequences were not studied. Therefore, different types of artificial reefs were used in the Caribbean:

- ✓ Ship wrecks (44%)
- ✓ Reef Balls (13%)

- ✓ Concrete structures and piles of building blocks (11%)

In addition to the main types of reefs mentioned above, plastic structures, rubber tires and hills made of oxidized metal were also used, which had a negative impact on the ecosystem as a whole. The most effective of them was the construction of reef balls (Fig. N3). The density and species richness of fish on this type of artificial reefs was higher than on natural reefs in the same depth zone. Especially many fish of the smallest species (1-5 cm) were around an artificial reef, which indicates that it was used as a nursery structure and a lot of seagrass beds were grown on them [10].

In addition to Reef Balls, various shapes and structures of artificial reefs have been designed, quite large and from 3 to 5 meters in height (Fig. N4.). Consequently, they have more massive structure and have large holes, which in turn, supports the growth of reproduction of large fish species.

Pic. N3. Reef Balls

Source: **1:** Tokyo Cement group. Reef Rehabilitation 2012. [11] ***Source:*** **2:** Tzuen Kiat Yap, ResearchGate 2018. [12]

Pic. N4 Artificial Reef - Massive Cement Construction (3-5 m. Height)

Source: Florida Artificial Reef Program. Florida Fish and Wildlife Conservation Commission, Division of Marine Fisheries Management. [13]

Conclusion

Underwater reefs in the maritime water area of Georgia are found mainly in the coastal areas in the form of collapsed bridges and rock slopes. They are not represented in depth, because we have no islands in this water zone, and the sea inhabitants actually do not have a natural shelter. Consequently, they mainly inhabit coastal structures along the coast, coastal structure is one type of the artificial reef, although these coastal structures are ineffective for fish species living in the open waters and cannot provide them with shelter.

We believe that on the basis of the EU project in 2015 ,,Research and Restoration of the Essential Filters of the Sea (REEFS) " a research group should be set up to study ecological, biological and biodiversity condition of the artificial underwater reef deployed in 2015.

The project is very important in its essence, but it is impossible to conduct a joint research in this direction without the main stakeholders such as (public sector, international organizations, local researchers). We expect that the study will have very good results, which will give us a basis for large-scale construction in this direction, all artificial structures will be deployed at a distance of 150-200 meters from the coastline and at a depth of 15-20 meters.

Production and deployment of artificial reefs will develop the following areas:

- ✓ Richness of fish species, reproduction growth, renewal of biodiversity and development of blue economy (taking into account economic indicators, diversification of restaurant chains with local fish species and mass fishery);

- ✓ Deep coastal barrier (coastal reclamation is a constant problem in the coastal zone of Georgia. The main impacts of erosion of the coastline are underwater waves, which gradually turn into surface waves);
- ✓ Development of underwater tourism (Diving) (we had a consultation with the Department of Tourism and found out that quite a large number of visitors are interested in this kind of service, but it is impossible to offer);
- ✓ Conducting scientific research of the underwater ecosystem and providing recommendations to the state (in fact, no significant studies of the sea and its ecosystem have been carried out in Georgia)
- ✓ Make a small but significant contribution to the global campaign for conservation and restoration of coral reefs.

We believe that the research topic: " The Prospects of Using an Artificial Underwater Reef in the Maritime Water Area of Georgia" is very important and relevant. Therefore, we plan to pay great attention to work in this direction in the future and in the form of project involve organizations interested in solving this problem.

References

[1] WWF (World Wide Fund for Nature) Impacts of climate change in the Coral Triangle. https://wwf.panda.org/discover/knowledge_hub/where_we_work/coraltriangle/problems/climatechangecoraltriangle/

[2] WWF (World Wide Fund for Nature) https://wwf.panda.org/discover/knowledge_hub/where_we_work/coraltriangle/

[3] WWF (World Wide Fund for Nature), PROBLEMS - https://wwf.panda.org/discover/knowledge_hub/where_we_work/coraltriangle/problems/

[4] Kepuladze T., Kepuladze G.. The concepts of ,,green" and ,,blue" economics in the context of global deficit. Proceedings of the Conference Economy - XXI Century

[5] World Bank. 2017. "Blue Economy"https://www.worldbank.org/en/topic/oceans-fisheries-and-coastal-economies#1

[6] World Bank. 2017. "Blue Economy" ://www.worldbank.org/en/topic/oceans-fisheries-and-coastal-economies#1

[7] Ilia State University 2016. Artificial reefs were placed in the Black Sea as a result of the expedition conducted by Ilia State University https://iliauni.edu.ge/ge/siaxleebi-8/axali-ambebi-36/ilias-saxelmwifo-universitetis-eqspediciis-shedegad-shav-zgvashi-xelovnuri-rifebi-gantavsda.page

[8] ELSEVIER June 2020. Response of protist community dynamics and co-occurrence patterns to the construction of artificial reefs: A case study in Daya Bay, China. https://www.sciencedirect.com/science/article/pii/S0048969720340973?casa_token=dM6cMgJKr54AAAAA:12Miryk9jglVv7PVKnTEo1a2NQcK0sIFcb8z0PH6pHKBOj-Kf-gJKloX3hn9HHimTX41Jnk7npMX

[9] Wentao Zhu, , Chuanxin Qin, Hongmei Ma, Shigai Xi, Tao Zuo, Wanni Pan, Chunhou Li. „Response of protist community dynamics and co-occurrence patterns to the construction of artificial reefs: A case study in Daya Bay, China“ ELSEVIER June 2020 https://www.sciencedirect.com/science/article/pii/S0048969720340973?casa_token=dM6cMgJKr54AAAAA:12Miryk9jglVv7PVKnTEo1a2NQcK0sIFcb8z0PH6pHKBOj-Kf-gJKloX3hn9HHimTX41Jnk7npMX

[10] Alwin Hylkema. Quirine C.A. Hakkaart, Callum B.Reid, Ronald Osinga, Albertinka J.Murk, Adolphe O.Debrot. Ocean & Coastal Management. „Artificial reefs in the Caribbean: A need for comprehensive monitoring and integration into marine management plans“. ELSEVIER August 2021. https://www.sciencedirect.com/science/article/pii/S0964569121001563

[11] Tokyo Cement group. Reef Rehabilitation 2012 https://tokyocement.com/reef-rehabilitation/

[12] Tzuen Kiat Yap, ResearchGate 2018 https://www.researchgate.net/figure/Reef-Balls-at-Selingan-Island_fig1_329449977

[13] Keith Mille and Christine Carpenter. “Florida Artificial Reef Program”. Florida Fish and Wildlife Conservation Commission, Division of Marine Fisheries Management. USA 2016. https://www.flseagrant.org/wp-content/uploads/1-Keith-Mille.pdf

External Debt Growth Trends in Georgia

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Abstract. The article discusses the dynamics of foreign debt growth in Georgia. Relevant analysis is done by years. Conclusions are drawn in this regard. Problems caused by the increase of foreign debt and proposals for debt reduction are given.

Keywords: external debt, growth dynamics, problems.

The political stability and economic development of any country requires a sufficient amount of financial resources. To achieve these goals, various sources and means are considered for mobilization of resources. Although the state budget of the country is intended to fulfill the state obligations to the public, it is impossible to fully meet the public needs in the modern state only with the financial resources mobilized in the state budget. That is why the state government refers to various sources of mobilization of funds required to finance expenditures, both inside the country and abroad. Among them, it is essential to attract financial resources from external sources. In particular, the loans from partner countries, international organizations, financial corporations and various foundations. The loans received from foreign creditors are presented in a solid amount in many countries, including Georgia.

For instance, there are some international financial institutions that aim to stimulate the trade and financial activities of countries. Namely, the International Monetary Fund, the International Bank for Reconstruction and Development (the same World Bank), the European Bank for Reconstruction and Development, the Asian Development Bank and others, which pay close attention to changes in the economic and financial situation in the countries, the problems of economic stabilization and balance of payments, based on this, provide them with the necessary financial resources etc.

Among the international financial institutions, the most crucial is the participation of the International Monetary Fund in financing the countries. Georgia has been a member of the IMF since 1993. Fund resources are in the tens of billions of US dollars. The fund capital is created by the contributions of its member countries. After receiving the loans from the International Monetary Fund,

the country undertakes a commitment to pursue an economic policy that will be able to accumulate foreign exchange reserves and repay the debt of creditors.

Another largest financial institution "... the World Bank, finances various investment projects in developing countries ... It provides loans for projects that meet a number of criteria and are aimed at the economic development of the country." ([1], pp. 272).

If the IMF aims to achieve and maintain macroeconomic stability in countries, to ensure the growing pace of economic development, the aim of the World Bank is to structurally transform the economies of its member countries to facilitate the development of individual sectors. Table №1 clearly shows the share of these organizations in financing the Georgian economy.

As mentioned above, the government, according to the necessity, borrows the financial resources both inside the country and abroad. Loans taken by the state collectively generate public debt (both domestic and foreign debts are combined here). Public debt is the sum of unpaid government loans with interest, that must be repaid over a period of time." ([2], pp. 147).

For reference, the unpaid volume of Georgia's domestic debt as of December 31, 2020 amounted to 6,201,177.4 thousand GEL. But, external debt as of December 31, 2020 amounted to 24,689,731.0 thousand GEL (that is, $ 7,535,168.0 thousand US dollars, 4 times more than the domestic debt). In total, the country's domestic and external debts as of December 31, 2020 amounted to 30,890,908.4 thousand GEL.

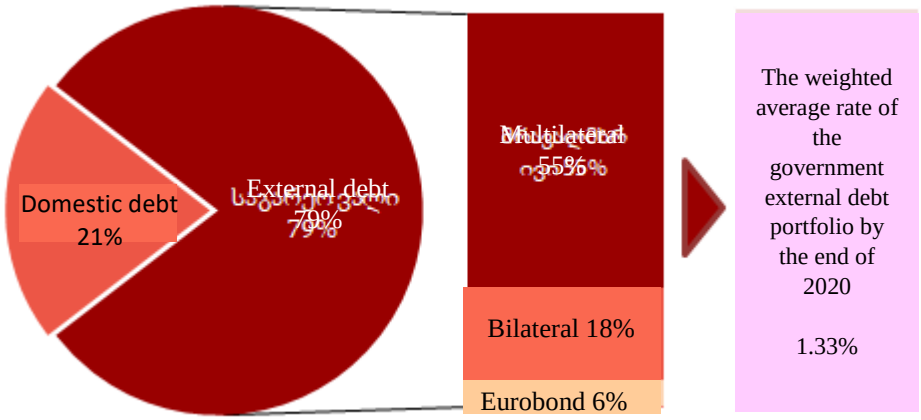
It should be noted that "the tendency of increasing public debt is not unique to Georgia. It characterizes even the developed countries such as the US and the UK. For example, if after World War II, in particular in 1950, US total public debt was up to 257 billion dollars, by the end of the 20th century, it amounted to $ 3 trillion (namely, $ 3.081 billion), in the same period, the debt in the UK rose from 26.8 billion pounds sterling to 185 billion, in France – the debt rose from 49.6 billion Frank to 1.035 billion, and in Germany – it reached 479 billion marks from 7.6 billion. ([2], pp. 148).

For today, as of June 2021, the US external debt amounts to $ 25,332,960.9 million, China - $ 18,138,334.8 million, UK - $ 2,803,507.4 million, Germany - $ 2,423,407.9 million, while in France - $ 3,071,880.5 million etc.

It is obvious that the trend of increasing external debt is typical for modern highly developed countries as well and in other equal conditions, for a developing country like Georgia, it should not be considered as an impediment to economic growth and a disadvantage. In Georgia, “as of December

31, 2020, the government's external debt portfolio accounts for 79% of total debt. Much of this credit resource is received from multilateral and bilateral donors and is mostly preferential. ... the weighted average interest rate is 1.33% per annum." (See diagram.1) [4].

Diagram.1



It is interesting, what is the dynamics of Georgia's external debt according to different creditors over the last few years? In particular, in 2017-2020. (See Table.1)

Table.1

Georgia External Debt Indicators in 2017-2020 [4] (Million dollars)

#	**Creditors**	**2017**	**2018**	**2019**	**2020**
1.	**The USA**	22,6	20,2	17,8	15,5
2.	**Russia**	70,6	61,4	51,4	40,5
3.	**Armenia**	10,0	8,6	7,1	5,4
4.	**Azerbaijan**	8,9	7,8	6,7	5,5
5.	**Kazakhstan**	21,7	17,6	13,3	8,8
6.	**Turkmenistan**	0,2	0,2	0,2	0,2
7.	**Uzbekistan**	0,2	0,1	0,9	0,05
8.	**Ukraine**	0,2	0,1	0,9	0,05
9.	**Austria**	15,2	20,6	18,8	19,2
10.	**China**	2,3	1,7	1,3	0,9
11.	**Germany**	286,5	324,9	375,4	731,5
12.	**Germany** (Guaranteed credits)	2,0	1,8	1,7	1,7
13.	**France**	138,9	215,8	330,9	580,5

14.	**Turkey**	16,9	15,0	12,9	10,6
15.	**Iran**	6,8	6,0	5,0	4,1
16.	**International Monetary Fund (IMF)**	192,2	215,6	248,9	584,7
17.	**World Bank, International Development Association (IDA) and International Bank for Reconstruction and Development (IBRD)**	1,851,7	1,849,8	1,874,1	2,051,2
18.	**European Union (EU)**	27,5	43,6	42,5	163,3
19.	**European Bank for Reconstruction and Development (EBRD)**	134,3	124,2	131,5	199,2
20.	**Council of Europe Development Bank (CEB)**	-	-	1,0	3,3
21.	**Asian Development Bank (ADB)**	1,058,6	1,142,7	1,249,7	1,443,5
22.	**Asian Infrastructure Investment Bank (AIIB)**	9,3	14,4	26,7	159,5
23.	**European Investment Bank (EIB)**	378,6	479,7	568,0	740,3
24.	**International Fund for Agricultural Development (IFAD)**	-	30,3	32,9	35,8
25.	**Nordic Environment Finance Corporation (NEFCO)**	-	-	0,8	2,6
26.	**Japan**	210,3	214,9	212,3	217,5
27.	**Kuwait**	12,3	10,6	9,1	9,3
28.	**Eurobonds**	500,0	500,0	500,0	500,0
29.	**Netherlands**	1, 1	0,8	0,6	0,4
30.	**Total:**	4,978,9	5,328,4	5,742,4	7,535,1

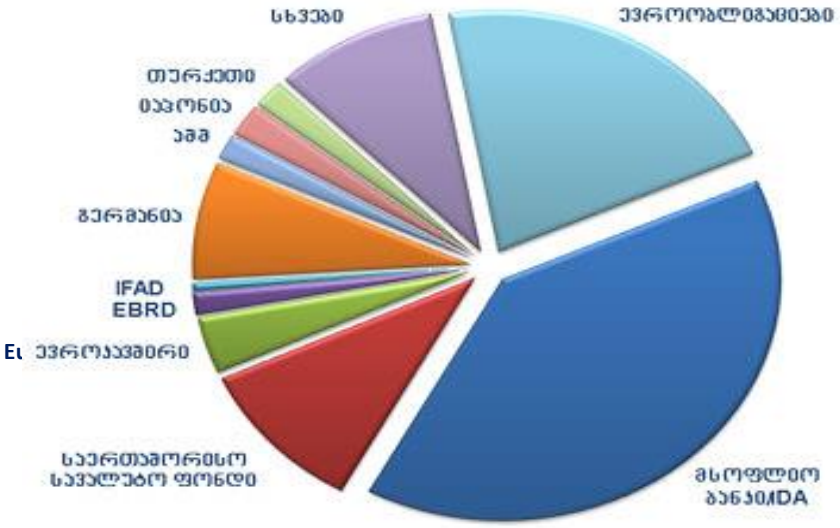
As can be seen from the data presented in the table, the external debt in dynamics is growing every year. "The more debt the country has, the weaker it is to deal with the expected shocks in the future. For example, Georgia was able to take on additional debts during the pandemic, since before the pandemic it was a country with medium debt. In the future, whether the economic crisis is caused by a pandemic or some other reason, Georgia will not be able to borrow more than 8 billion GEL a year. Donors will also limit funding. In addition, it should be taken into consideration that … the annual debt service is already a pretty big burden. In 2020, Georgia will pay a total of 1.8 billion GEL to cover the principal and interest. For example, this amount is 3 times more than Georgia pays for police and state protection services. It also exceeds funding for health and education taken separately. Another indicator of the debt burden how much debt falls per capita in the country. In 2014, Georgia

owed a debt of about 2,800 GEL per person, which doubled by the end of 2019 and reached 5,700 GEL. By the end of 2020, the government's debt per capita **will be up to 7,400 GEL**. " [5].

External debt growth in 2020 compared to 2019 was **$ 1,792.7 million**. Dollars. One of the key factors in this was the economic crisis caused by the Covid-19 pandemic. However, it is also important that in 2020, the state budget revenues of Georgia were reduced by one billion GEL. While the costs increased by GEL 1.5 billion (Mostly, health and social assistance costs).

The major part of Georgia's external debt is presented in the form of preferential loans provided by the international financial institutions to finance infrastructure projects. Germany takes the first place among the creditor countries [5], towards which, as of 2020, Georgian public sector owes, $ 731 million. (See Diagram.2)

Diagram.2



The number of loans received from large creditors **only in 2020** is as follows: (See Table.2)

Table.2

The number of loans received from large creditors (Million dollars)

№	Large Creditors of Georgia	The total amount of debt 31/12/2020 From a specific creditor	Credit balance for 2019	Credit received in 2020	Increase in % compared to the previous year
1	**Germany**	**731,5**	**375,4**	**356,1**	**94,8**

2	**France**	**580,5**	**330,9**	**249,6**	**75,4**
3	**International Monetary Fund**	**584,7**	**248,9**	**335,8**	**134,9**
4	**World Bank, International Development Association (IDA) and International Bank for Reconstruction and Development (IBRD)**	**2,051,2**	**1,874,1**	**177,1**	**9,4**
5	**European Bank for Reconstruction and Development**	**199,2**	**131,5**	**67,7**	**51,5**
6	**European Union (EU)**	**163,3**	**42,5**	**120,8**	**280,0**
7	**Asian Development Bank (ADB)**	**1,443,5**	**1.249,7**	**193,8**	**15,5**
8	**Asian Infrastructure Investment Bank (AIIB)**	**159,5**	**26,7**	**132,8**	**497,0**
9	**European Investment Bank (EIB)**	**740,3**	**568,0**	**172,3**	**30,3**

- Credit from Germany amounted to **$ 356.1 mill**ion, which is **94.8%** of the 2019 credit balance ($ 375.4 million);
- Credit from France amounted to **$ 249.6 million**. That is, **75.4%** of the 2019 credit balance ($ 330.9 million);
- Credit from the International Monetary Fund amounted to **$ 335.8 million**. That is, **134.9%** of the 2019 credit balance ($ 248.9 million). The total debt of the IMF is $ 584.7 million;
- Credit from the World Bank, the International Development Association (IDA) and the International Bank for Reconstruction and Development (IBRD) amounted to **$ 177.1 million,** which is **9.4%** of the 2019 credit balance ($ 1,874.1 million). To date, total debt from the World Bank is $ 2,051.2 million. Dollars;
- Credit from the European Bank for Reconstruction and Development (EBRD) amounted to $ 67.7 million, which is 51.5% of the 2019 credit balance ($ 131.5 million).
- Credit provided by the European Union (EU) in 2020 amounted to $ 120.8 million; This is almost 3 times more (280%) compared to the 2019 credit balance ($ 42.5 million).
- $ 193.8 million is received from the Asian Development Bank (ADB) in 2020 alone, which is 15.5% of the 2019 credit balance ($ 1,249.7 million).

- From the Asian Infrastructure Investment Bank (AIIB) - $ 132.8 million, which is almost 5 times more (497%) compared to the 2019 credit balance ($ 26.7 million).
- From the European Investment Bank (EIB) - $ 172.3 million, which is 30.3% of the 2019 credit balance ($ 568.0 million).

According to the current law on "Economic Freedom" in Georgia, **the government's debt to GDP cannot be more than 60%.** During a state of emergency, the government can borrow more than 60% of GDP, but it must present a plan on how to return the debt ratio below 60% over the next 3 years". [5]

"The Public Debt Statistical Bulletin of Georgia" published by the Public Debt Management Department of the Ministry of Finance of Georgia states that the public external debt to GDP ratio in 2013 was 25.5%; In 2014 - 25.1%; In 2015 - 30.5%; In 2016 - 33.4%; In 2017 - 32.9%; In 2018 - 32.6%; In 2019 - 33.4% and in 2020 - 50.0%." ([7], pp. 34)

It should be noted that if the GDP in 2020 was 49.4 billion GEL, and external debt - 24.6 billion GEL, then it is gradually approaching the extreme mark. When the Ministry of Finance makes the financial results of 2021 public, then we will see the real picture even more clearly.

Judging objectively, the country will find it difficult to cope with the current difficulties and the implementation of promising projects without the help of foreign creditors. However, **here are some important issues**:

- How will it be able to pay off a huge debt in fragile economy conditions?
- Will the payment of billions of GEL (even on preferential terms) lead to a weakening of the revenue part of the state budget?
- Will the above mentioned provoke the issuance of extra money to cover costs and this in turn will further accelerate the rate of inflation?
- And finally, will all this aggravate the economic situation complicated by the pandemic and many other factors?

Of course, it is difficult to give unequivocally correct answers to the given questions, but we can **formulate some directions** that we think need to be implemented:

1. While making a decision to increase foreign debt, the benefits and expected negative consequences that the country may receive must be carefully considered;

2. When some private companies take the external credits, the Georgian state should become less of a guarantor (unless it is a project with state interests), this will increase the motivation of private companies, as they will be fully responsible;
3. Every borrowed cent is a burden on the country's population, therefore, in accordance with the principles of a democratic state, the decision to implement important projects must be made through public discussion;
4. The targeted use of the external credits taken by the government for some specific projects should be strictly controlled at any stage of the work to be performed, etc.

Naturally, this is a very small list of measures that may be taken to attract and manage external credits. However, Maintaining such a high growth trend of public debt without the consequences of economic recovery will further complicate not only the economic but also the political situation in Georgia.

References

[1] Bakhtadze L., Barbakadze Kh., Kandiashvili T., *Financial institutions and markets (Lecture course) Pdf.*, 2012, p. 294. https://www.academia.edu/16938099/%E1%83%A4%E1%83%98%E1%83%9C_%E1%83%98%E1%83%9C%E1%83%A1%E1%83%A2%E1%83%98%E1%83%A2%E1%83%A3%E1%83%A2%E1%83%94%E1%83%91%E1%83%98_%E1%83%93%E1%83%90_%E1%83%91%E1%83%90%E1%83%96%E1%83%A0%E1%83%94%E1%83%91%E1%83%98_%E1%83%9A%E1%83%94%E1%83%A5%E1%83%AA%E1%83%98%E1%83%94%E1%83%91%E1%83%98%E1%83%A1_%E1%83%99%E1%83%A3%E1%83%A0%E1%83%A1%E1%83%98_

[2] Dzneladze L., *Finance, money circulation and credit* (Short lecture course), the second completed edition, publishing house "Adjara", Batumi, 2013, p. 204.

[3] Website Country Meters, https://countrymeters.info/ru/China/economy ; 12-06-2021 20:15:18 https://countrymeters.info/ru/United_Kingdom_(UK)/economy ; 12-06-2021 20:34:21 https://countrymeters.info/ru/Germany/economy ; 12-06-2021 20:52:47 https://countrymeters.info/ru/Germany/economy ; 12-06-2021 21:10:13 https://countrymeters.info/ru/United_States_of_America_(USA)/economy. 12-06-2021 21:20:33

[4] Ministry of Finance of Georgia, https://mof.ge/saxelmwifo_vali

[5] Ministry of Finance of Georgia, https://mof.ge/saxelmwifo_valis_statistika

[6] Namchavadze B., *Georgia's public debt is approaching a dangerous level*, https://forbes.ge/saqarthvelos-sakhelmtsipho-v/ July 22, 2020, at 1:10 pm.

[7] Georgian Public Debt Statistical Bulletin №15, Tbilisi, December, 2020, https://mof.ge/images/File/2020/biuletenebi/29-03-2021/N15_GE.pdf, p. 34.

Cruise Tourism in a Pandemic Reality: The End of the Industry or Not?

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Abstract. The following research work aims at analyzing coronavirus disease impact on cruise industry. The study provides a general overview of the sector before the crisis, as well as current Covid-19 pandemic situation and suggests possible post pandemic evolution of the industry.

The findings show that despite the biggest crisis in the sector, the business is too successful to go down and sink under the pressure of financial problems. Even bad publicity of cruises is going to be temporary. According to 2020 CLIA Report 82% of cruise travelers are likely to cruise again. The fact testifies to the high attractiveness of the cruises. Another 'pro' is a positive attitude tendency of society about cruising. [1].

Keywords: cruise industry, cruise tourism, pandemic, covid-19, crisis

1. INTRODUCTION

In terms of globalization the world became very sensitive to economic, political, technological, cultural, environmental and social aspects. This implies that integrated global markets react instantly to innovations, dangers, development or challenges in any area. Until recently the society was accustomed to technological leaps, political polarizations and instability, extensions or collapses of international trade, financial crises (latest 2008y. I & 2009 y. II) and other fluctuations. However, another significant variable that appeared to be homicidal and underestimated by the society is global health thread.

Despite H1N1 and SARS viruses that occurred in the 21th century, the 2020 world proved to be completely unprepared to deal with a brand new disease, that made it kneel down all the nations.

Besides the health threats caused by Covid-19, coronavirus pandemic has knocked down the globe economy. The head of the International Monetary Fund (IMF) Kristalina Georgieva declared that today we were facing the worst global economic crisis since the Great Depression (1929-1932) [7]. All the businesses are severely affected. The situation was and still is very tough on everyone, however, tourism, hospitality, aviation and cruise industry are the most paralyzed sectors. According

to World Bank, one of the first sectors to be badly affected by coronavirus pandemic were the travel and tourism industries. [6]

It feels especially painful when it was hard to find even a couple of more successful businesses to run than cruises.

Cruise tourism implies travelling on a cruise ship for recreation purposes with all-inclusive services. According to UNWTO (World Tourism Organization) cruise tourism is "a wide range of activities for travelers in addition to its traditional function of providing transport and accommodation". Cruising, unlike passenger shipping for transportation or other shipping, is a unique type of tourism that combines transportation ,accommodation, attractions and hospitality. This type of vacation has become a choice for millions of people worldwide.

Originally cruise tourism was mainly located within warmer climate zones like the Caribbean and Mediterranean. Howbeit, now more and more people choose diverse and unusual destinations like Norway or the Arctic. CLIA deploys cruise travelers by regions as follows: Caribbean (32%), Mediterranean (17%), Europe w/o Med (11%), China (5%), Australia/NZ/Pacific (5%), Alaska (5%), Asia w/o China (5%), South America (2%), all other (17%). [1]

Although most people associate cruises with the sea luxurious tours, this belief is far from the today's reality. Nowadays you can take a river cruise down the Nile , take a part in an expedition cruising to Galapagos Islands, make a whirlwind tour of the world in 90-120 days or discover the Artic. Contrary to popular belief, cruses are popular among youth, and not only elderly rich people are enjoying their holidays on the water. Cruising is a developing industry, offering a lot of diverse itineraries and services for any taste.

2. CRUISE INDUSTRY DYNAMICS

Cruise ships industry had been growing dynamically for the last 40 years till now. Starting at its cradle-in North America, this form of traveling became more and more popular in Europe, later in China, Australia and now all over the world.

Since 1980 till 2017 world cruising grew from 1.8 ml passengers to 25.8 ml passengers respectively. The average rate of growth for cruise tourism was 7.5% per year , while the traditional tourism was not more than 4.9% . [3]

Table 1- International arrivals and the number of cruise passengers in the world, 1980 – 2017 Source: *(Peručić, DIEM (I) 2019)*

Year	Tourist arrivals in ml.	Annual growth rate %	Cruise passengers in ml.	Annual growth rate %
1980-1985	285.9-327.2	2.3	1.8-2.8	7.7
1986-1990	338.9-458.2	6.2	3.3-4.5	6.4
1991-1995	463.9-565.5	4.0	4.92-5.67	2.9
1996-2000	596.5-681.3	2.7	6.5-9.72	8.5
2001-2005	680.3-802.0	3.3	9.92-14.47	7.8
2006-2010	846.0-952.0	3.0	15.11-18.8	5.6
2011-2017	983.0-1326.0	5.1	20.6-26.75	4.5
1980-2017	285.9-1326.0	4.9	1.8-26.75	7.5

Rising demand and thus expanding market requested new solutions for the industry. To satisfy the demand and meet the requirements of new travelers cruise lines decide to upgrade the sector. As cruises are perceived as floating hotels there were 3 dimensions for this purpose:

- Ships;
- Services;
- Destinations.

Thus, huge profits and popularity made companies invest into larger ships with appropriate infrastructure for them (new berths), as well as develop new itineraries with diverse range of services. Soon travelers were offered a large number of destinations all over the world, starting from 2 days trips to 2 months travelling onboard of modern equipped ships of all sizes.

Over the last couple of decades the size of the cruise ships has significantly increased from 500 passenger capacity in 1997 up to today's giant – "Symphony of the Seas", which is currently the largest cruise ship in the world. Its tonnage is 228,081 GR, measures 362m long. Ship's capacity is almost 9000 passengers including the crew. [4]

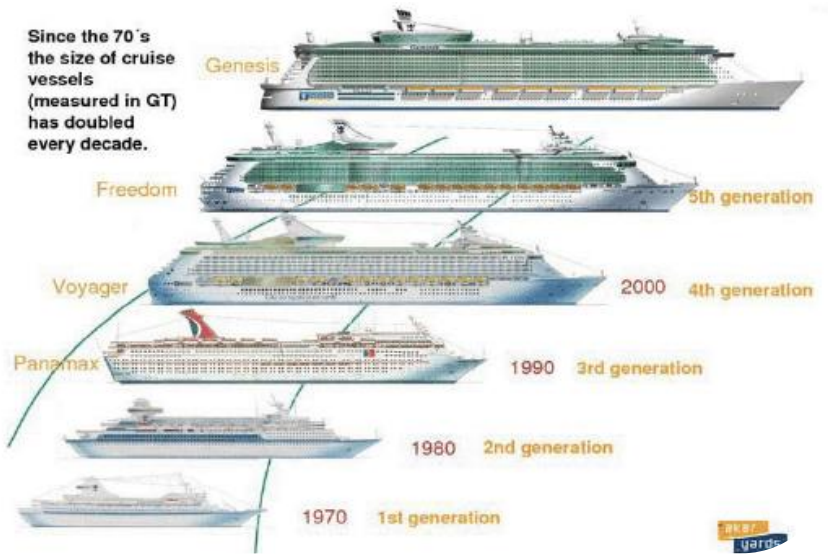

Figure 1-Sizes of cruse ships since 70's Source: GOALDS – Goal Based Damage Stability of Passenger Ships (SNAME 2013 Annual Meeting)

As you can see the data in Table 2, Royal Caribbean cruise lines own 7 of world's biggest vessels.

Table 2- 10 largest cruise ships in 2020. Source : (Peručić, DIEM (I) 2019)

Ship name	Cruise line	GT	Passengers N	Year built
Symphony Of the Seas	Royal Caribbean	228,081	6.680	2018
Harmony of the Seas	Royal Caribbean	226,963	5,479	2016
Allure of the Seas	Royal Caribbean	225,282	6,780	2010
Oasis of the Seas	Royal Caribbean	225,282.	6,296	2008
AIDA Nova	Carnival Corporation	183,900	2,600	2018
MSC Meraviglia	MSC Cruises	171,598	4,500	2017
Quantum of the Seas	Royal Caribbean	168,666	4,180	2014
Anthem of the Seas	Royal Caribbean	168,666	4,905	2015
Ovation of the Seas	Royal Caribbean	168,666	4,905	2016
Norwegian Bliss	Norwegian Cruise Line	168,028	4,002	2018

According to Joseph V Michallef's article "State Of The Cruise Industry: Smooth Sailing Into The 2020's" written for Forbes in January 2020, the last 10 years were incredibly successful for the cruise industry and nothing seems to change in 2020. [5] Before the tables have turned cruise industry

revenues have grown from about 15.7 bln $ in 2010 to an approximately 31.5 bln $ in 2020, the rate of growth of 7.2%. [1]

According to CLIA (Cruise Lines International Association) report , until March 2020 cruise industry was the fastest growing sector of travel industry. [1] Referring to some statistics, cruise tourism passenger traffic was:

- 26.7 million passengers in 2017
- 28.5 million passengers in 2018
- 30 million passengers in 2019
- 32 million passengers were expected to cruise in 2020. [1]

Global cruise market consists of more than 280 ships , 55 cruise lines, 400 executive partners, 15 000 travel agencies and 53 000 travel agent members worldwide. [1] According to KPMG (a global network of professional firms providing Audit, Tax and Advisory services) ¾ of this market is controlled by 3 main entities:

- Carnival Corporation;
- Royal Caribbean Cruises;
- Norwegian Cruise Line.

They manage 18 own cruise line brands and their overall income made $34.2 billion in 2018. [2] In addition CLIA reports that estimated revenue of the global cruise industry reached $ 45.6 billion in the same year. [1]

And now a $150 billion output business with 1,177,000 jobs and $50.24 billion in wages/salaries worldwide seems to be sinking in today's pandemic reality. [1]

3. PANDEMIC REALITY

2020 has become a total nightmare for the whole world. However, cruise lines have been the first ones to face the novel disease crisis. The frontline ended up aboard numerous cruise vessels. During the spring 2020 there were several COVID-19 outbreaks: The Diamond Princess (Carnival Corp.), quarantined during 14 days at the port of Yokohama, Japan; the Grand Princess in California and another 25 cruise ships with similar situations [8]. Cruise giants like those listed in Table 2 are of huge passenger capacity (4000-7000 passengers). In terms of COVID-19 this fact puts significant percentage of cruise consumers who are over 65 at high risk. Thus, cruise ships have acquired a reputation as deadly cages of disease. Bad publicity has aggravated already grave situation.

Announcement of a temporary suspension of cruising till the end of May was the first step undertaken by CLIA. The Centers for Disease Control and Prevention (USA) has also announced a "no sail" order for all cruise ships in United States till there is no emergency. [9]

Since the March three core cruise enterprises (Royal Caribbean, Carnival Corporation and Norwegian Cruise Lines) have already experienced major drops in stock prices of their companies.

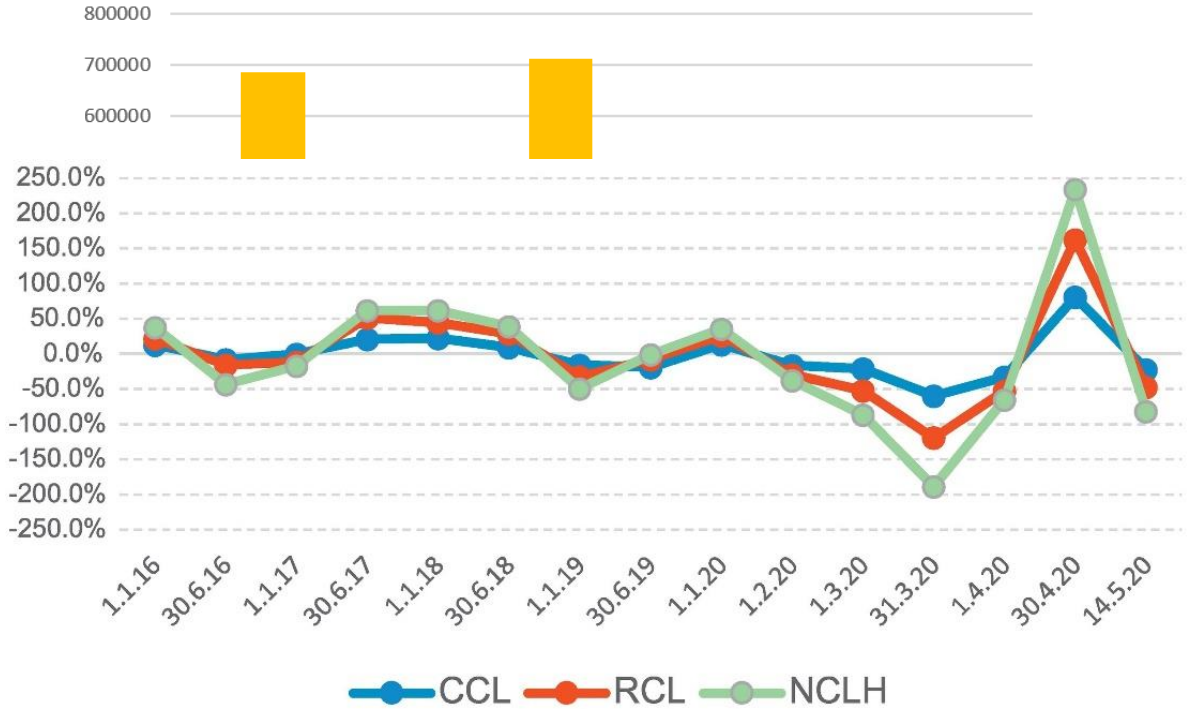

Figure 2- Cruise share returns (%) – Post COVID-19 impact. Source: (Theodore Syriopoulos 2020)

Norwegian Cruise Lines have lost up to 80 % since the beginning of the year. Royal Caribbean stocks have dropped 70% of their value. With $500 million monthly expenses Carnival Corporate had to require $6 billion cash flow injection to stand the crisis [6]. These unfavorable circumstances are reflected in the sharp drop of share prices and the market value of the leading listed cruise lines [12] (Figure 2). The Carnival's stock has fallen by 60% [11]. According to UNWTO forecasts, the whole tourism industry revenues in 2020 will be 35% lower than in 2019 ($685 bln. in 2019 and down to $447 bln. in 2020. [10, 11]

The huge drop in stock prices and reputational damage by COVID-19 will affect the regeneration ability of cruise companies. A quick recovery is not going to be a denouement for the 2020 crisis. Moreover, according to World Bank Group "Tourism response, recovery and resilience to the COVID-19 crisis" report published in July 2020, 'measures' are taken to help 'travel and tourism as a whole'. Quote: "Measures include direct financial support to alleviate debt obligations,

cash grants and subsidies, employment and training support, easing of regulatory burdens and waiving of fees and charges." However, cruises are considered a luxurious type of traveling with high level of income that brings the industry to the end of the line for getting help. In the "Response Options by Tourism Subsectors" by WBG, World Bank has proposed some mitigation plan activities like:

- 'Assess impacts on ports that are primarily ports of call for day visitors versus those which are refueling and restocking ports or home ports';
- 'Consider repurposing vessels to support health efforts and to provide emergency housing';
- 'Rebuild confidence of consumers and receiving ports through specific marketing campaigns to overcome negative image of the industry as part of the cause of the problem, i.e., Princess cruise ship saga in Japan.'

3. METHODOLOGY

The study is based on the desk research, that implies processing of already existing research materials. Official sector reports, statistical information, articles of governmental and non-governmental agencies and other similar documentation was analyzed in pursuit of latest and relevant information. Quotes of industry experts are also used in order to put the picture of cruise lines industry together. The paper introduces the world of cruise tourism and provides recent information in the terms of COVID-19. Different sources are used to reflect today's situation. Gathered information is checked. The data is collected and summarized in accordance with the pandemic timeline, starting from March 2020 up to now (November 2020).

4. CONCLUSION

Since COVID-19 struck the world global cruises have suffered not only huge economic losses, but also become infamous as deadly cages of disease. Bad publicity has aggregated the situation. Though there is no good forecast for any of travel and tourism industry until the disease thrives, 'economies of scale' play their roll for cruises. While small firms have to close because of collapsed consumer demand and lack of cash reserves, cruise lines are big enough to withstand the challenges and face the crisis. Notwithstanding the fact that cruise's reputation has suffered greatly by images of trapped passengers on quarantined ships, the industry is ready to come back with new proposals. After CNN News officially declared in November Coronavirus vaccine developed by Pfizer to be 94.5% effective [13] , the industry has gotten the second wind.

References

[1] CLIA, Cruise Lines International Association. "STATE OF THE CRUISEINDUSTRY OUTLOOK 2020." Miami, Florida, 2020 https://cruising.org/en-gb/news-and-research/research/2019/december/state-of-the-cruise-industry-outlook-2020

[2] Monique Giese, Partner. "COVID-19 impacts on global cruise industry." KPMG. July 23, 2020. https://home.kpmg/xx/en/blogs/home/posts/2020/07/covid-19-impacts-on-global-cruise-industry.html#:~:text=Based%20on%20a%20recent%20survey,2021%20in%20comparison%20to%202019 (accessed November 2020).

[3] Peručić, Doris, "DIEM (I)." Analysis Of The World Cruise Industry. Zagreb, Croatia, 2019. 89-99.

[4] BBC News. 2018. https://www.bbc.com/news/av/world-43838805

[5] Micallef, Joseph V. Forbes. January 20, 2020. https://www.forbes.com/sites/joemicallef/2020/01/20/state-of-the-cruise-industry-smooth-sailing-into-the-2020s/?sh=6508c53e65fa (accessed 2020).

[6] Team, Markets & Technology Global Tourism. "World Bank Group." www.worldbank.org July 2020. https://openknowledge.worldbank.org/bitstream/handle/10986/34348/Rebuilding-Tourism-Competitiveness-Tourism-response-recovery-and-resilience-to-the-COVID-19-crisis.pdf?sequence=5&isAllowed=y (accessed November 2020)

[7] CNN News. November 2020. https://edition.cnn.com/2020/11/16/health/vaccines-coronavirus-covid-19-questions-answered-wellness/index.html.

[8] USA.gov. CDC Website. March 2020. https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e3.htm?s_cid=mm6912e3_e

[9] Prevention, Centers for Disease Control and. CDC Announces Modifications and Extension of No Sail Order for All Cruise Ships. 2020. https://www.cdc.gov/media/releases/2020/s0409-modifications-extension-no-sail-ships.html

[10] UNWTO. IMPACT OF COVID-19 ON GLOBAL TOURISM MADE CLEAR AS UNWTO COUNTS THE COST OF STANDSTILL. July 2020. https://www.unwto.org/news/impact-of-covid-19-on-global-tourism-made-clear-as-unwto-

counts-the-cost-of-standstill.

[11] Richter, Henzy. Cruising Post-COVID-19: Lessons and Challenges for the Cruise Ship Industry. June 2020. https://www.sustainalytics.com/esg-blog/cruising-post-covid-19-lessons-and-challenges-for-the-cruise-ship-industry/

[12] Theodore Syriopoulos, Michael Tsatsaronis, Martha Gorila. "The global cruise industry: Financial performance evaluation,." Research in Transportation Business & Management (ISSN 2210-5395), 2020: 100558.

[13] CNN. CNN News. November 2020. https://edition.cnn.com/2020/11/16/health/vaccines-coronavirus-covid-19-questions-answered-wellness/index.html

Table 1 - Doris Peručić, "Analysis Of The World Cruise Industry" Edward Bernays University College,Zagreb, Croatia;

Table 2- Marine Insight "Top 10 Largest Cruise Ships in 2020"

Figure 1- GOALDS – Goal Based Damage Stability of Passenger Ships (SNAME 2013 Annual Meeting)

Figure 4- Cruise share returns (%) – Post COVID-19 impact (Theodore Syriopoulos 2020)

Figure 5- COVID-19's impact on Global Travel and Tourism. Industry revenues from 2019 to 2020 (in million USD) Source: Statista

Effectiveness of Social Media Marketing in the Georgian Consumer Market

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Abstract. In today's digital world, traditional marketing is increasingly being integrated with high technology and Internet resources. The digitalization of global and local markets has put on the agenda an overview of practical marketing mechanisms and the search for new approaches. Traditional marketing communication tools and channels such as advertising, direct marketing, promotion, personal selling, catalogs, etc. They are gradually integrated with Internet marketing trends and are used more or less in a comprehensive manner.

This article discusses the Social Media Marketing development stages, the key platforms, the tools used, and their impact on the consumer market. As with traditional marketing, the effectiveness of social media marketing is determined by the nature of consumer markets and their awareness of a particular marketing event. The article also discusses marketing trends used in the Georgian consumer market and customer reviews in the same market.

Keyword: Marketing, Internet Marketing, SMM.

1. Introduction

The development of high technology in the modern world, including the global availability of the Internet, has completely changed the world agenda. The dimension of markets has changed in the digital world, leading to the need to change strategies to influence them. Companies have moved to the digital market in parallel in order to maintain competitiveness and stay up to the horizon of consumers.

The consumption of Internet resources has increased dramatically: 59.9% of the world's population and 96% of the European population use the Internet. The same trend is observed when using social networks, only 53% of the world's population are users of social networks. Of course, the growth in the volume of the digital market has not gone unnoticed by today's marketers, who have been able to quickly respond to current events. Intensive customer engagement and timely response from companies have fueled the further development and improvement of social media marketing used by large companies in a variety of ways.

"Using the Internet, Companies save their time and money. The marketing activities of many modern organizations are associated with the widespread use of the Internet. They create their own website, organize promotions, contests on the Internet, have representations in various social networks, communicate with users and get their opinion. The Internet is becoming more and more attractive for modern organizations as an effective means of public relations".([1], pp. 1). "In Georgia, as well as in the whole world, the future belongs only to those companies that will adapt to the changing economic environment." ([1], pp. 1)

That is why it is especially interesting how effective the use of digital marketing in Georgia is, in particular social media marketing, as well as customer feedback, which is especially important in the process of developing marketing strategies. The relevance of the topic led to the choice of the topic of the article and the study.

2. Theoretical and practical aspects of the development of marketing in social networks

Leveraging marketing efforts in today's business is an essential component. In the classical sense, "marketing is the process by which individuals and groups create what they want and need, creating value and sharing it with others" ([2], pp. 5). However, marketing has undergone an evolution that has led to changes in strategies and tools to keep up with current trends. E-commerce is on the agenda of global and national consumer markets, which is a game changer in the marketplace. Modern companies have come to agree that the Internet and modern technologies that are creating a new digital market have the greatest potential.

Social networking is a technology that simplifies relationships between people / social groups through the use of a variety of information and data. ([3], pp. 2) Thus, we can say that any combination of media that facilitates communication between people is a social network. The fact of any kind of feedback can be seen as the foundation of social media marketing, such as the heavy use of the telegraph in the 18th century. Well-known sociologist Émile Durkheim, believed that social networking began when people started using phones and radios.[3]

Despite the de facto beginnings of social media, we are becoming more and more curious about how modern social media was created and how it is integrated into the marketing mix. as is well known, in 1969, the US Advanced Research Projects Agency (ARPA) created the Internet, later called

"ARPHANET", the creation of an analogue of the Internet allowed the US government to exchange short text messages, which was considered a step forward. ([3], pp. 3)

Social networks were further developed in the 1970s, when the first chat box "MUD" was created in the virtual world, users downloaded and wrote relevant texts on this platform, then appeared BBS, which placed user ads on the Internet, all these platforms are a prerequisite for creating a new global network. Global public platforms such as WELL, Genie, Listserv and IRC were created in the 80s.

5P Concept

The marketing mix is the product strategy, distribution, promotion and pricing policy, which is carried out to ensure the production and exchange of products in the target markets. The development of high technology and the Internet has led to the integration of the 4P complex with Internet resources, at the same time it has added a 5th **P factor** - People, as the involvement of people in the Internet increases, which leads to the interests and attention of potential customers. This not only ensures the implementation of the appropriate strategies, but also influences the effectiveness of other 4P factors.

When discussing the elements of the marketing complex in the context of Internet marketing, each of them appears in a modified form. **The product** is presented in the Internet space with additional features, various parameters, taking into account the interests of potential customers, which makes the offered product and service as highly personalized as possible. The results of the survey in our study show that 65.4% of Georgian consumers often find the desired company / product / service in the form of advertising on social networks, and 33.2% rarely, but only 1.5% of respondents have never met such an advertisement. In the case of **Price**, it has become easier to segment customers and identify potential customers, as consumers themselves observe the prices offered by the company through various catalogs and online shops. There is a specific tendency for price policy openness in the Georgian market, as many companies do not provide consumers with mass prices for products /services. According to results of our survey, 82.9% of respondents confirm this trend and note that companies often ask them to write to them in person, only 8.3% of respondents state that the price of products is directly stated, while 4.4% did not notice a similar trend. There are many reasons for this tendency: The first is that the selling company is afraid of price dumping from competitors, the second reason is that the cost of products is directly proportional to the dollar / euro exchange rate, which does not allow setting a fixed price, and the third reason is the company's attempt to make the customer

relationship as loyal and personalized as possible through direct communication, furthermore, the interest shown by the buyer in the case of a personalized subscription indicates a high likelihood that the buyer will want to purchase the product, which of course allows the seller to better convince the buyer during the purchasing process. However, companies should definitely assess the risks of using such a communication strategy, as it can lead to negative attitudes from some users.

Place has become a secondary factor in the Internet space, because for the consumer it is important not where his desired product is located, but at what time it will be delivered. This circumstance made the company think about the development and improvement of the quality of logistics services in order to timely and quickly deliver products to customers. However, a link to the location of the company (office / commercial / administrative building) is necessary in the SEO optimization process, since the placement of contact information on web portals is necessary for page ranking. According to our survey, 41.5% of respondents believe that the location of a shop, in the case of online shopping often affects the delivery time, which they attach importance to, and 29.8% believe that the location always matters, while only 28.3% of respondents believes that the location of the company does not matter if you purchase online.

The process of product **Promotion** through internet has been relatively simplified due to the availability of optimal means of communication. Product promotion with the help of online platforms has become relatively easy, as the online resource allows marketers to present their product in a variety of ways: Catalogs, online advertisements and various visual effects make the product / service more attractive. This trend is evident in the daily life of Georgian consumers. In our survey, respondents to the question: "Do you find on the Internet advertisements for the products you just searched for on various platforms?" This fact is confirmed. 62% of respondents say that they often encounter such advertising, 27.3% say that they rarely, although they realize, only 9.8% say that they have not observed such a trend, 1% of respondents have not encountered such advertising.

People have become an essential element of the marketing mix as the rest of the elements depend on it and they will not be able to perfect the marketing formula without people. People include all people who are directly or indirectly involved in the production and promotion of a product / service. In people we might consider two sides, on the one hand hired people who design and produce products, conduct marketing research and identify customer demand, produce products and services, care about their quality and availability, promote them. On the other hand, people who buy products indirectly and directly value the service, the quality of the product, the price. These people willingly

or unwillingly influence the image of the company, the promotion of their products, as well as the formation of the brand. Any kind of feedback provided by them contributes to or, conversely, damages the formation of the company's image.

Social Media Marketing platforms and their tools

According to a study by DataReportal.com, the media portal of the world digital statistics, the most popular social media platforms in the world are: Facebook, YouTube, Fb Messenger, Instagram, LinkedIn, Twitter. Consider some of them:

Facebook is a social network founded in 2004 by Mark Zuckerberg, Eduardo Caverin, Dustin Moskowitz and Chris Hugo. Today, Facebook has more than a billion users worldwide. Consumer activism has activated marketers and advertising agencies to take advantage of this wide audience. Originally Facebook was a social media support network, today it is a powerful platform for implementing a digital marketing strategy. Facebook has many ways for brands and organizations to connect with potential customers. These methods include: business pages (the ability to create an online directory); Advertising; Forward messages; Direct sales. Such marketing efforts are especially beneficial for small businesses. Facebook allows you to create and distribute the content you want, and brands also have the ability to have two-way conversations with users in real time. Facebook's search functionality has been greatly enhanced to enable marketers to better research the market. Since demographic and psychographic information about consumers is collected on the mentioned social platform, digital marketers can use the so-called “Targeting” or marketing efforts to the target segment. In addition, a message posted on Facebook is accompanied by a conversion (“Conversion” is the same action that a user performs in an online transaction provided for by an online advertising campaign, as a result of which the company receives financial or any other benefits ” ([4], pp. 41)

Thus, Facebook represents the most popular marketing choice used by global brands and other small business representatives. It offers companies an audience of 2 billion and a large number of audience, making it a universal way to raise brand awareness. Affordable analytics, useful business tools, a diverse and diverse advertising space have all made Facebook the number one social media marketing platform.

YouTube Video Content Replacement Website, created on February 14, 2005 by Steve Chen, Chad Hurley, and Jawed Karim. Their original idea was to get users to upload amateur and home videos. YouTube is available for individuals and companies, they can create a completely free account, carry out their own branding and create the desired content in any field. Users (here: viewers)

subscribe to various channels, with the result that they receive messages from companies, news and, most importantly, updated advertising content. It was with the help of YouTube that blogs, video blogs were created, which are updated monthly, weekly and even daily. Today, blogging has become a new profession, allowing the blogger to actively express their own attitudes, views and experiences towards brands. This strategy is used in social media marketing and is called Influencer marketing. This is widely used on the Youtube platform. For example, Unboxing videos where an influential / famous person opens the packaging of a particular brand of products and shows it to the audience. This technique is used in the fields of technology, fashion and beauty. We often see the use of this type of marketing in the social media space of Georgia, there is, for example, Tako Sazina, who runs his own video blog on various cosmetics, such as PSP, Miniso, Morebeauty, Alix Avien, GPS and others. Products of brands that are tailored to the Georgian audience.

Youtube social media marketing is considered in two aspects: the first is paid advertising promoting a certain brand of video content, which accordingly increases the number of users, and the second is the brand channel, which allows the company to perform content and audience analytics and perform various functions. YouTube offers companies different options for advertising. For example, the "video promotion" function, the "fan search" function, etc. Content marketing strategy is used in the presence of a brand channel. Brand content should not be exaggerated by advertising, but should convey the core values of the brand. Many brands use the YouTube channel to introduce new products.

Instagram is a social network that users upload photos and videos to. It was created by Kevin Systrom in 2010. His main goal was to create another social network where users could publish whatever they like. Thus, Instagram was not only a social network, but also content that matched the interests and character of each user. That's the inspiration for the authors was the famous whiskey maker Bourbon, named after the original author of the platform. We can assume that due to such a specific niche and different approach, Instagram has become a popular social network for months, on the first day Instagram had 25 thousand users. [5]

Thus, Instagram is a popular mobile platform that should definitely be considered in the marketing strategy of a company that wants to communicate with customers.

Twitter is the most popular microblogging. it is a platform on which users can make short text statements (approximately 140 characters) that anyone can view. Just like on Instagram, Twitter companies can categorize their messages. This tool is also useful for promoting company forums, conferences, B2B meetings, brand or product presentation and other events. Twitter has become an

important marketing tool for many government organizations, brands and companies. Many brands use it successfully in customer service, market research and customer feedback. The efficiency of the platform is first and foremost the best way to disseminate information.

Thus, Twitter is considered to be a powerful marketing tool of brands and various companies with high authority, having two-way communication systems. This platform provides wide access to the customer and raises his awareness.

LinkedIn is a professional social network that brings together 740 million users from 55 million companies in 200 countries.

Thus, from a marketing point of view, LinkedIn is an excellent tool for raising company awareness, attracting targeted audiences and building partnerships. It offers marketers a wide range of advertising tools: advertised content; Advertising email that is delivered to the target audience in the form of personal messages as well as text ads that are placed on the LinkedIn platform.

3. Effectiveness of using social media marketing in the Georgian consumer market

The Georgian digital market is just taking off, which is indicated by the activation of companies operating in the Georgian market on social networks and various platforms. This is important for these companies to gain a competitive advantage, as the number of Georgian users on social media platforms is growing daily. Due to the urgency of the topic, it became important to determine the level of involvement and interaction of Georgian consumers on social media platforms, and the effectiveness of marketing measures implemented through the same channels.

The study used an empirical method, in particular a general electronic consumer survey. The survey included 205 respondents. A total of 205 respondents were interviewed. Including 141 females (69.8%) and 61 (30.2%) males. 45.6% (94) of the respondents were under 18-24 years old, 36.4% (74) were under 25-34 years old, and the relatively older generation under 35-44 was 8.7% (18), 45-60 Under the age of 4.9% (10), as for the age group of 14-17 years, adults, of which 9 people participated in the survey, which was 4.4% of respondents.

Most visited websites in Georgia: *Google, YouTube, 1Tv.ge, Adjaranet.com, Facebook, Wikipedia, Yahoo, Ok.ru, Myauto.ge, Adjarabet.com.* Data analysis datareportal.com shows the following trend in Georgia, where the population mainly uses search engines, as well as information portals and social networks, as well as various platforms for replacing video content and gambling

portal. In addition to Facebook, Instagram is also a popular social network in Georgia, which according to 2021 data has 1.21 million Georgian users. As for the results of our survey, their analysis shows a similar trend: To determine the level of social media use, respondents were asked if they use social media. The survey showed that 98.5% of respondents use social networks, and 1.5% do not.

In the process of determining the rates of use of social networks by users in Georgia, it was also important to identify the main platforms that they use mainly. Thus, the most popular and used social networks in Georgia among the respondents are: Facebook - 98.5% (202), YouTube - 81% (166), Instagram - 77.6% (159), Pinterest - 37.6% (77), LinkedIn - 28.8% (59), TikTok - 25.4% (52), Twitter - 10.2% (21) and others. *Respondents had the opportunity to choose multiple answers. The resulting percentage distribution is over 100.

Based on the goals of users using social networks, marketers will be able to guess their area of interest, the behaviors of existing and potential users on the social network, and formulate the right communication strategy with them. According to our survey, the motives of the respondents are diverse, their goals in social networks are mainly limited to: communication, education, news and shopping. The percentage of motives for use is as follows: Social networks in Georgia are mainly used for communication - 94.1% (193); Understand the news - 81.5% (167); Education - 64.9% (133); 28.3% for purchases (58); Business for management - 31.7% (65), etc.

The frequency of use of social networks indicates the intensity of the impact of these platforms on the user himself, as 53.9% (111) of respondents use social networks on a daily basis, and 44.2% (91) use them every hour. Only 0.5% of respondents never use social networks. This result once again confirms the view that social networks are part of the daily life of Georgian consumers, which indicates the need to develop new channels and strategies for direct communication with them.

In order to assess the impact of social media marketing efforts on consumers, respondents answered questions such as: "Does the presence of a company / brand in the social network affect your purchasing process?" Mostly positive results are observed in this regard, which indicates that the existence of a brand or company in social networks is important for consumers in the Georgian market. For 84.5% of the respondents, the existence of a company / brand in social networks is important, while for 12.6% it is not.

Often users use social media information posted by companies and their representatives, this may be different types of marketing information. For this purpose, it was important to determine whether Georgian consumers trust the information posted on the social network and how much they

use it in the purchase process. 49% of respondents say that they often rely on information received on the social network, which has a great impact on the purchasing process, 7.8% always rely, and 41.3% rarely, but still rely on the information spread on these platforms, and only 1.9% never Relies on similar information. Thus, it can be noted that most of the users follow any information spread on social networks and use it in the purchase process. This proves that marketers must post the kind of information that will play a crucial role in the customer buying process. Thus, it can be noted that most of the users follow any information spread on social networks and use it in the purchase process. This proves that marketers must post the kind of information that will play a crucial role in the customer buying process.

Word Of Mouth is quite well established in the Georgian market, as the Georgian society likes to share this or that experience in both negative and positive aspects. Word Of Mouth is one of the forms of marketing effort in which users themselves mention the name of the company or its products and share their experience with other potential customers. It can be said that traditional advertising is often irritating for consumers in the Georgian market and they are always skeptical about discounts, promotions or various offers, but not when a friend or family member offers them the same discount. 68% of respondents interviewed during the survey confirm that the opinion of users posted on a social network is important to them, which further influences the decision to purchase. 28.2% say they rarely act, and 3.9% say they never acted in accordance with someone else's opinion about the process on social media. That is why companies operating in the Georgian market must be able to respond in a timely and correct manner with negative or even positive feedback from the customer on the social network.

Proper use of communication channels is crucial in the implementation of the strategies developed by the marketer. No less noteworthy are the channels through which consumers receive information on the Georgian market from various companies. 92.7% of respondents say they get information about products and promotions offered by companies, mainly from social networks. 48.8% (100) even from family members or friends, which also confirms Word Of Mouth statistics. 24.9% say they receive marketing messages through outdoor advertising, and 24.9% (51) are still from the seller. * Respondents had the opportunity to choose several answers, resulting in a percentage distribution of over 100.

Since consumers in the Georgian market receive marketing messages through social networks, we were interested in what kind of information their companies provide. According to the survey

results, users mainly get information: Discounts, promotions - 87.3%, as well as information about new products / services - 73.2%, general information about products / services - 64.4%, information about other customers' experience - 59%, only 24.5% Social media is a source of inspiration.

We were interested in whether Georgian potential users considered social networks as one of the most powerful tools of communication. The majority of respondents (90.8%) believe that social media is a powerful tool for marketing communication, only 4.4% are skeptical about this tool of communication.

The high level of customer interaction indicates the effectiveness of the marketing measures used through this platform. This part of our survey assesses the frequency and quality of customer engagement, which companies are frequently interacted with and converted to, and how they behave on social media platforms.

The constant presence of the company in the eyes of the customers is one of the tasks of the marketer. In this regard, the involvement of consumers is also important, how much they are interested in the activity of companies on social media platforms. 68% of respondents follow companies represented in the Georgian market on social networks, while 28.2% rarely, although they have done so, and only 3.9% never follow.

Many companies operating in the Georgian market use social media to promote their products or brands, but not all of them are intensive and often forgotten by consumers. That is why it was important to identify the companies that operate in the Georgian market and at the same time remember the potential buyer through social media channels. Survey of respondents reveals that among the companies operating in the Georgian consumer market, social media marketing tools are used by companies such as: technic shop (Zoommer, Elite Electronics, Alta, Technolab.) Banks (TBC, Bank of Georgia), delivery service (Glovo, Volt. ..) and other brands such as PSP, Altersox, Meama, Gorgia, AgroHub, Sandomi, Herbalife, Whistler, Tegeta Motors, Miniso, Nabeghlavi, etc.

As already mentioned, customer engagement and direct sharing of the experience gained by them affects the company's position, its brand and sales volume. It was important to find out how intensively Georgian consumers do this. Direct participation of surveyed users in order to share their experiences on social networks, most of the respondents here say that they rarely share (63.6%) - 131, after sharing a positive or negative experience with the company, and never share (24.3%)) - 50.

Using social media marketing strategies to motivate consumers to buy this or that product becomes part of the agenda of consumers and companies. Often, companies use these platforms to

inform customers about current promotions and various marketing offers. To determine the respondents' attitude towards this process, they answered whether it is useful information which they found out through the social network to have a discount or other offer in the store? 75% of respondents used discounts and promotions posted on social networks, 19.4% rarely, and 3.9% never.

Companies often choose inappropriate and incorrect channels when communicating with customers. As part of the study, it was important to determine whether social networks were the best channel for direct communication with users. Thus, 79.6% of respondents believe that social networking is the best way for companies to communicate with them as a customer.

Conclusion

Social media marketing is the best tool for modern companies to be competitive and communicate directly with the target segment, which is confirmed by the analysis of international scientific papers. The research in this article also convinced us of the need to use social media marketing to run a successful marketing strategy.

Thus, social media marketing is the future of marketing, which is an unconditional means of gaining companies' competitiveness. That is why the involvement of Georgian companies in social media networks ensures their awareness, visibility and the formation of the desired image. Consequently, companies need to track social media rankings and use these channels in their customer relationship process. Therefore, the involvement of large and small business companies operating in the Georgian market in the social media space should be strengthened and appropriate integrated marketing strategies should be developed.

The process of digitalization has led to the integration of traditional marketing with the Internet, which has led to the emergence of modern marketing trends such as digital marketing, in particular social media marketing. This process has created modern marketing concepts that are more dramatically reflected in real-time consumer behavior, as evidenced by a qualitative study conducted as part of a study. In parallel with the integration with these processes, companies operating in the Georgian market should make consumers aware, in particular, to increase the awareness of Georgian consumers about the types of social media marketing and their tools.

The level of influence of Word of Mouth in the digital market is increasing, which necessitates the attention of marketers and the regulation of this process. This is also confirmed by our research,

which showed that the majority of consumers take into account the information spread on social media during the procurement process, which is an important fact for marketers working in the Georgian market, because consumers' opinions must always be understood. Therefore, it is recommended to fully monitor social networks and respond adequately to positive or negative recommendations, which will ensure successful marketing management.

The process of global 'internetization', of course, also affected Georgia, which changed the agenda of existing markets and their users. The results of the qualitative research once again confirmed that social networks are part of the daily life of Georgian consumers, which indicates the need to develop new channels and strategies for direct communication with them. Our qualitative research also showed the most popular social media outlets in Georgia among consumers, the process of interaction with them and the level of impact of social media outlets as marketing communication channels on the same users. Therefore, companies operating in the Georgian market should develop marketing strategies that will be integrated with the social platforms that are most often used by Georgian consumers.

In the global markets, there is a significant increase in the role of social media marketing, which is due to the expansion of the audience of the same platforms and the growth of their ratings. Therefore, companies focus in this direction and pay more attention to customer interaction and the effectiveness of the measures taken by them. As for the usability of social media marketing tools by companies operating in the Georgian market, based on the survey results, we can say that various companies operating in the Georgian market are actively using social media to promote the company or its products. The results of the research show that these types of marketing tools are used by electrical equipment stores, banks, delivery services, etc. In order to develop the market and move companies forward, it is important to increase their involvement in social media platforms and develop social media marketing strategies tailored to the Georgian market.

Thus, based on the analysis of the research results, it is confirmed that social media marketing influences consumer behavior in the Georgian consumer market.

References

[1] Mermanishvili T., "The phenomenon of digital marketing in modern business", (2018), III International Scientific Conference: "Challenges of Globalization in Economics and Business" (TSU), 2021. Link: http://eprints.tsu.ge/1325/ p.1-2

[2] Kotler f. Armstrong g. (2015) "Fundamentals of Marketing", Tbilisi, Bakur Sulakauri Publishing House

[3] Edosomwan, S. O. (2011 January). “The history of social media and its impact on business.” The Journal of Applied Management & Entrepreneurship, Pg.1-14. Retrieved May 9 , 2021 from: https://www.researchgate.net/publication/303216233_The_history_of_social_media_and_its_impact_on_business

[4] Mamuladze G., Abashidze I., (2020), "Online Marketing" (reader), Batumi Shota Rustaveli State University, Faculty of Economics and Business.

[5] Walsh, S. (12 April 2021). searchenginejournal.com “44 Instagram Statistics and Facts for 2021.” Retrieved from: https://www.searchenginejournal.com/instagram-facts/314439/#close

The Study of Migration Influence on the Labor Market Structure and Employment in Georgia

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Abstract. The present work is aimed at the study of impact of migration on labor marker structure and employment. Migration is a complex, multifaceted and very painful issue for our country. There is two forms of the migration - internal and external, both with its own peculiarities, aims and results.Both may be discussed in positive and negative contents, but taking into account a small scale of population in Georgia, external migration has more negative than positive sides and threats on the sustainable demographic development of the country. To identify the internal migration impact, we have used the official statistic information from National Statistics Office of Georgia, also the research materials of the scientific-research grant projects and the Neoclassical theory of migration. We have discussed as well the impact of the external migration on the demographic development of the country and on the employment structure. There are given particulars of the different types of migrants, and the accent is made on Seafarers, specifically are seafarers migrants or not. Research in regard of the seafarers is made on basis of the information of Maritime Transport Agency of Georgia, according which is shown growth of the seafarers employment. Works of Georgian migration and demography researchers are used within the frame of the research.

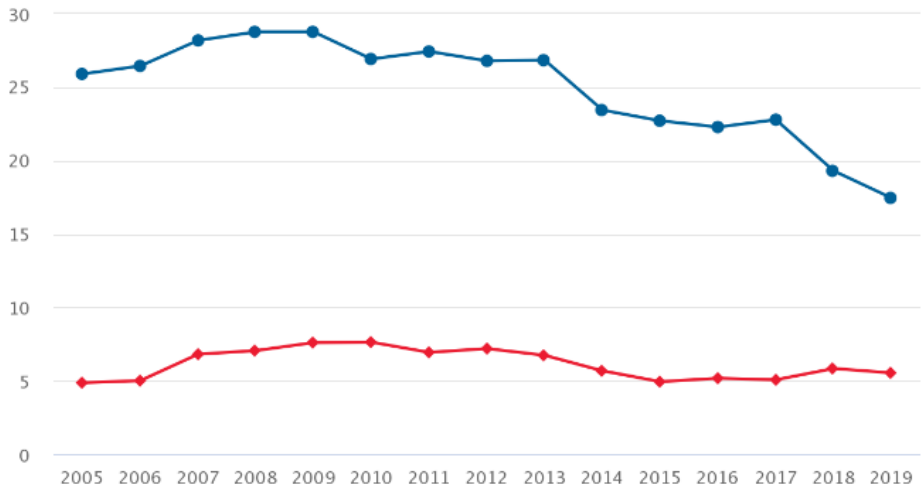
Keywords: migration, unemployment, employment, population, seafaarer

Migration has made significant changes in social-economic development of country, namely in modification of population social structure and as well in context of the sustainable development of country in general. Internal and external migration processes are sharply defined. Both of them have reasons and consequences, what may couse increase of internal migration or vice versa, incrase of external migration. However, according to researches, reversal is rare, what is confirmed in this paper as well. Our goal is to identify the impact of two types of migration on the structure of employment market and employment, also to show what influence can have the uncontrolled migration on sustainable demographic development and how imminent is to have correct migration policy.

According to the geographical structure of the country, population shall be redistributed in such way, to avoid disbalance between Able-bodied population and finansial resources. If the most part of able-bodied population is concentrated in cities, especially young population, from one side it

may cause the increase of unemployment in cities and from the other side, it hinders the sustainable development of mountainous regions, because economically inactive population is less involved in the production process. Diagram 1 shows the level of unemployment in Georgian cities and villages.

Diagram 1. Unemployment rate of Georgian population by city and village (by %)



blue – City; red - village

Source: National Statistics Office of Georgia

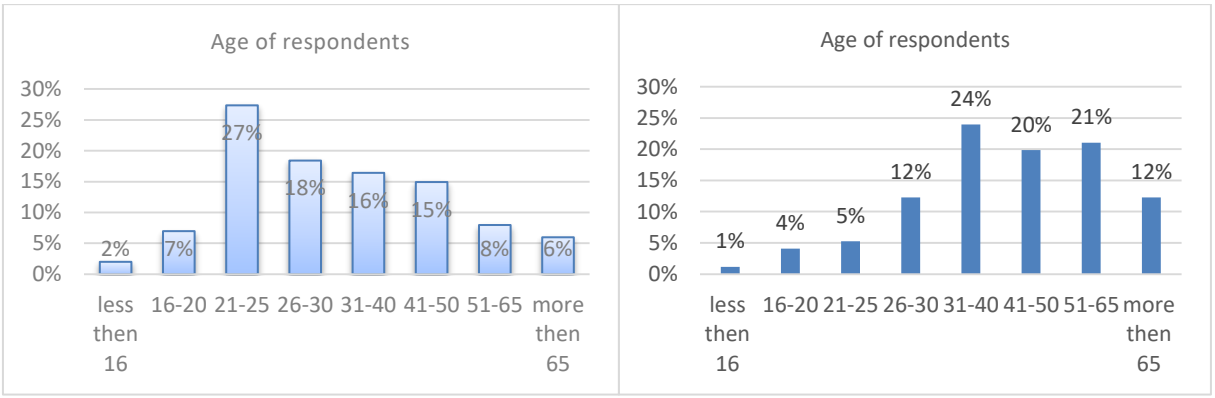
As we see on the diagram 1, the unemployment range in cities is higher than in villages, what is caused by the reason that in the villages is higher range of self-employed population. In addition to this reason there are other reasons what makes situation, that demand for labor in the city exceeds the supply of labor, such: difficulties of employment in cities, law wages, unskilled workforce. According to these reasons unemployed workforce, hoping for employment, migrates from their cities and regions. In the better case, circular migration is activated in neighboring cities or neighboring countries, and in the worst case, the unemployed population migrates abroad for an indefinite period of time (mainly in the USA and European countries). In 2018, under the leadership of Professor Avtandil Sulaberidze, N. Gomelauri and we studied the circular migration from Adjara to Turkey, which is one of the most painful issues not only in Adjara, but in Georgia in general [2].

Why do people have a migratory need? To clarify this, shall be its meaning. A migratory need is “a condition of a person who needs to change his or her living environment and because of this migrates. Migration needs are driven by different needs, aspirations, goals and values that cannot be met or achieved in a given environment" [1]. Unemployment and a low standard of living (poverty) remain the main causes of migration needs in Georgia today.

In order to research internal migration, we conducted a survey in one of the highlands of Adjara, where we surveyed about 600 respondents through a sociological survey, as well as the population who left the city from the highlands. For the purposes of our scientific article, we present some important conclusions from the above research. Diagram 2 from the results of the mentioned research shows that the majority of migrants are young, economically active, while the rest of the rural population is older. This fact proves that the villages are empty of young people.

Diagram 2. Age structure of respondents (%)

Population migrated to the City *Local population*

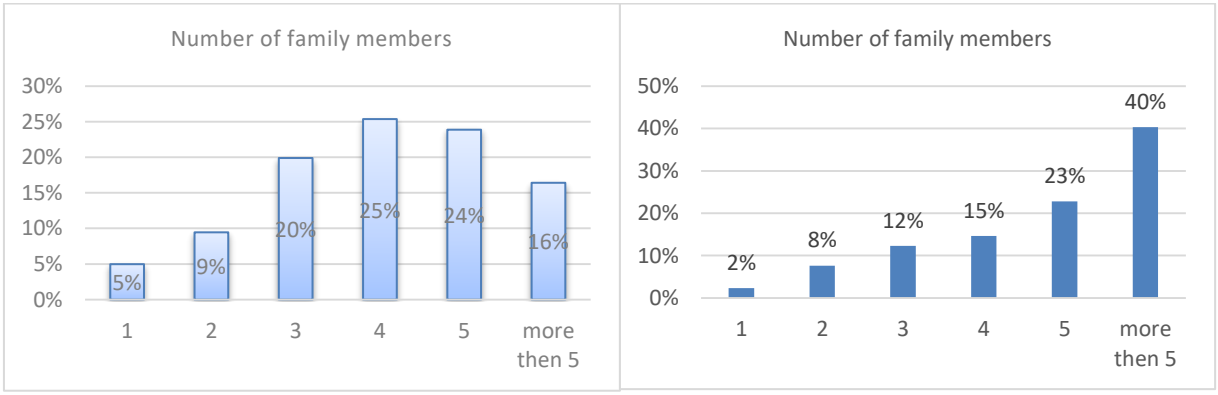


Source: Targeted scientific grant project of Batumi Shota Rustaveli State University.

Diagram 3 shows us that amount of the family members in families migrated from villages to the cities are lower than in villages, what demonstrates the negative impact of migration on the demographic development of the region.

Diagram 3. Change in the number of family members as a result of migration (%)

Population migrated to the City *Local population*

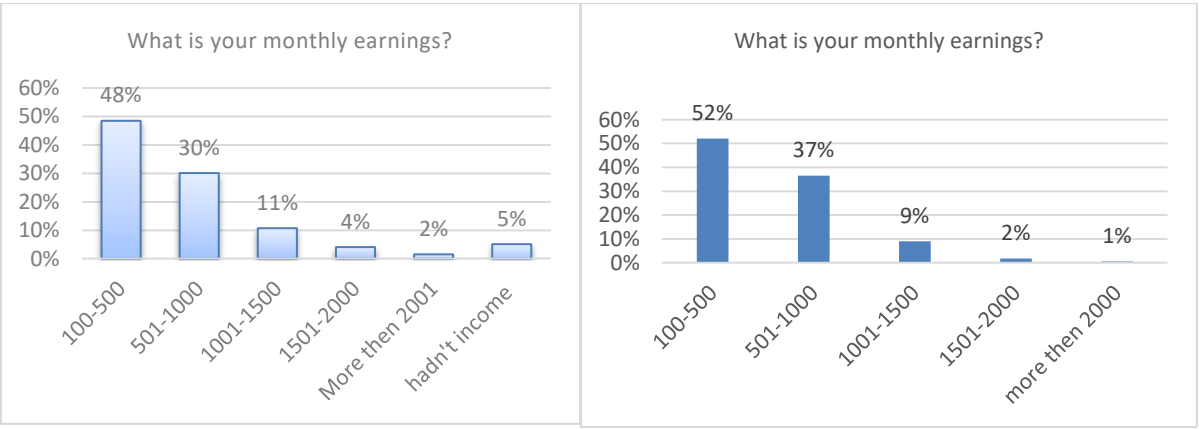


Source: Targeted scientific grant project of Batumi Shota Rustaveli State University.

Diagram 4 shows a comparison of the monthly incomes of rural residents living in cityes and living in rural areas. Comparing the incomes of these two target groups, it was found that the incomes of both of them mainly range from 100 to 500 GEL. Income from 501 to 1000 GEL (37%) is more in rural areas than in population migrated in urban areas (30%). If we take into account the fact that according to Geostat data, the average monthly nominal salary in Adjara is 866 GEL (2018), it turns out that the number of people in rural areas who can receive a nominal salary or more is higher. It is also important to note that most of the rural respondents are producers of various agricultural crops, which in addition to selling, they use for their own consumption, also have cattle, the product obtained from them is also usable for their own consumption, in other words, if the urban population is buying agricultural products, rural people bring the same products themselves and the amount they do not spend on food can be counted as income received in natural form. Therefore, the monthly income for the rural population is much higher than for the urban population. If we also take into account that various benefits apply under rural law (utility, tax, salary supplements), it turns out that the monthly expenses are also lower than those of the urban population" [3].

Diagram 4. Monthly household income (%)

Population migrated to the City *Local population*



Source: Targeted scientific grant project of Batumi Shota Rustaveli State University.

From all above mentioned we can conclude, that insufficient income may be one but not the determining factor in meeting migration needs and changing migratory attitudes2.

“Respondents name the main reasons for internal migration: First - the desire to get higher education, which causes young people to migrate from the village to the city of Batumi. Employing

[2] Migratory mood - a person's readiness for psychophysical activity aimed at meeting the needs of migration.

while studying here forces them to give up the prospect of going back. Secondly - there is an unfavorable ecological situation. The third reason is the lack of access to health care. One of the respondents adds that “there is only one medical point in Skhalta gorge, while the area of Skhalta is about half of the whole Khulo municipality”. The fourth reason is “absence” of jobs. There is another problem with education, which contributes to the growth of internal migration. Due to the fact that with education received at school is not enough to be enrolled in a higher university, there is a need of an additional training. Lack of such additional preparatory courses leads to their migration to city, resulting in the emptying of villages. “The attitude towards the return of those who are already in the process of internal migration also deserves special attention. Most of the respondent’s state that they do not intend to return in the near future, as the situation there has not changed and is unlikely to change. And those who states that they do not know yet how they will act, during a relatively long and in-depth interview, we get the same answer and name the same reasons we had in the previous case" [3]. No less important issue for our country with external migration, during which the population moves outside the country, or migration from outside the country.

The theory of external migration dates back to the 19th century. There are various theories of external migration: New Economics Theory of Migration, Migration Transition Theory, World Migration Systems Theory, Neoclassical Migration Theory, Dual Labor Market Migration Theory, Family Migration and Migration Selectivity Theory. We have derived Migration New Economics Theory, according to which people make the decision to migrate in groups, in agreement with the family, and the main motive for such a decision is to increase their family income and reduce the risks of market failures typical of developing countries. Later, 1970-1980 years, contemporary researchers have developed a new neoclassical theory of migration, according to which, “countries with a high share of labor compared to capital are characterized by lower market wages, countries with a low share of labor relative to capital have higher market wages. These income disparities are forcing workers to move from low-wage to high-wage countries" [1].

The strategic document defining the migration policy was first created in Georgia in 1997. This document was mainly declarative in nature and did not specify a specific action plan. In the following years (2013-2015) it was revised, with an action plan and institutional development of migration management mechanisms. "The Strategic Document defining the migration policy for 2016-2020 is the third document, which is based on the results achieved in recent years in the field of migration management, addresses the existing challenges and establishes mechanisms to deal with them" [4]. This document is of great importance for the proper management of the complex and

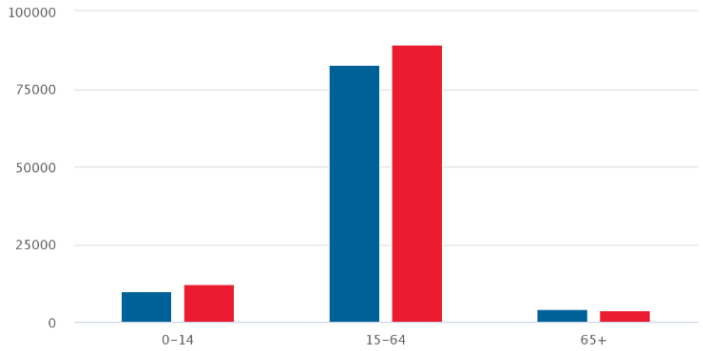
qualitatively multi-component migration process. Its goal is “to create a legislative and institutional space for migration management in Georgia by 2020, which will ensure the country to be even closer to the EU; Facilitate the reintegration of returned migrants, using the positive economic and demographic aspects of migration for the development of the country [4].

During the research we have identified statistic information regarding on the distribution of immigrants and emigrants by age.

Graph 1. Distribution of Emigrants and Migrants by Age 2019 (in Thousands)

Distribution of emigrants and Immigrants by age for 2019

(Blue – Immigrants; red - emigrants)



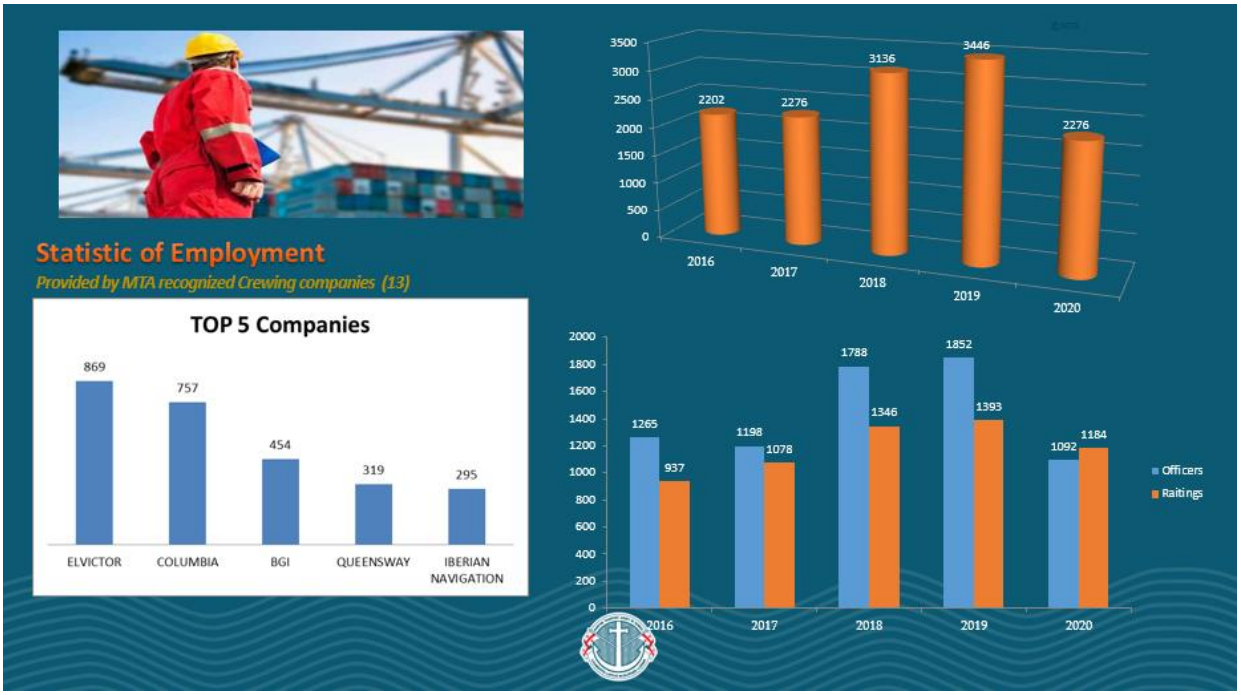
Source: GeoStat

According to the given graph, a large proportion of emigrants are of working age population. This means that one of the main factors of production - labor, is consumed by the economies of other countries, which is a negative side of migration, with consequent differentiated consequences. We distinguish two of them: the shortage of Georgian specialists on the one hand leads to the employment of foreign nationals in the local labor market, for example, in the construction sector. On the other hand, the constant outflow of economically active population may cause problems in the future if there is a real opportunity to move to a productive economy. (During the pandemic, a new challenge arose to move the country from a consumer economy to a productive economy). Remittances made by the emigrated workforce by electronical transfer shall be considered as a potential of use of emigrants. "According to the World Bank, electronic transfers in Georgia account for about 60-70 percent of all incoming remittances" [4].

While working on migration issues and participating in different studies, arose new idea to research workforce involved in maritime industry, in particular consider seafarers as a migrant or not. There are three types of migrants: “1. Temporary migrants - persons who are temporarily outside their home country; 2. Migrants in transit - persons moving from one country to another through a third

country (countries); 3. Migrant workers - temporary migrants who work in the host country or are willing to work for paid work [1]. From the listed three categories we can consider seafarers to the third – Migrant workers, however according to the various legal aspects of seafarer's employment, their consideration as labor migrants requires clarification of certain specific nuances. In particular, it has to be mentioned that seafarers are employed in high seas on vessels, while migrant workers are based on shore. Seafarers do not have a recipient country, it is a vessel under the jurisdiction of flag state, but this can be changed in certain circumstances, flag state can be changed or an employment vessel. In this regard we have to discuss other nuances as well, in most cases flag state is not owner of the vessel, or there are some cases that shipowner is privat company from one country and crew is employed by the company form other country re4sidence. In addition, seafarers cannot be considered residents of the countries that employ them, as they do not / cannot stay ashore for the time required to obtain residency when entering various ports. Also, in the event of an incident on shore, the incident is legally dealt with under the law of the country where the incident took place and not under the law of the country that is considered to be the official employer of the seafarer. There are more specific legal issues which have to be researched more detailed. According to the above-mentioned reasons seafarers can be considered as a Specific Migrant Workers, whose share of labor in the country's economy may be higher than that of other migrants. We have requested information from GeoStat to clarify this issue. According to the GeoStat position Seafarers can't be considered as migrants, because the reason that they have special passports (Seamans Books) like for example diplomatic servants. But in this case our position is different, because diplomatic servants are living and working in recipient countries, in case of seafarers it is not possible.

We also have requested information from Maritime Transport Agency of Georgia about sefarers amount and their employment. The employment rates of seafarers are quite high, and there is a shortage of specialists in some positions. There are about 12000 Seafarers in Georgia in general and about 9000 from them are employed, but according to the statistics from 2019 only 3444 seafarers from them are employed by Georgian resident companies. The income received from employed seafarers in the Georgian economy is about 180 million US dollars annually.



Source: Maritime Transport agency of Georgia.

The diagram below shows the employment rate of seafarers in the total number of employees by age. The diagram is based on the number of seafarers employed by employers recognized by the Maritime Transport Agency and calculates the percentage of employees in the total employment of the country according to the 2019 data. If we add officially employed seafarers to those, who are not officially registered by the agency, the figures on the diagram will double. It has to be mentioned as well that according to the data from GeoStat from 2017, 2018, 2019 the rate of employment is reducing over the years, but for seafarers employment rate is increasing.

Diagram 1. Seafarers employment

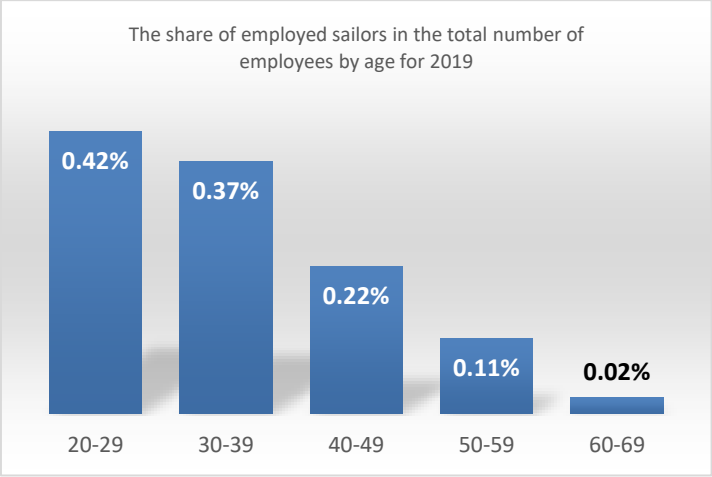


Table 1.

Distribution of employees by types of economic activity (Nace rev. 2), 2017-2019

A thousand

	2017	2018	2019
Total:	**1 706,6**	**1 694,2**	**1 690,2**
Rural, forestry and fish farming	735,9	659,0	644,6
Industry	142,0	144,9	139,0
Construction	82,8	99,0	102,0
Wholesale and retail trade; Repair of cars and motorcycles	171,6	185,4	197,0
Transport and warehousing	68,8	78,3	82,4
Accommodation and food delivery services	37,3	44,4	49,1
Information and communication	21,3	20,9	19,1
Financial and insurance services	30,7	33,8	30,9
Real estate services	3,0	4,4	3,9
Professional, scientific and technical services	21,6	21,3	19,1
Administrative and support service activities	18,2	21,4	22,5
State governance and defense; Mandatory social security	88,3	91,5	93,7
Education	156,4	155,4	154,2
Health and social services	66,8	65,4	60,6
Arts, Entertainment and Recreation	26,4	28,5	30,1
Other services	20,7	20,1	22,2
Activities of households as employers; Production of undifferentiated goods and services by households for their own consumption	14,2	19,4	18,0
Activities of extraterritorial organizations and bodies	0,5	1,1	1,4
Unidentified	0,2	-	0,4

Conclusion

In conclusion, the study of the impact of migration on the labor market and employment is imminent importance, since labor is one of the main factors of production. Both internal and external migration, for its many reasons, can significantly hinder the socio-economic development of our country. One of the main measures to stop internal migration is to ensure the economic stability of the population and to raise the standard of living in the villages and districts, so that the working population is less concentrated in the big cities. Although the main reason for migration is the lack of income in the highland regions, according to our research, the population is no less worried about the problem of improving living conditions. The main reason for the migration of young people is to live

in better conditions. The determinants of external migration are similar to those of internal migration. According to studies, there are cases when people from rural areas do not settle in the city and often leave the country for work illegally. (Going legally is associated with costs, which in most cases potential migrants do not have) We think that in order to stop migration, it is necessary to develop production, create jobs where both highly educated and professionally educated people will be employed. On the other hand, it will stop emigration to some extent. In general employment, it is important to promote the employment of seafarers as labor migrants of a specific nature. Nowadays, more and more young people are interested in the profession of a sailor, as employment in the maritime sector is a guarantee of high wages. High income, is a prerequisite for the financial stability and better life of each family, which also generates new cash (investment) flows in the Georgian economy and stimulates it.

References

[1] Tsuladze G.; *Short Encyclopedic Dictionary of Demography*; P. 156. 2012.

[2] Current migration problems in Georgia; Monograph; Chapter 6. p. 197. 2018.

[3] Chanidze K.; Tsiklashvili N,; Surmanidze Z .; "Mountain Law" and migration. *Proceedings of the Institute of Demography and Sociology of Ilia State University "Problems of Demography and Sociology"*. P. 291-315. 2020.

[4] Government Commission on Migration Issues .; Georgia Migration Strategy for 2016-2020; P. 44.

[5] Geostat - https://www.geostat.ge/ka/modules/categories/37/dasakmeba-khelfasebi

[6] Maritime Transport agency of Georgia - https://mta.gov.ge/

Maritime Discourse in Diachronic Aspect

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Abstract. The work deals with the Georgian maritime discourse in different time ranges. It shows the impact of dominant languages on verbal communication of Georgian seafarers at different times and their trace not only in oral but in written languages.

The research is connected to the very topical issue today, the purity of the Georgian language that is highly debatable among linguists. Language, language system, language policy is a complex phenomenon, study of which is inexhaustible and comprehensive. The work aims to depict the state of the Georgian maritime discourse, existing problems and to review the ways of solving them. Accordingly, it sets the following goals: to review the maritime discourse, identify barbarisms and neologisms, make a contrastive analysis of the examples found, present the impact of the globalization role.

The synchronous and diachronic approaches used in the study reveal the influence of Russian and English on the Georgian maritime discourse. Nothing can stop the process of entering and establishing new lexical elements in a language. It is a continuous factor, but not all the words are capable of entering the base language, most of them disappear with time passage. Language in general has the ability to protect itself.

Key words: Maritime discourse, barbarisms, neologisms.

The main tool for establishing communication is language, it is a means of exchanging opinions and having social interactions. Language exists with people, with society, they are interdependent and it is implausible to have them separately. Naturally, it is natural that with the advancement of the universe lexical composition of a language evolves as well. Society utilize those lexical units in which community the interaction is established. Accordingly, different discourses are distinguished, be it political, media discourse, scientific, technical or other.

Discourse has emerged as one of the directions of linguistics since the middle of the 20th century. There are different definitions of discourse. Some of them are presented below.

According to the online dictionary discourse represents the construction of knowledge toward specific subject and ways or ways of discussing that subject: a complex (union) of ideas, images, and practices related to a particular topic, social activity, or institution in society. These discursively

formed unions determine what is and what is not acceptable when discussing a particular subject or social activity, what knowledge is indispensable and relevant in a given context, and what types of individuals possess these characteristics. [1]

The notion of discourse is central to Michel Foucault's theoretical arguments and his methodology. Discourse can be defined as "a certain form of language, with its own rules, conditions and institutions, within which discourse is created and spread." For example, medical discourse includes the specific language of medicine, the knowledge it creates, and the professional institutions and social spaces it occupies. [2]

There is no comprehensive and accurate definition of discourse, although it can be said that discourse is primarily a type of words, word-combinations, expressions characteristic of a particular social group.

The language that the society uses is permeated with a view of their world. The linguistic picture of a sailor world is a very interesting phenomenon because sailors spend most of their lives in the water, hence their speech and maritime discourse are different and contain maritime lexical units.

The fact that English barbarisms and neologisms are abundant in the Georgian language is not a strange fact, nor is it surprising that the maritime vocabulary is undergoing some changes. Intercultural relations, which deepen especially in the period of globalization, are followed by linguistic changes, in the form of the invasion of foreign lexical units into Georgian, be it barbarisms, which is a very debatable issue among linguists today, or borrowed neologisms the establishment of which in the language takes place due to the absence of a corresponding word in a borrower language.

The object of synchronous linguistics is one given state of language, which is studied by synchronous linguistics in a way that it does not take into account the transformations (historical changes) that have caused the given state of language. Diachronic linguistics, by contrast, is based on the time factor. It determines what changes have taken place in this or that language over a period of time, what the rules for changing one synchronous state to another synchronous state are. It takes centuries for a language to move from one synchronous state to another synchronous state.

Language is a very powerful phenomenon, it has the ability to protect itself. The Russicisms or Anglicisms that are so actively circulating in our language, can be said that only manage to survive in an outer layer of it, in the peripheral zone of the language, and in most cases they are transformed into archaisms. In rare cases, they enter the nuclear zone and settle among the basic lexical units of language.

In the chart below, we highlight examples of barbarism and neologism and discuss language changes of this type in diachronic terms. The influence of Russian and English on maritime vocabulary is presented using synchronous and diachronic approaches.

Here are some examples of **barbarisms**:

Russian-Georgian examples:

(Tab.1) [3, 5, 6]

Barbarism	**Russian**	**Georgian**
ვინტელი	винтел	ხრახნი
ვალნარეზი	волнорез	ტალღასაჭრელი
კრენი	крен	გემის დაგვერდება
მაიაკი	маяк	შუქურა
ტრაპი	трап	გემის საბიჯელი
სტარში მეხანიკი	старший механик	უფროსი მექანიკოსი
პერვი მეხანიკი	первый механик	პირველი მექანიკოსი
ვტაროი მეხანიკი	втарой механик	მეორე მექანიკოსი
ვახტა	вахта	საგუშაგოცვლა
სმიჩკა	смычка	შემაერთებელი კავი(ღუზის ჯაჭვის25-27მ. საზომი)
ვახტაზე დგომა	стоять на вахте	მეთვალყურედ დგომა
მატორისტი	моторист	მემანქანე
ბუიოკი	буёк	ტივტივა,ბუი
სტარპომი	старпом	პირველი თანაშემწე
კრანოვშიკი	крановщик	ამწის ოპერატორი
უზელი	узел	კვანძი (სიჩქარის საზომი ერთეული)
კომანდირი	командир	ოფიცერი
ვადალაზი	водолаз	მყვინთავი
ვაენი კარაბლი	военный корабль	საომარი ხომალდი
გრუზი	груз	ტვირთი
გრუზავოი	грузовой	სატვირთო
ტამოჟნია	таможня	საბაჟო
მოშნოსტი	мощность	სიმძლავრე
კლაპანი	клапан	სარქველი
შტურმანი	штурман	ნავიგაციის ოფიცერი
გრუნტი	грунт	ფსკერი
კაიუტა	каюта	ოთახისმაგვარი სადგომი გემზე

An interesting case is observed in relation to the term ‘каюта’[kaiuta] , because today among the sailors in the spoken language there is the word ‘cabin’ along with ‘каюта’[kaiuta], which already indicates the influence of the English language. In this case, the event is very interesting, because the Georgian language is influenced by two languages, Russian, which had such a great influence that it even entered the Georgian Basic language and English.

The Russian language has dominated for years and its influence is evident in the examples above. Most of them are transliterated into Georgian and positioned in the nomintive case. If we analyze the mentioned examples, we can single out only a few of them, which were deeply grasped by the Georgian language and were also established in written language. For example: ‘трап’[trap], ‘вахта’[vakhta], ‘командир’[kamandir], ‘каюта’[kaiuta], ‘грунт’[grunt] - are found in Georgian dictionaries and in universal encyclopedic dictionaries as well.

English-Georgian examples: (Tab.2) [4, 5, 7]

Barbarism	**English**	**Georgian**
პროპელერი	propeller	სანავე ხრახნი
დრაფტი	draft/draught	წყალშიგი
ტანკერი	tanker	ნავთობსასხმელი გემი, ტანკერი
ლოკაცია	location	ადგილმდებარეობა
პირსი	piers	ნავმისადგომი
პისტონი	piston	დგუში
კადეტი	cadet	პრაქტიკანტი
ვორფი	wharf	ნავმისადგომი
მასტერი	Master	კაპიტანი
დოკერი	docker	მტვირთავი
რადარი	rudder	გემის საჭე, საჭის ფრთა
რადარი	radar	რადიოლოკატორი/რადიოგადამცემი
პილოტი	pilot	ლოცმანი
საუნდინგი		სიღრმის გაზომვა

სრასტერი	sounding thruster	სამანევრო ძრავა. დამხმარე მოწყობილობა, რომელიც ზრდის გემის მანევრირებას ნაპირთან მისვლის დროს, გემის დაბმის ან აშვების ოპერაციების დროს.
გროს ტონაჟი	gross tonnage	მთლიანი სარეგისტრო წონა/ტონაჟი/ბრუტო-ტონაჟი
ნეტ ტონაჟი	net tonnage	სუფთა სარეგისტრო (ტვირთის) წონა, ნეტო-ტონაჟი
ჯაჭვის სტოპერი	chain stopper	ჯაჭვის შემაკავებელი/შემაჩერებელი
დედვეითი	deadweight	სრული ტვირთამწეობა
ბიმსი	beam	გემის განივი კოჭი
კილი	keel	გემის ხერხემალი, გემის ფსკერის სიგრძეზე გადებული ძელი

The analysis of the English examples shows that, like the Russian examples, they entered the Georgian language mainly through transliteration, and most of them have a nominative case sign "i". Words like: Propeller, tanker, location, ballast, docker are already recorded in both written lanuage and dictionaries. While the Georgian language counts the years of relations with Russian, English is relatively new, although its influence on the Georgian language is great, both in various and maritime discourses. This fact can be explained by the factor of globalization, the rapid influence of English on the Georgian language and the pronunciation of many new lexical items in Georgian was accelerated by the factor of globalization. Naturally, mass and multicultural relationships are reflected in language.

In the given scheme we present examples that go through the processes of neologization in the Georgian language, we also note that the source of borrowed neologisms is the lack of an appropriate term in the borrower language, so nowadays if we do not react quickly and create the appropriate word, it will naturally lead to the establishment of a new neologism in Georgian by borrowing from English. The word ‘coamings’, for example, is of English origin – ‘coaming’ means a protective barrier from water, and it has already been established due to the lack of a corresponding lexical unit in the Georgian language.[5]

possible neologism’s examples:

(Tab.3) [4]

Possible neologism	English	Definition
ეარ დრაფტი	air draft	მანძილი წყალხაზიდან გემის უმაღლეს წერტილამდე
ფრიბორდი	freeboard	მანძილი წყალხაზიდან ბორტის კიდემდე
შპრინგი	spring	მისაბმელი თოკის/ბაგირის ერთ-ერთი სახეობა, რომელიც გემის წინ და უკან მოძრაობას აფერხებს.

In reviewing these examples, we underscore the team of linguists of the Batumi State Maritime Academy, who are actively involved in these processes and within the framework of the winning project "Electronic Translation / Explanatory Dictionary of English-Georgian Maritime Terminology", try to develop a correct, adequate translation of marine words or terms that will make a great contribution in liberating the Georgian language from maritime barbarisms.

Compared to previous centuries where interpersonal communication consisted mainly of oral, verbal communication, in the 21st century the picture of the world communication is depicted differently. Nowadays, the rapid development of digital technologies has changes interpersonal relationships and written communication is entering a fairly active phase. In addition, the Internet and technology give us an extraordinary opportunity to access a variety of literature, even maritime literature. Hence a relatively chaotic picture is created in the language. If earlier a new lexical unit first underwent certain stages in oral communication and after overcoming these stages reached the written language, nowadays the word can be entered directly in writing while translating literature due to the lack of a relevant concept or term in Georgian and then move to spoken language. Sailors also commence utilizing them actively in naval discourse.

Conclusions

The examples discussed in the topic are widely used in maritime discourse, here the Georgian language is outlined in diachronic aspect and the linguistic picture of the sailors' world in different epochs. During the Soviet era, the Georgian language was greatly influenced by Russian lexical units and Russianisms established, while today the Georgian language is strenuously influenced by the English language.

If we compare neologisms and barbarisms, we should note that the use of barbarisms is really undesirable and requires the development of a certain policy by linguists in order not to establish them in the Georgian vocabulary, linguists also consider them as language dirt. We are facing a completely different issue when analyzing neologisms. Neologism is created when a new item appears, a denotation that needs naming. In this case, if a word was first formed in English and then borrowed in Georgian, this action can be partially justified, as it may not be possible to create a new lexical unit in Georgian to indicate the exhaustive expression of a borrowed word. In such a case, Georgian linguists apply explanatory translation and there is a great possibility that the borrowed word will be freely established in the borrower language and will be combined with its usual, core vocabulary.

The alterations that take place in a language are constant and a consistent feature of a language. Linguists are constantly involved in these processes and are actively developing various linguistic approaches to overcome these processes painlessly. However, it takes centuries for a language to move from one synchronous state to another. If we compare the old Georgian, for example the 5th century Georgian with the present day Georgian, we will see radical changes, but the fact is that the language took many centuries to get such a changed picture.

Intercultural relations are not new for either Georgia or the Georgian language, it spans centuries and the Georgian language lasts for centuries as well. It is true that the period of globalization has accelerated these processes, but it should be noted that language is such a strong phenomenon that it has the ability to protect itself. Today, the Georgian language is under attack of new lexical units from different directions, and the maritime direction is not an exception. The maritime discourse has also been filled with barbarisms or borrowed neologisms, but with the tireless work of Georgian linguists, where we also single out the linguists of the Maritime Academy in terms of working on the maritime dictionary, we can boldly say that the Georgian language will endure for many centuries.

References

[1] National Parliamentary Library- Civil ენციკლოპედიური ლექსიკონი http://www.nplg.gov.ge/gwdict/index.php?a=term&d=5&t=10082

[2] ლექსიკონი-ცნობარი სოციალურ მეცნიერებებში, სოციალურ მეცნიერებათა ცენტრი 2016 http://dictionary.css.ge/content/discourse

[3] Английский для моряков: лексика и аббревиатура Автор: Эрмина Борисюк, ukr. 2019 https://yappi.com.ua/posts/read/anglijskij-dlya- moryakov

[4] Bezhanovi Z. „A Guide to Maritime English",Shota Rustaveli State University– 2010.

[5] ენის მოდელირების ასოციაცია, განმარტებითი ლექსიკონი, http://ena.ge/explanatory-online

[6] National Parliamentary Library. http://www.nplg.gov.ge/gwdict/index.php?a=index&d=8

[7] Oxford learner's dictionary. https://www.oxfordlearnersdictionaries.com/

Interdisciplinary Teaching of Natural Science Training Courses

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Abstract. Georgian sailors hold leading positions on the world market. Therefore, they need to be thoroughly trained and successfully integrated into international transport systems. The presented paper describes the introduction of interdisciplinary teaching, which is the basis for the success of the set goal. The introduction of this method of training will have a positive impact on the process of acquiring professional knowledge of a sailor and the formation of his personal qualities. It is well known that understanding most of the issues related to a sailor's professional activity is based on knowledge of the laws and theories of natural sciences, elements of higher mathematics, digital technologies, the use of alternative energy, environmental safety and others. The acquired knowledge should be used by the student both in the educational process and in future professional activities. The model of interdisciplinary training of sailor training allows to achieve the professional competencies that are formed in the student in the process of learning and training. Competence is the ability of a sailor to apply in practice the knowledge gained in the learning process and properly formed skills.

Keywords: interdisciplinary teaching, integration, professional knowledge and competence.

Today, maritime transport is the most in demand, and seafaring is one of the most prestigious, but at the same time difficult and dangerous professions. He must possess the special skills and personal qualities that are formed in the process of professional training. The main feature that makes the seafaring profession different from the rest is the increased responsibility. The safety of the occupants of the ship and of the ship itself depends on the accuracy, timeliness and urgency of repairs, troubleshooting or other work. To do this, a sailor must have deep and solid theoretical knowledge, be able to demonstrate this knowledge in practice, have the ability to carry out professional activities achieved through technical and research thinking, show resilience in stressful situations.

The introduction of rapidly evolving technologies and equipment on ships necessitated certain changes to the seafarer's professional training standard, which were duly reflected in the STCW Convention (1978). A conference was held in Manila in 2010 to discuss and approve amendments to the International Convention on the Training, Certification and Voyage of Seafarers. According to the adopted amendments, additional requirements for the quality of professional training of seafarers were

defined, competencies, knowledge and skills were specified [1]. The implementation of the adopted changes required the introduction of innovations in the process of preparation, training, teaching and research. The learning process was optimized, educational standards were met (industry characteristics adopted by the National Center for Educational Quality Enhancement in 2017), and the recommendations set out in IMO Model Course 7.02, 7.04, 7.08 were reflected in the syllabi.

We conducted a detailed analysis of the Manila changes, aiming to improve the quality of teaching. As a result, we decided to integrate the educational process. The foundation of special knowledge and skills should be laid from the first year of teaching. We need to show interest and motivation from the very beginning to better master the courses Sailing Directions and navigation, ship sustainability, oceanography, electrical and radio navigation, astronavigation and other specialties in the following courses. If the foundation is solid, it is easy to build any knowledge on it. It is the training integrated with the disciplines of the natural sciences that provides the future sailor with the ability to better understand the principle of operation and operation of all the technical equipment with which modern ships are equipped [2].

According to the Interdisciplinary Learning Model, the following components are required for a seafarer to achieve the required level of knowledge and competence:

- Free possession of knowledge and skills of general education and special education courses;
- Adequate use of teaching methods and professional tools;
- Demonstrate knowledge and skills in accordance with professional activities;
- Ecological education, thoughtful and careful attitude towards the water ecosystems of their own and world countries, maximum avoidance of marine pollution during the operation of ships;
- A sense of patriotism, responsibility to one's own country;
- Equal treatment, communication skills and a favorable psychological climate among multinational crew members;

Forming professionally important personal qualities, understanding the meanings of these qualities and being satisfied with the chosen profession.

The level of knowledge of the general laws of nature and information technology has a significant impact on the formation of a separate component of the educational process of a marine specialist. The very fact that the Manila changes imply an in-depth knowledge of the fields of technology and technology requires a new understanding of the importance of science courses.

Equally important in the conduct of the educational process should be not only the acquisition of specialized knowledge and skills, but also the application of knowledge of the natural sciences integrated with them [3].

Existing knowledge has emerged and been formed as a result of the application of various scientific discoveries about nature in practice. For example, research in the field of electromagnetism has led to the introduction and use of radio communications on ships. Thermodynamic studies have made it possible to create different types of engines and improve vehicles. The development of electronics has led to the use of computers and Internet connections in a variety of industries, including the marine industry. It is the knowledge gained as a result of integrated learning that ensures the formation of correct ideas about the world around the sea and its development.

Education is the process of acquiring knowledge and skills, and competence is the ability to apply and demonstrate that knowledge. The use of the method of "interdisciplinary training" in the process of professional training of a marine specialist will allow us to correctly define and implement the transition to competencies.

Let us illustrate this point with specific examples. In studying the "mechanical properties" of a solid body, the future pilot will be introduced to the concept of "residual deformation" generated during the ship's motion. But its competence will be revealed only if it is able to assess this deformation and perform the appropriate loading-unloading work in a timely manner. "Conditions of body swimming. During the study of "ship sustainability" the student must master such concepts as shipwreck, water abyss, sinking, stability conditions. The competence of a seafarer must be manifested in the fact that in the event of any kind of external impact on the ship he will be able to correctly calculate the ship's deadweight and differential.

What is the essence of the "interdisciplinary teaching model"? What role does the teaching of natural sciences have in the training of a marine specialist? It is in this that understanding and comprehension of most issues related to the professional activity of a sailor is based on the foundations of the laws and theories of natural science. Due to his professional activities, the sailor has access to computer and special equipment, simulators, meteorological equipment, laser and optoelectronic systems and more. Working with all of them requires knowledge of any of the natural sciences (mathematics, physics, chemistry, information technology, and marine ecology) not only in theory but also in practice, in connection with the specialty. The range of knowledge content and involvement of the natural sciences in maritime affairs is so vast that it is impossible to list them all. Here are some:

- The ship's power plant specialist must have knowledge of the physical processes underlying the ship's engines, generators and vehicles.
- The use of digital technology in the activities of a pilot requires knowledge of the physical basis of receiving information in digital form. The same knowledge is required for the proper operation of the ship - taking into account the characteristics (navigation, ship speed, capacity, power of the power equipment, etc.) [5].
- The electromechanics must ensure the proper functioning of the ship's electrical equipment, such as: power plant, electricity users - electrified mechanisms and equipment, power converters, power tools, radio equipment, electro-navigation devices, systems and internal systems, etc. Their operation depends entirely on the operation of the ship. Therefore, it is clear that such a highly qualified specialist must have a fairly high level of knowledge in the field of electromagnetism.

I wonder how the level of knowledge of natural sciences can affect a sailor's communication skills, stress resistance, sense of patriotism and other personal characteristics? It is obvious that a sailor with thorough knowledge is distinguished by high intelligence, which provides motivation for the chosen profession and adequate self-esteem. All this leads to professional satisfaction, maturation of professionally important qualities and rapid career growth. High levels of intelligence also affect communication skills. Sailors whose views are based on scientific laws and theories are more psychologically sound because they pay less attention to the various prophecies, superstitions, and false conclusions that are so important in long-distance sailing [4].

Knowledge of the natural sciences is no less important in the process of forming a patriotic feeling. A sailor who is well acquainted with the laws of nature, the history of their discovery and use, the stages of development of science and technology, the names of researchers, information about the Georgian sailors and scientists who made a name for the Georgian Navy, etc. - They perceive their own nation differently when they are in society with other nations and, consequently, they are more deeply aware of their responsibility to the nation and country.

Conclusion

Over the past two years, we have partially incorporated elements of the specialty into the teaching process of a number of natural sciences (general physics, industrial chemistry, information technology) for the purpose of experimentation [6]. To do this, we developed professional-based

learning resources and methodological guidelines that students had unimpeded access to. We observed and analyzed the results of the assessment of students' academic performance, which is given in Table 1.

Training year	**category**					
	A (%)	**B (%)**	**C (%)**	**D (%)**	**E (%)**	**F (%)**
2108 - 19 Average annual indicator	8,28	10,42	10,64	17,18	20,76	32,51
2019-20 (II Semester.)	9,31	15	15	16,17	14,7	30,65
2020-21 (I Semester.)	13,88	13,8	18,84	17,11	16	20,18

Table 1. Analysis of students' academic achievement results by categories

By analyzing the results of the last three years of academic achievement and combining the results of the teacher attendance, the students identified the following activities:

- Increased involvement and feedback on lessons;
- The student developed an interest in working with himself / herself;
- The student has become highly motivated to independently acquire special knowledge about the application of various natural science techniques and techniques in the marine field;
- Students' skills in working with additional literature and Internet resources were diversified;
- The process of preparation of presentations, abstracts, conference topics became interesting and joyful.

In this way we came to the logical conclusion that the method of teaching integrated with the subjects of our chosen specialty was justified. Therefore, it would be better to raise the status of natural sciences to the main disciplines of the specialty. This requires a new organization of the learning process and new methodological approaches.

We mean the improvement of the syllabi of natural science courses by integration with the disciplines that define the specialty. As a result, the learning process will become dynamic, flexible and result-oriented. The student will be able to apply the acquired knowledge and skills properly formed in the learning process in practice, which is a prerequisite for his professional competence.

References

[1] Charlotte Woods. Researching and Developing Interdisciplinary teaching: Towards a Conceptual Framework for classroom. Published by: Springer, Higher Education, Vol. 54, No. 6, pp. 853-866, 2007;

[2] Ranka Petrinovića, Nikola Mandića. The Importance of Maritime Law in Seafarer Training Pursuant to Amendments to the STCW Convention. Transactions on Maritime Science. No. 01, pp. 53-64, 2016;

[3] By Srdjan Vujicic, Nermin Hasanspahic, Ana Gundic & Niko Hrdalo. Assessment for Ensuring Adequately Qualified Instructors in Maritime Education and Training Institutions Athens Journal of Sciences. Vol. 7, pp. 115-126; 2020;

[4] L. Martes. Best practices in competency-based education in maritime and Inland Navigation. the International Journal on Marine Navigation and Safety of Sea Transportation. Vol. 14. No. 3, pp. 557-562, 2020;

[5] Diasamidze M., Shotadze A. Ballast water management and their system processing. Fundamental and applied researches in practice of loading scientific schools. Vol. 31, No. 01, pp. 58-60, 2019;

[6] Diasamidze M., Gvindjilia Ts., Motskobili I., Takidze I. Evalution of the "Quality of education" in higher educational institutions (on the example of the Batumi State Maritime Academy). Fundamental and applied researches in practice of loading scientific schools. Vol. 31, No. 01, pp. 54-57, 2019.

The Use of Wind Turbines in Ports and Sea Vessels

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Abstract. The technical result of the research of presented wind turbine is simplification and rise of the practical application of its main body – the rotor construction, which shall be achieved via transformation of wind shifting movement into rotating movement is implemented by rotor blades, which present bent or inclined shape plates and during rotation, these plates are not influenced with decelerating resistance of surrounding air.

The technical novelty of the turbine construction is presented with the following features: each profile blade of the rotor presents concave arc placed eccentrically towards its rotative axis, and the rotor may be equipped with one, two or more wings.

Keywords: power, turbine, shaft, hub, reactive force

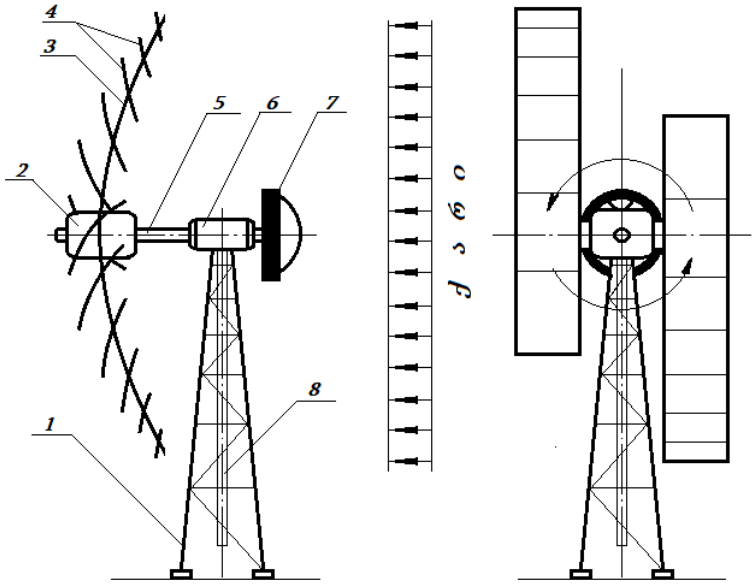
A permanent expansion of the industrial and domestic proceses on an international scale requires sufficient electro-energetic support, an issue that leads to global energy shortages and probable ecological devastation as an unfortunate byproduct. To resolve this problem inevitably and timely, the solution necessitates not only a way to reduce the carbon emissions from industrial plants but also a new, more efficient way of acquiring and using the present energy resources.

The transportation of cargo and civilians by the way of sea and rivers is assured by the obtained ressources found deep within the earth. It must be noted that the present massive urban and industrial expansion are taking a significant toll on the remaining reserves, allthewhile wreacking havoc on the environment. Consequently, to avoid devastating energy deficits and to preserve the ecology of our planet, the focus has shifted towards more renewable sources of energy that are abundant in nature on earth.

A discussion on the topic is perpetuated endlessly, often even by the mainstream media, with the main focus of the topic being the alternative, environmentally conscious sources of energy; one of which is the wind currents that possess kinetic energy that can be harvested and used. As such, an important decision must be made to substitute the more conventional, nuclear energy with wind-based renewable sources in all fields existing, or, at the very least, wherever possible.

The transformation of the wind's kinetic energy into mechanical energy is made possible by the main ruddered rotor that the airstream forces into motion through physical contact. Consequently, the efficiency of the turbine will be in direct correlation to the quality of the rotor's construction.

In this context, the Batumi National Naval Academy's General Engineering department creative focus groups, accompanied by students as well, has created a prototype and is developing a multi-rudder wind turbine; the device will transform the aforementioned kinetic energy into rational mechanical energy more efficiently and will be usable by ports and naval vessels alike. The schematics show how the presented prototype is functionally different from the existing wind turbines. The blueprints for the said wind turbine are presented bellow (*Fig.1*).



ნახაზი 1.

ქარის მრავალნიჩბიანი ენერგოდანადგარი

1- საყრდენი; 2- მორგვი; 3- მზიდი კონსოლური მრუდი ძელი; 4- ნიჩბები; 5- ძირითადი ლილვი; 6- კორპუსი; 7- საპირწონე (რომელიც ერთდროულად ასრულებს მჭევარას ფუნქციას); 8- გამოსავალი ლილვი.

The prototype, which has the mentioned turbine is balanced by the support beam (1). The Upper part of the support holds the rotating chassis (6). The ball bearings situated on the chassis hold the main support of the turbine horizontally (5). One side of the base of the main support is fitted with and affixed by ball bearings (2); adjacent to the supports are the fulcrum and the fly-wheel (7). On the other side of the rudder, along the main support beams, heavyweight curved mills (3), which hold a certain number of plates that register impact more efficiently (4). From the chassis (6) the outward shaft (8) facing vertically downwards, which is kinetically connected to the main shaft (5).

The wind turbine functions as follows:

Upon impact, the rotating chassis displaces until the plates are facing the wind frontward.

The air current, upon impact, goes through them, gets reflected and leaves the turbine. Upon said reflection on the surface of the plates, a reactive force is generated.

These reactive forces create the momentum in relation to the main support beams, effectively bringing the windmill into motion, jumpstarting its functionality.

The main support, channelling the energy through a conic transmission, forces the outgoing support to rotate.

The attained mechanical energy created as a product is then used accordingly.

The main factors for the wind turbine are force, the rotation speed and geometric properties of the main mill which determine its construction.

Henceforth, for the establishment of the analytical link between the above-mentioned enterokinetic and force parameters, check the schematics of the turbine in question (pic.1)

The rotating part of the turbine, whose momentum of inertia equals $\mathscr{J}$, and spins with the angular velocity ω. The resistance of the rotation is ensured by calculating the angular vrlocity of the main shaft of the turbine when the following parameters are given:

- P – Force of the machinery:
- $\mathscr{J}$ – Inertia of the rotating part;
- V – Wind velocity;

The differential equation of the rotation:

$$\mathscr{J} \cdot \frac{d\omega}{dt} = T_b - T_c \qquad (1)$$

Where T_b – Momentum created from the impact with the wind,

T_c – Resistance

Resistance is presented by

$$T_c = \mathrm{k}\omega,$$

then (1) will take the form of

$$\mathscr{J} \cdot \frac{d\omega}{dt} = T_b - \mathrm{k}\omega \ .$$

By dividing and multiplying both variables with $(-\mathrm{k})$ and taking the appropriate integral

$$\int_0^{\omega} \frac{-\mathrm{k}d\omega}{T_b - \mathrm{k}\omega} = -\frac{k}{\mathcal{J}} \int_0^{t} dt$$

We get

$$\ell\mathrm{n}\,\frac{T_b - \mathrm{k}\omega}{T_b} = -\frac{k}{\mathcal{J}} \cdot t$$

or

$$\frac{T_b - \mathrm{k}\omega}{T_b} = e^{-\frac{k}{\mathcal{J}} \cdot t}$$

which results in

$$\omega = \frac{T_b}{k}\,(1 - e^{\frac{k}{\mathcal{J}} \cdot t})$$

$$\omega = \frac{T_b}{k}$$

Since the meaning of the k coefficient depends on many factors, determining its role analytically is difficult, however, its role can be determined through an experiment

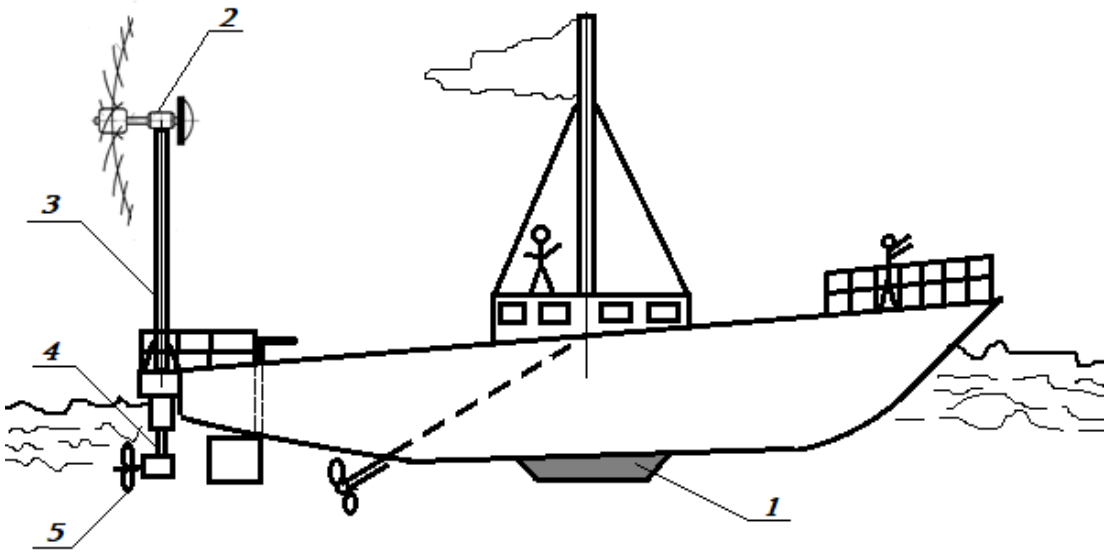
If ω is known, the power of the turbine can be determined

$$P = T_c \cdot \omega.$$

Field of use: By riding the air currents, the sailboats and old motorless sea-transports could relocate through the use of sails, however, these sails do not provide enough speed and therefore it is only logical that, instead, the vessels use wind turbines.

As wind turbines do not work efficiently in calm weather, the main motor should have a backup supply motor that runs on fuel.

The direction of the wind is not a detrimental factor to the rotation of the turbine, since the additional spaded screws (fig. 2) that ensure transportation in the desired direction, regardless of which direction.



ნახაზი 2
ტურისტული სასეირნო გემი
1- კილი; 2- ქარის ტურბინა; 3- საყრდენი ბოძი; 4- გამოსავალი ლილვი;
5- ნიჩბიანი ხრახნი.

In case of calm weathers or if the vessel needs to pick up speed, upon command, the main engine comes on, activating the spaded screws.

On sea/riverbound vessels, like the tourist tour boats or the cargo ships, the possibility to use the wind turbines effectively is apparent.

Using wind turbines for transportation of larger ships is a different issue, possibly for the future

Conclusion:

The use of wind turbines on sea/riverbound ships, as well as in ports and terminals bear the following perspectives:

- The use of cheaper, cleaner, more environment-friendly renewable energy for the day-to day operations;
- Fuel conservation;
- A more ecologically sound future.

References

[1] Сивоконь П., Журнал «Корреспондент» №50 19.12.2014., статья «Климат-контроль». (Sivokon P., “Klimat-kontrol”, Journal “Korrespondent”, №50, 19.12.2014);

[2] Шефтер Я. И., «Использование энергии ветра» Энергоатомиздат. Москва. 1983 (Shefner Ya. I., “Wind power research”, Energoatomizdat, Moscow, 1983)

[3] კაპანაძე შ., „ქარის მიკრო და მცირე ელექტროსადგურები“ თბილისი-საქართველოს ტექნიკური უნივერსიტეტი - 2001. (Kapandze Sh., “Wind micro and small power plants”, Tbilisi, Georgian Technical University, 2001)

Importance of GHS in Seafarers Education

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Abstract. Global harmonized system (GHS), relating to hazard chemicals, is a process of making regulations among countries uniform to the extent possible so as to benefit an industry to export its product to several countries with one communication system.

On one side, the system is helpful to develop communication as labeling and material safety data sheets, and on the other side is helpful for personal in the industry (including manufacturer, chemical carrier, Ports, Terminals, Ships, laboratories) to properly handle chemicals with covering all safety rules.

Such international guidelines are believed to be the most reliable information so that USERS of hazard chemicals is confident enough in handling, storage, segregation, disposal and using.

The current article has two goals. Firstly, is to extend the awareness and understanding the main principles of GHS system, their guidelines, and how the hazard chemicals are being classified, communicated as labels, symbols, pictograms, hazardous / precautionary statements and material safety data sheets. Secondly, is to establish the importance of implementing of GHS in curricular of bachelor students of maritime specialization, significance of increasing their awareness, knowledge and understanding in hazardous communication and understanding of hazard identification and risk management of different cargos, which is the part of ISM code and MSC 286(86) requirements.

Keywords: *Global harmonizing system (GHS), Chemical Hazardous classification, communication, labeling, symbols /pictograms, Safety Data Sheets (SDS)*

1. Introduction

The Globally Harmonized System of Classification and Labeling Chemicals (GHS) is a single worldwide system for classifying and communicating the hazardous properties of industrial and consumer chemicals. GHS sits alongside the UN 'Transport of Dangerous Goods' system.

The UN brought together experts from different countries to create the GHS with the aim to have, worldwide, the same:

- criteria for classifying chemicals according to their health, environmental and physical hazards;
- hazard communication requirements for labelling and safety data sheets.

Compared to pre-GHS hazard communication, GHS offers better protection to workers and users and facilitates international chemical trade.

Before the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) was created and implemented, there were many different regulations on hazard classification in use in different countries, resulting in multiple standards, classifications and labels for the same hazard. The fact that Chemicals directly or indirectly affect our lives and are essential to our food, our health, our lifestyle; the fact that the widespread use of chemicals has resulting in the development of sector-specific regulations (transport, production, workplace, agriculture, trade, and consumer products); and the fact that Chemicals and related products are specific to Goals 9 & 17 (Industry, Innovation, & Infrastructure, and Partnerships for the Goals) respectively, and implicated in practically all of the other Sustainable Development Goals (SDGs); the cost of the much needed compliance with multiple systems of classification and labeling is significant. Having readily available information on the hazardous properties of chemicals, and recommended control measures, allows the production, transport, use and disposal of chemicals to be managed safely. Thus, human health and the environment are protected. A worldwide standard accepted as an alternative to local and regional systems presents an opportunity to reduce cost and improve compliance.

In pre-GHS era, users may see different label warnings or safety data sheet information for the same chemical, which can cause confusion. In addition to that, most of countries have their own hazard classification and labelling regulations in pre-GHS era. Those regulations vary significantly and compliance with them is very costly and time-consuming.

The GHS aims to ensure that information on the hazardous properties of chemicals is available throughout the world in order to enhance the protection of human health and the environment during the handling, transport and use of chemicals. GHS also provides the basis for harmonizing regulations on chemicals at national, regional and worldwide level. This is important for facilitating trade. At a more basic level, GHS also aims to provide a structure for countries that do not yet have a classification and labelling system.

The GHS is referred to as the 'Purple Book' reflecting the purple binding of the published version of GHS. This is in keeping with the Transport of Dangerous Goods system.

Fig. 1. - 'Purple Book' (UN GHS Purple Book) [1]

The GHS is not a formal treaty, but instead is a non-legally binding international agreement. Therefore countries (or trading blocs) must create local or national legislation to implement the GHS.

Many countries already have regulatory systems in place for chemical classification and hazard communication. These systems may be similar in content and approach, but their differences are significant enough to require multiple classifications, labels, and safety data sheets (SDS) for the same product. Regulatory authorities in countries adopting the GHS will take the agreed criteria and provisions, and implement them through their own regulatory process and procedures. The GHS document provides countries with the regulatory building blocks with which to develop or modify existing national programs that address classification of hazards and transmittal of information about those hazards and associated protective measures.

The United Nations goal was broad international adoption, and as of 2017, GHS has been adopted to varying degrees in nearly all major countries.

As a voluntary international system, the GHS is not legally binding in any country. Therefore, countries adopting GHS have to issue their own regulations or standards to implement GHS criteria and provisions. Two examples are:

- The EU CLP REGULATION (EC) No 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures;
- OSHA's Hazard Communication Standard (HCS) 2012 in the United States;

Fig. 2. GHS implementation - world map [2].

Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

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- : Countries/regions that have already implemented GHS.
- : Countries/regions where GHS is voluntary.
- : Countries/regions that are in the process of implementing GHS.
- : Countries/regions where GHS is not implemented or not available.

2. Methodology

The study was accomplished using traditional scientific methods such as mind mapping, deduction, induction, envisioning, system thinking and complexity thinking. These methods were selected considering the aim and research objectives as well as literature availability. The study begins to unpack a web of complex and entangled ideas around GHS system. Mind mapping, a visualization of information and associations between its components, was primarily used at the initial stage of the research, which was identifying and collecting state to the art information and regulations. Obtained outcomes were developed into research objectives and consequently shaped the content of learning course which to be developed for ungraduated students. Whilst an extensive list of literature on hazardous materials exists, the research faced a lack of literature relating to GHS system in maritime education and training contexts, except the main regulations requirements.

3. Scope of UN GHS and Applicable Industry Sectors

Prior to the development of the GHS system, the communication systems of hazardous substances used in different countries differed from each other in terms of both marking and data in

the safety sheets. There was no unified approach, which was the barrier in timely data processing and approval of system internationally.

The GHS covers all hazardous chemicals and Sectors that may adopt GHS include:

Transport	• The UN Recommendations on the Transport of Dangerous Goods - Model Regulations takes precedence;
	• GHS parts expected to be adopted:
	  ○ GHS hazard classification criteria;
	  ○ GHS hazard pictogram;

Workplace	• Some authorities may not have jurisdictions over environmental hazards.
	• GHS parts expected to be adopted:
	  ○ GHS hazard classification criteria;
	  ○ GHS label elements;
	  ○ GHS safety data sheet;

Consumer	• Labels may include the core elements of GHS labels subject to some sector-specific considerations(i.e., instructions for use, expiration date);
	• Risk-based labelling may be applied.
	• GHS parts expected to be adopted:
	  ○ GHS hazard classification criteria;
	  ○ GHS label elements;

Pesticides	• Pesticide labels may include the core elements of GHS labels subject to some sector-specific considerations(i.e., instruction for use, crops, expiration date);
	• GHS parts expected to be adopted:
	  ○ GHS hazard classification criteria;
	  ○ GHS label elements;
	  ○ GHS safety data sheets required in workplace

Some countries have adopted GHS in all 4 sectors while other countries have only adopted GHS in 1 or 2 sectors.

3.1. GHS Hazard Class, Hazard Category and Hazard Pictogram

GHS describes the nature and severity of a chemical hazard by hazard calss and hazard category. GHS also assigns standard pictograms representing different types of hazards.

- **Hazard class**: the nature of a chemical hazard, i.e., flammable liquids, carcinogen.
- **Hazard category**: the division of criteria within each hazard class. For example, flammable liquids have 4 categories among which flammable liquids category 1 represents the most severe hazard.
- **Hazard pictogram**: 9 pictograms conveying different types of health, physical and environmental hazards.

The picture below shows the type of chemical hazards each GHS pictogram represents.

Fig 3. GHS pictograms [3]

There are 29 hazard classes in the latest version of UN GHS (UN GHS Rev. 8). A chemical meeting the criteria for any hazard class below will be regarded as a hazardous chemical [5].

Physical Hazards(17 classes)	Health Hazards(10 classes)	Environmental Hazards (2 classes)
• Explosives • Flammable Gases • Aerosols • Oxidizing Gases • Gases Under Pressure • Flammable Liquids • Flammable Solids • Self-Reactive Substances • Pyrophoric Liquids • Pyrophoric Solids • Self-Heating Substances	• Acute Toxicity (Oral/Dermal/Inhalation) • Skin Corrosion/Irritation • Serious Eye Damage/Eye Irritation • Respiratory or Skin Sensitization • Germ Cell Mutagenicity • Carcinogenicity • Reproductive Toxicology • Target Organ Systemic Toxicity - Single Exposure	• Hazardous to Aquatic Environment (Acute/Chronic) • Hazardous to the Ozone Layer

• Substances which, in contact with water emit flammable gases • Oxidizing Liquids • Oxidizing Solids • Organic Peroxides • Corrosive to Metals • Desensitized explosives [Added in GHS Rev.6]	• Target Organ Systemic Toxicity - Repeated Exposure • Aspiration Toxicity	

It shall be noted that the GHS allows individual countries or regions to choose which hazard classes or hazard categories to implement to meet their domestic needs. For example, EU has not adopted flammable liquids category 4. The United States has not adopted Hazardous to the Ozone Layer yet. This is often called **GHS Building Blocks** approach.

3.2. GHS Classification and Labelling Elements

GHS classification is a process to determine the hazard class and category of a chemical (substance or mixture) in accordance with GHS hazard classification criteria.

The picture below is an example of GHS classification criteria for flammable liquids. A liquid with a flash point between 23 and 60 Celsius degrees will be classified as flammable liquid category 3. A liquid with a flash point above 95 Celsius degrees does not meet GHS classification criteria and will not be regarded as a hazardous chemical,

Category	Criteria
1	Flash Point $< 23°C$ Initial Boiling Point $\leq 35°C$
2	Flash Point $< 23°C$ Initial Boiling Point $> 35°C$
3	Flash Point $\geq 23°C$ Initial Boiling Point $\leq 60°C$
4	Flash Point $> 60°C$ Initial Boiling Point $\leq 95°C$

Once a chemical has been classified according to GHS classification criteria, you can easily find assigned signal word, pictogram, hazard statements and precautionary statements that need to be included on labels and in SDSs. The data are unified in one catalogue [4].

For example, a liquid with a flash point between 23 and 60 Celsius degrees will be classified as flammable liquid category 3. By checking the page 316 of above document, you can easily find out the core labelling elements for this liquid:

- Signal word: Warning;
- Pictogram: Flame;

- Hazard statement: H226 flammable liquid and vapour;
- Precautionary statement: P210, P233, P280, P303+P361+P353, P370+P378, P403+P235, P501

The labeling rules of GHS system has the following core elements, which includes:

- **Product identifier**: Chemical identities of a substance or hazardous ingredients in a mixture;
- **Supplier identification**: The name, address and telephone number of a supplier;
- **Signal word:** Danger or Warning;
- **Hazard pictogram:** conveying different types of chemical hazards;
- **Hazard statement:** standardized and assigned phrases that describe the hazard(s) as determined by hazard classification;
- **Precautionary statement:** standardized phrases that describe measures to minimize or prevent adverse effects;

An example of a GHS label for a chemical can be found below:

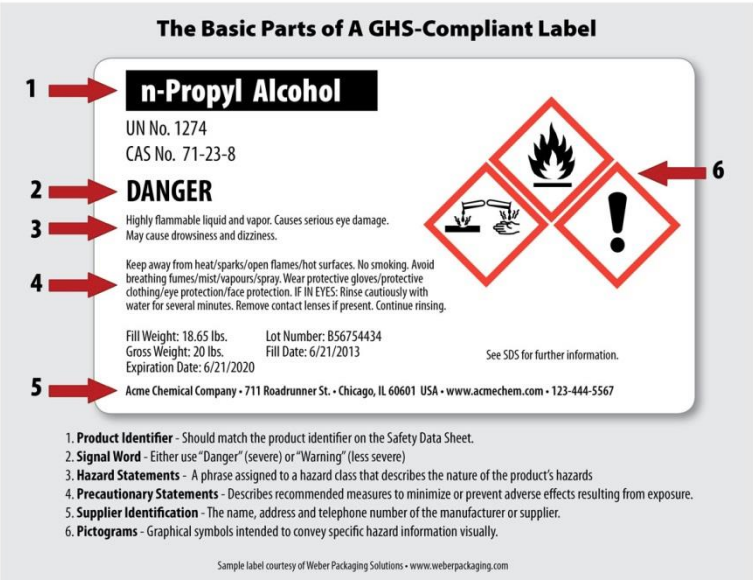

Fig 4. GHS label [4,5]

GHS also established the minimum concentration limits of hazardous substances. GHS cut-off value or GHS concentration limit is the minimum concentration for a hazardous substance to trigger the classification of a mixture containing it. They are mainly expressed as % thresholds and are primarily used for mixture classification under GHS.

Example of cut-off value/concentration limit for hazard class skin corrosion/irritation. If a mixture contains a hazardous ingredient that has been classified as skin corrosive category 1, the mixture itself will also be classified as skin corrosive category 1 if the concentration of ingredient exceeds 5%.

3.3. Safety Data Sheet (SDS)

Safety Data Sheet (SDS), also called as Material Safety Data Sheet (MSDS) in pre-GHS era, is a very important document to inform its audience of the hazards of a substance or mixture and provide advice on safety precautions.

GHS has harmonized the format and content of Safety Data Sheets. There are 16 sections in standard GHS SDSs (as shown below). GHS has also set the minimum info required for each section.

- Section 1 Identification of the substance or mixture and of the supplier;
- Section 2 Hazard identification;
- Section 3 Composition/information on ingredients;
- Section 4 First-aid measures;
- Section 5 Fire-fighting measures;
- Section 6 Accidental release measures;
- Section 7 Handling and storage;
- Section 8 Exposure controls/personal protection;
- Section 9 Physical and chemical properties;
- Section 10 Stability and reactivity;
- Section 11 Toxicological information;
- Section 12 Ecological information;
- Section 13 Disposal consideration;
- Section 14 Transportation information;
- Section 15 Regulatory information;
- Section 16 Other information.

Please be noted that:

- An SDS usually needs to be prepared in the language of its destination country;
- Some countries may have set additional requirements on some sections of SDSs (for example, information disclosure in section 3, occupational exposure limits in section 8, regulatory info in section 15) [5].

4. GHS SDS in Maritime Industry

A ship has to carry different types of cargo which includes oil cargo, chemical cargo, and cargo in gaseous form. These types of goods are hazardous for marine environment as well as for the health of seafarer. Apart from carrying cargo, the ship carries different types of chemicals and solutions which are used for several marine operations. A Material Safety Data Sheet is provided for such cargo and also for chemicals carried onboard which are used for maintenance purpose.

Effective 1 January 2011, SOLAS requires that each ship must be provided with Material Safety Data Sheets (MSDS) for oil cargoes (MARPOL Annex I cargoes) and for oil fuel (bunkers) as defined in MARPOL - Resolution MSC.239(83) – Adoption of Amendments to SOLAS (new Regulation VI/5-1) [6]. The MSDS have to be provided prior to loading such oil as cargo in bulk or as oil fuel. Additionally, the IMO has recommended a format and content for the MSDS (IMO Resolution MSC.286(86)) [7].

Therefore, after 1 January 2011, parties to SOLAS can be expected to verify that ships have the required MSDS.

OCIMF VIQ 7 – Chapter 5.46 reads: ‘Ships carrying MARPOL Annex I cargoes, as defined in Appendix I to Annex I of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973, and marine fuel oils shall be provided with a material safety data sheet prior to the loading of such cargoes. (SOLAS 2007 Amendments VI 5-1)’ ‘On ships carrying MARPOL Annex II cargoes, Prior to loading, the shipper should provide both to the Master and the Company, as defined in the ISM Code, a Material Safety Data Sheet (MSDS), formatted in accordance with resolution MSC.286(86), for cargoes containing benzene. (IBC Appendix 8 Annex) [8].

Appendix 1 of the Resolution MSC.286(86) is the recommendation for MSDS/SDS for marine use suitable to meet the particular needs of the marine industry containing safety, handling, and

environmental information to be supplied to a ship to the loading of MARPOL Annex I Type Oil as cargo in bulk and bunkering of oil fuel [8].

Goods present on board ship that can be hazardous to the ship and its crew are:

- Different hazardous goods like fuel oil, lube oil, chemicals, LNG, LPG etc.
- Cargo carried in containers under IMDG code.
- Fuel oil and lube oil carried as a bunker are also hazardous in nature and can harm humans and environment
- For maintenance and operational purpose, different kinds of chemicals are used onboard which can be hazardous. They are mostly used as cleaning agents, for water treatments, for dosing in fuels and as an additive in sanitation systems [9].

SDS is carried onboard for ensuring the safety of marine environment and seafarers, provides useful and accessible information on the product carried on board, either as a cargo or for operational purposes, for all individual hazardous material carried on board along with proper personal protective equipments (PPE) so that in the time of emergency, appropriate procedures and swift response can be achieved in that situation.

5. GHS implementation in curriculum

Curriculums for undergraduate students in the field of Maritime Studies contains learning course “Quality assurance and Risk Management onboard ship” aims to provide students with a general knowledge on quality management applicable in the context of shipping covers training in the requirements of the International Security Management Code (ISM code), the principles of development of the management system, documentation of the processes and activities based on hazards identification, risk assessments and management, handling and management of hazardous chemicals for cargo of the high risk activities.

Study of the GHS Material Safety Data Sheets (MSDS / SDS) document provided in the learning course allows the student to get complete information about a specific cargo or substance, in particular to understand the following information:

- the physical and chemical properties like the three main points such as flash, boiling and melting points

- the nature of the substance indicating its toxicity
- effects on health
- first aid that needs to be administered in case of adverse contact
- possible reactions
- methods of storage
- methods of disposal
- protective equipment to be used by people that come in contact with the material
- spill-handling procedures

6. Conclusion

Providing thorough comprehensive and explanatory information to Maritime students about the Globally Harmonized System (GHS) is a vital task that will serve to raise their personal safety awareness and educate future qualified, highly competent seafarers.

Mastering the GHS system for students of Maritime specialties will develop their skills of leadership in the GHS system and provide them the relevant knowledge for safely performance the duties assigned to the future employment. During the teaching process the student will equipped with the appropriate knowledge, understanding, skills and competences in handling the hazardous goods and:

- Understand the dangers of the system when working with hazardous substances / cargo;
- Be able to correctly understand and use the warning signs, symbols and phrases reflected in the classifier;
- Correctly use the information of SDS;
- Promptly and efficiently search for necessary information on cargo transportation, storage, first aid, firefighting, physical and chemical properties;
- Understand and evaluate the Impact of potential hazards on health, environment, physical hazards, etc.;
- Be able to correctly understand information and, based on its processing, identifying hazards related to substances and mixtures , as well as risk identifications and management issues.

All above-mentioned, will eventually give the undergraduate students the appropriate level

of awareness, increase safely performance of duties in the work environment, develop habitual awareness, which is a prerequisite for the development of a safety culture.

References

[1] UN GHS Purple Book, GHS, Rev.8, 2019 https://www.chemsafetypro.com/Topics/GHS/UN_GHS_Purple_Book.html

[2] DHI toolbox, DHI Environment and Toxicology, Newsletter on Chemicals and Regulatory Toxicology, 2020, http://ghs.dhigroup.com/GHSImplementatationMap.aspx

[3] UNECE, Sustainable Development Goals, Globally Harmonized System of Classification and Labeling of Chemicals (GHS), Transport and Sustainable Development Goals, 2020, https://www.unece.org/trans/danger/publi/ghs/pictograms.html

[4] Example of arrangements of the GHS Label elements, Annex 3, United Nations, 2017, https://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev07/English/10e_annex7.pdf

[5] Global Harmonized system of Classification and Labeling Chemicals (GHS), Rev.8, United Nations, 2019, https://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev08/ST-SG-AC10-30-Rev8e.pdf

[6] International Convention for the Safety of Life at Sea, 1974 (SOLAS), as amended. Consolidation Edition, Regulation 5-1, pg. 441, 2018, https://www.samgongustofa.is/media/english/SOLAS-Consolidated-Edition-2018.docx.pdf

[7] Report of the MSC 83/28, Chapter VI, Carriage of Cargoes, Regulations 5-1, Material Safety Data Sheets, 2017, pg.386, Resolution MSC.239(83) – Adoption of Amendments to SOLAS (new Regulation VI/5-1), https://safety4sea.com/wp-content/uploads/2014/09/pdf/msc83-28.pdf

[8] Resolution MSC.286 (86) (adopted on 5 June 2009). Recommendations for Material Safety Data Sheets (MSDS) for MARPOL Annex I Cargo and Oil Fuel, https://www.navcen.uscg.gov/pdf/marcomms/imo/msc_resolutions/MSC286(86).pdf

[9] Material Safety Data Sheet or MSDS Used on Ships, Marine insight, Marine Safety, Last Updated on October 9, 2019, https://www.marineinsight.com/marine-safety/material-safety-data-sheet-or-msds-used-on-ships/

Some Trends in the Development of Maritime Industry in the World and in Georgia

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Abstract. The paper "Some Trends in the Development of Maritime Industry in the World and in Georgia" substantiates the place and role of international maritime industry in both the world economy and the economic development of the country. The special importance of maritime transport-logistics systems is emphasized in the further development of the Georgian economy. The abstract conclusions are based on the research and data analysis published by national and international institutions on world economy, international trade of goods as well as international maritime trade, and their interrelationships. Trends in the development of some areas of the maritime industry (international maritime trade, world navy, shipbuilding and training of seafarers) have been studied. Based on the analysis of similar indicators of the Georgian maritime industry, separate conclusions have been made about the further development and efficient use of the Georgian maritime transport-logistics system.

Keywords: Economic Development, GDP, Maritime Trade, Maritime Industry, Maritime Merchant Navy, Seafarers Training, Maritime Business, Maritime Shipping

At the present stage of world economic development, the proper functioning of maritime transport and logistics systems is essential, as about 90% of the total volume of international trade cargo is transported by sea [1]. The world economy and international trade development rates are interlinked to the development rates and trends of maritime trade and industry.

Maritime transport and logistics systems also play a crucial role in the economic development of individual countries, especially in international economic activities since most of the foreign trade (export-import) is carried out through the involvement of maritime transport and logistics systems. The role of Maritime transport logistics in the economic development of Georgia, which is still at a rather challenging stage of state-building, is also important. Unfortunately, the current level and trends of the country's economic development still do not meet the needs of Georgian society. According to the World Bank, Georgia's gross domestic product (GDP) in 2020 amounted to 15.892 million US dollars and ranked 119th among 206 countries [2]. Georgia was ranked 126th in terms of GDP per capita in 2020 [3]. GDP per capita in the world was 10,561 USD (constant 2010 USD), while in Georgia - 4,679 USD. According to the same data, in 2020, Georgia's unemployment rate was 6.5% and ranked 37th (the world unemployment rate was 6.5%) [4, 5].

The document approved by the Government of Georgia - Government Program 2021 - 2024, Towards Building the European State (December 2020), states [6]: "Economic policy of the Government of Georgia will be geared at economic growth. The starting point will be to promote a post-crisis rapid recovery and development of businesses, which in turn should ensure job creation and eradication of extreme poverty". The same document states: "An important area of action is to further strengthen the transit role of Georgia in relation to the European Union and to reap the benefits of a component related to the membership of the European Energy Community (EEC) and integration into the trans-European transport network (TEN-T)." ([6], pp. 7)

Thus, effective use of its international transit function is one of the top priorities of Georgia's economic development. The document developed by the Ministry of Economy and Sustainable Development of Georgia - "Georgia's National Logistics Strategy for 2021-2030", states that "Globalization and growing economic ties with the EU provide a unique opportunity for Georgia's full integration into international trade. The transport and logistics sector must play a crucial role in this process." [7]

Therefore, it is crucial to study the development trends of the Georgian maritime industry, as well as international maritime trade and industry, analyze their interdependence, evaluate the current state of the potential use of the industry, and develop recommendations.

The efficient functioning of maritime transport logistics systems, and the maritime industry as a whole, is important to increase the competitiveness of Georgia's transport communication systems, which are in a highly competitive environment by other alternative communication systems (North, South, and Maritime).

"Maritime industry" is a broad term and includes all kinds of organizations and activities related to the sea, ocean, ships, navigation, maritime trade, and seafarers.

The maritime industry includes the following sectors: [8]

- **Maritime trade** (shipping)-covers the transport of passengers by sea and cargo transportation.
- **Marine industry**, also known as marine engineering, includes shipbuilding, offshore oil and gas extraction, marine recreational activities, marine research, etc.
- **Port activities** - work related to cargo (reloading, sorting, warehousing, storage, etc.), passenger services, and other types of port agricultural activities;

- **Maritime business services** - covers a wide range of maritime business activities, such as maritime insurance, financial and legal services, ship accounting, maritime consulting services, maritime tourism, maritime education, etc .;

- as well as other activities related to the maritime sector.

It is critical to analyze the data published by international institutions to study international maritime trade and industry development trends. The volumes and percentage changes of world GDP, international trade in goods, and international maritime trade by individual years are presented in the table (Table 1).

The data presented in Table 1 show that the growth rates of international trade in goods and maritime trade over the past two decades are mainly higher than the growth rates of the world economy. Indeed:

- In 2000, the world GDP growth rate was 31%, while international trade in goods grew by 85%, and international maritime trade - 49%;

- In 2010, the volume of world GDP increased by 30%, while the global export value of trade in goods increased by 137%, and international maritime trade - by 41%;

- According to 2017 data, the world GDP growth rate was 31%, global trade in goods - 85%, and international maritime trade - 49%.

Table 1.

Volumes of world GDP, international trade in goods and international maritime trade and percentage change by individual years

Years	World GDP volume, (constant 2010 USD), billion USD [9]	Global export value of trade in goods, billion USD [10]	International maritime trade volume (in million metric tons loaded)
1990	38 986	3 496	4 008
	40 %	71 %	8 %
2000	50 949	6 452	5 984
	31 %	85 %	49 %
2010	66 126	15 303	8 408
	30 %	137 %	41 %
2015	76 958	16 556	10 023
	16 %	8 %	19 %
2016	7 7 988	16 043	10 295
	1 %	-3 %	3 %
2017	80 508	17 738	10 716
	3 %	11 %	4 %
2018	82 905	19 468	11 019
	3 %	10 %	3 %
2019	84 848	19 015	11 076

	2 %	-2 %	1 %
2020	84 540 [11]	17 483	-
	-0.3 %	-8 %	-

Source. The table is compiled based on the sources cited by the author

The volume of international maritime trade is growing every year - at a much higher rate during the growth (prosperity) of the world economy, relatively low - during the recession.

The structure and volume of maritime trade by types of cargo are presented in Table (Table 2).

Data published by the United Nations Conference on Trade and Development (UNCTAD) show that international maritime trade is constantly growing [12]. In recent years, the share of certain types of cargo in international maritime trade is virtually unchanged. In particular, the share of cargo transported by tankers in the total volume of shipments is 29%, the share of cargo transported by bulker is similarly 29%, and the share of other dry cargo is -42%. In addition, the share of tanker cargo in international maritime trade has declined slightly, from 33% to 29%, over the past two decades. Respectively, the share of cargo transported by bulkers and other dry cargo vessels in total shipments increased slightly.

Table 2.

International maritime trade volume by type of cargo (in million metric tons loaded , percentage)

Years	**Cargo transported by tankers**	**Cargo transported by bulkers**	**Other dry cargo**	**all:**
1980	1 871	608	1 225	3 704
	51 %	16 %	33 %	100 %
1990	1 755	988	1 265	4 008
	44 %	25 %	31 %	100 %
2000	2 163	1 186	2 635	5 984
	36 %	20 %	44 %	100 %
2010	2 752	2 232	3 423	8 408
	33 %	27 %	40 %	100 %
2015	2 932	2 930	4 161	10 023
	29 %	29 %	42 %	100 %
2016	3 058	3 009	4 228	10 295
	30 %	29 %	41 %	100 %
2017	3 146	3 151	4 419	10 716
	29 %	29 %	42 %	100 %
2018	3 201	3 215	4 603	11 019
	29 %	29 %	42 %	100 %
2019	3 169	3 225	4 682	11 076
	29 %	29 %	42 %	100 %

Source: Table compiled by the author based on the source cited [13]

One of the most important sectors of the maritime industry is the merchant navy. Table (see Table 3) presents statistics on the structure of the world merchant fleet.

Table 3.

World Merchant Fleet statistics by ship type (1000 tons of deadweight)

	Oil tankers	Bulk carriers	General cargo	Container ships	Other types of ships	**Total fleet**
1980	337 896	181 880	112 841	10 290	29 236	672 142
	50,3	27,1	16,8	1,5	4,3	100
1990	235 785	223 619	100 457	22 346	47 770	629 976
	37,4	35,5	15,9	3,5	7,6	100
2000	283 066	274 445	101 520	63 580	71 160	**793 771**
	35,7	34,6	12,7	8,0	9.0	**100**
2005	340 748	325 666	91 827	100 226	49 007	**907 474**
	37,5	35,9	10,1	11.0	5,4	**100**
2010	450 053	456 623	108 232	169 158	92 072	**1 276 137**
	35,3	35,8	8,5	13,3	7,2	**100**
2015	491 058	762 322	76 012	228 230	195 469	**1 753 092**
	28,0	43,5	4,3	13,0	11,1	**100**
2016	505 955	779 289	76 481	244 339	205 150	**1 811 215**
	27,9	43,0	4,2	13,5	11,3	**100**
2017	535 031	795 586	75 522	245 683	216 351	**1 868 174**
	28,6	42,6	4,0	13,2	11,6	**100**
2018	563 188	822 906	75 702	253 633	222 349	**1 937 777**
	29,1	42,5	3,9	13,1	11,5	**100**
2019	568 037	846 461	76 425	266 129	232 871	**1 989 924**
	28,5	42,5	3,8	13,4	11,7	**100**
2020	601 342	879 725	76 893	274 973	238 705	**2 071 638**
	29.0	42,5	3,7	13,3	11,5	**100**
2021	619 148	913 032	76 754	281 784	243 922	**2 134 640**
	29,0	42,8	3,6	13,2	11,4	100

Source : The table is compiled by the author based on the source [14]

The data show that the volume of the world merchant navy is growing at a fairly rapid pace in terms of total cargo capacity (deadweight) and by 2021 amounted to 2 134 640 thousand tons. Despite the pandemic, the world merchant navy increased by 63 million tons in 2021 compared to 2020 (an increase of 3.1%). Which reaffirms the growing role of the maritime industry in the global economy and international economic relations. As for the structure of the navy, tankers make up 29.0% of the total volume of the fleet, Balkers - 42.8%, dry cargo vessels - 3.6%, container vessels - 13.2%, and other types of vessels - 11.4%. This structure has changed slightly in recent years.

Another important sector of the maritime industry is maritime education. It provides qualified personnel with relevant competencies to a growing international navy. Table 4 shows statistics on the

number of sailors employed in the World Merchant Navy. In 2015 the World Trade Fleet employed 1,647,494 sailors. China (243,635 sailors, 14.79% of the total number of sailors) is in the first place by the number of people employed, the Philippines is in the second place (215,500 sailors, 13.08%), Indonesia is in third place (143,702 sailors, 8.72%), followed by the Russian Federation (97,061 Sailor, 5.89%).

Table 4.

Number of seafarers employed in the World Trade Fleet by country (2015 data)

		Officers	Ratings	Total	Percentage of total world, %		
-	World	773 949	873 545	1 647 494	100.00	100.00	100.00
1	China	101 600	142 035	243 635	13.13	16.26	14.79
2	Philippines	72 500	143 000	215 500	9.37	16.37	13.08
3	Indonesia	51 237	92 465	143 702	6.62	10.59	8.72
4	Russian Federation	47 972	49 089	97 061	6.20	5.62	5.89
5	India	69 908	16 176	86 084	9.03	1.85	5.23
6	Ukraine	39 000	30 000	69 000	5.04	3.43	4.19
7	Turkey	18 568	20 417	38 985	2.40	2.34	2.37
8	Italy	12 988	21 498	34 486	1.68	2.46	2.09
9	Norway	14 768	18 933	33 701	1.91	2.17	2.05
10	Bulgaria	10 890	22 379	33 269	1.41	2.56	2.02
11	United States of America	18 330	14 888	33 218	2.37	1.70	2.02
12	Vietnam (Viet Nam)	19 630	12 815	32 445	2.54	1.47	1.97
13	Poland	25 586	6 603	32 189	3.31	0.76	1.95
14	Brazil	10 526	18 220	28 746	1.36	2.09	1.74
15	Croatia	17 183	10 063	27 246	2.22	1.15	1.65
33	Georgia	3 386	4 584	7 970	0.44	0.52	0.48
34	Latvia	5 500	2 278	7 778	0.71	0.26	0.47

Georgia ranks 33th in this sector of the maritime industry (7,970 sailors, 0.48%). This maritime sector can be the best employment opportunity for Georgian citizens on the world labor market. That is why special attention is paid to the training of Georgian sailors in Georgia. In this regard, with the assistance of the Government of Georgia and the Autonomous Republic of Adjara, the infrastructure of the Batumi State Maritime Academy (BSMA) was upgraded, new educational programs were launched and the Poti branch of the BSMA was opened.

Table 5.

Volume of International Maritime Trade and Some Indicators of Georgia's Transport Industry (2014-2020)

Years	**Foreign trade volume, million USD [15]**	**Number of cargoes transported by transport sectors, million tons [16]**	**Number of cargoes transported to seaports and terminals, million tons**	**Number of recycled containers in seaports, units**	**International maritime trade volume, loaded in millions of tons [17]**
2014	11 462.9	46.4	21.3 [18]	446972	-
	-5 7 %	-	-	-	-
2015	9 505.0	44.2	19.2	379816	**10 023**
	-5 09 %	- 4.7 %	- 9.9 %	- 15.0 %	**19 %**
2016	9 407.0	42.3	17.6	329805	**10 295**
	-5 18 %	- 4.3 %	-8.3 %	- 13.2 %	**3 %**
2017	10 802.9	41.5	12.1	283319	**10 716**
	14.2 %	- 1.9 %	-31.3 %	-14.1 %	**4 %**
2018	12 741.5	41.1	15.1	453938	**11 019**
	17.9 %	-1.0 %	24.8 %	60.2 %	**3 %**
2019	13 317.6	42.3	17.2	647816	**11 076**
	4.5 %	2.9 %	13.9 %	42.7 %	**1 %**
2020	11 396.3	42.9	16.9	490370	-
	-14.4 %	1.4 %	- 1.7 %	- 24 %	-

Source. Table compiled by the author based the sources cited

To assess the situation in the Georgian maritime industry, we used the volume of Georgia's foreign trade, number of cargoes transported by the transport sector, number of cargoes transported to seaports and terminals, number of containers processed at seaports, and international maritime data. As the presented materials show, the amount of cargo transported by the Georgian transport system varies mostly in accordance with the volume of Georgia's foreign trade. Indeed:

- Foreign trade in 2015 and 2016 decreased from 5.18% to 5.09%. Consequently, The number of shipments transported by the Georgian transport sectors as a whole decreased from 4.7% to 4.3%, respectively, as well as the number of shipments transported to seaports and terminals (9.9% and 8.3%) and the number of recycled containers in seaports (15.0% and 13.2%);

- According to 2020 data, the volume of foreign trade decreased by 14.4%, respectively, the number of shipments transported to seaports and terminals decreased by 1.7% and the number of containers processed at seaports by 24%;

- Despite the increase in the volume of international maritime trade, the volume of cargo processed by the Georgian maritime transport system is decreasing. For example, in 2015 volume of the international maritime trade increased by 18%. Meanwhile, the number of processed cargo in Georgian seaports and terminals decreased by 9.9%, and the number of recycled containers by

15%. In 2016, the volume of international maritime trade increased by 3%, the number of processed cargo in Georgian seaports and terminals decreased by 8.3%, and the number of processed containers by 13.2%. The indicators of other years also show that the development trends of the Georgian maritime sector are determined not by the international maritime trade, but by the development trends of Georgia's foreign trade;

- Georgia is still not able to properly use the international transit function assigned by its strategic position;

- Training of seafarers should become one of the priorities to more effectively use the potentials of the maritime industry;

- More opportunities should be created for the development of maritime business in the country.

References

[1] Shipping and Maritime Industries, https://www.willistowerswatson.com/en-TH/Solutions/services/shipping-and-maritime-industries

[2] Worldbank, "GDP", available at https://databank.worldbank.org/data/download/GDP.pdf

[3] Worldbank, "GDP per capita", available at https://data.worldbank.org/indicator/NY.GDP.PCAP.KD

[4] TheGlobalEconomy, "Unemployment rate" https://www.theglobaleconomy.com/rankings/unemployment_rate/

[5] Worldbank, "Unemployment, total", available at https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS

[6] Government of Georgia: Program for 2021 – 2024 Towards Building a European State, February 2021, available at http://gov.ge/files/41_79014_435561_govprogram.PDF

[7] Ministry of Economy and Sustainable Development of Georgia. National Logistics Strategy of Georgia for 2021-2030, http://www.economy.ge

[8] Career Transition Partnership, https://www.ctp.org.uk/assets/x/53125

[9] World Bank: Nominal (current), Nominal (constant 2010), PPP (current), PPP (constant 2011)

[10] Trends in global export value of trade in goods from 1950 to 2020(in billion U.S. dollars) https://www.statista.com/statistics/264682/worldwide-export-volume-in-the-trade-since-1950/

[11] Global gross domestic product (GDP) at current prices from 1985 to 2026(in billion U.S. dollars) https://www.statista.com/statistics/268750/global-gross-domestic-product-gdp/

[12] United Nations Conference on Trade and Development, UNCTAD https://unctad.org

[13] UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT, REVIEW OF MARITIME TRANSPORT, 2020, https://unctad.org/system/files/official-document/rmt2020_en.pdf

[14] UNICTADSTAT, United Nations Conference on Trade and Development, https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=93

[15] National Statistics office of Georgia, https://www.geostat.ge/media/39340/External-Merchandise-Trade-2020_publication-2021.pdf

[16] Ministry of Economy and Sustainable Development of Georgia http://www.economy.ge/?page=ecoreview&s=26&lang=en,

[17] UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT, REVIEW OF MARITIME TRANSPORT, 2020 https://unctad.org/system/files/official-document/rmt2020_en.pdf

[18] USAID, Project "Governance for Development", https://pdf.usaid.gov/pdf_docs/PA00TH43.pdf

Detection a Natural Source of Oil in the South-Eastern Part of Black Sea During Monitoring of Oil Pollution With on European Maritime Safety Agency Satellite Service

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Abstract. The paper deals the presence of a natural source of oil, which is sometimes detected in the southeastern part of the Black Sea as part of the monitoring of oil pollution of the Black Sea using the EMSA (European Maritime Safety Agency) satellite service.

With the collaboration of EMSA CLEANSEANET System and MRCC (Maritime Rescue Coordination Center) of Maritime Agency of Georgia MRCC is regularly receiving data to region possible spills pollution.

The EMSA satellite service offers extensive surveillance of European waters for oil spills by using radar images acquired by Synthetic Aperture Radar (SAR) sensors on polar orbiting satellites. SAR sensors have the capability to detect oil slicks on the sea surface in darkness as well as daylight hours and to see through clouds.

The analysis CleanSeaNet Alert Report possible spills, it's safe to say that we are observing a natural expression of oil on the sea surface, which is formed by the migration of oil hydrocarbons in the sedimentary complex of the southeastern part of the Black Sea, seaward of the city of Poti (Georgia). Source identified based on the analysis of multi-temporal radar satellite imagery.

Keywords: Natural source of oil, CLEANSEANET System, Oil slicks, Black Sea.

1. Introduction

In 1955, the Azerbaijani scientist G.P. Tamrazyan predicted the eruptions of mud volcanoes for the next 4 years. An increase in activity was expected in August-September 1957, April-May, and October-November 1958. The forecast was brilliantly confirmed. And it was built on the basis of astronomical tables, from which the relative position of the Earth, Moon and Sun was selected. That is, the initiators of the activity of volcanoes are the tidal forces of the Moon and the Sun. Here, it turned out to be significant also when the tide comes: at apogee and apogelia or at perigee and perihelion. Statistics show that 60% of mud eruptions occur at times when full and new moons coincided with the moon's perigee. Eruptions begin, as a rule, in the evening, at about 6-8 hours local time [1].

This fact is also confirmed by that all natural source of oil, which is detect in the southeastern part of the Black Sea as part of the monitoring of oil pollution of the Black Sea using the EMSA satellite service eruptions begin in the evening, at the same time [2].

The total solar eclipse on July 31, 1981, in the zone of which the Caucasian mud volcanoes were located, confirmed the validity of such assumptions. It was at the moment of the full phase that gas bubbles and a large amount of water began to actively appear on the surface of the griffin. The activity of the volcanoes, as the instruments showed, manifested itself at this very moment, even many hills that had ceased their activity turned out to be broken from below by some incredible force [1].

For the occurrence of mud volcanism, powerful plastic strata, the presence of reservoir waters, the accumulation of continuously flowing gases, the existence of tectonic ruptures, and anomalously high reservoir pressure are required.

The analysis of radar images (RI) made it possible to establish a connection between the natural manifestations of oil observed on the sea surface and the processes of formation and migration of oil hydrocarbons in the sedimentary complex of the southeastern part of the Black Sea. Based on the analysis of spots detected on radar images of different times, obtained in the period from 1993 to 2011, the position of the source on the seabed was determined. The source is located at a point with coordinates 41° 58' 59" N 041° 07' 30"**E** at a depth of about 1050 m and works with a frequency of 0.3 - 5 hours. The first reliable observation of this griffin from space using space radar took place in December 1993 [3].

There are results of satellite observations, indicating natural emissions of oil in the Black Sea. According to their results, the Georgian sector of the Black Sea seeps out from 0.4 to 3 thousand tons of oil per year, and in the Turkish sector - up to 2 thousand tons per year [4], [5]. However, this work was carried out using space radar images without confirmation by "contact" research, as evidenced by a wide range of possible pollutant intake.

According to experts, the unloading of reservoir oils in the southeastern part of the Black Sea (See Fig.1.) only from this source, taking into account the constant flow, can provide an average supply of 1 to 8 tons per day or from 400 to 3000 tons of oil per year. The maximum possible estimates of the volume of natural oil emissions from the subsoil in this place according to space radar data can reach 7 thousand tons of oil per year [3].

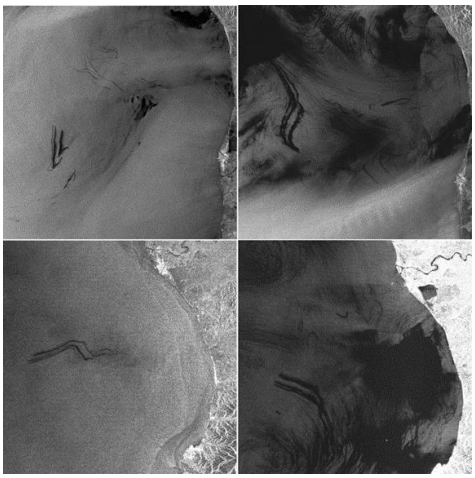


Figure 1. Oil slicks, the south-eastern waters of the Black Sea

Detailed bathymetric data showed that there is a positive landform at this location at the bottom - which, obviously, is the source of these oil outbursts. This is also confirmed by the data of independent geophysical studies carried out by IFM-GEOMAR (Kiel, Germany). In addition, the RI in this area revealed a number of smaller spots confined to secondary structures, which indicates the presence of a number of other natural sources of oil. They are also of interest and require further research.

Based on an analysis of the spots found on radar images in the southeastern Black Sea, oil slicks are shown in red, drifting in different directions from the ascent site under the influence of wind and currents (See Fig.2.).

The local elevation of the seabed located at a depth of about 1050 m is an underwater source of oil. The use of radar surveys at different times can significantly increase the likelihood of detecting natural sources of oil at sea (See Fig.3.).

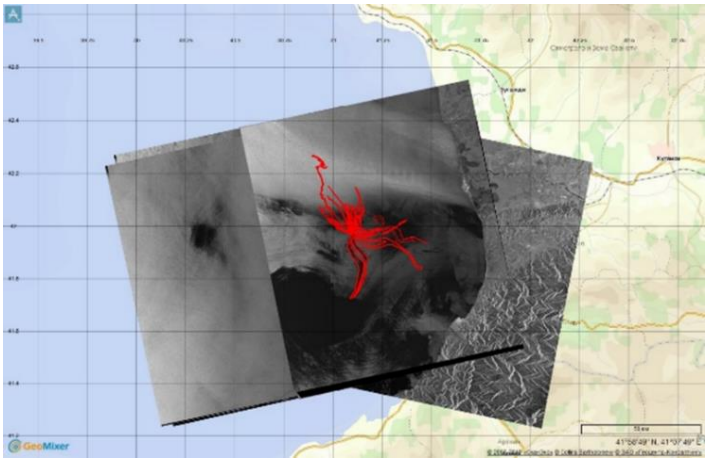


Figure 2. Analysis of spots detected on radar images in the southeastern Black Sea

For the analysis and study of natural oil shows detected by radar survey, a geoformation technique was used. This method proved to be very successful and many natural sources of oil in different seas were discovered with its help [6].

This natural oil infiltration is one of the characteristic features of this part of the Black Sea. Estimates of oil emissions can be obtained by measuring the areas of spots on radar images and based on simple physical considerations that relate the thickness of the oil film to its color, which varies from rainbow at the ascent point to silvery gray at the periphery of the oil slick [6].

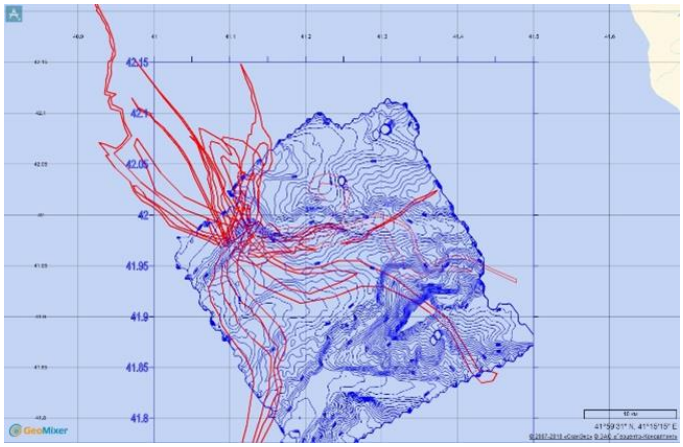


Figure 3. The local elevation of the seabed located at a depth of about 1050 m

2. Monitoring of oil pollution using European Maritime Safety Agency satellite service

CleanSeaNet is the European satellite-based oil spill monitoring and vessel detection service. It analyses images, mainly from synthetic aperture radar (SAR) but also from optical missions, to:

- Detect possible oil on the sea surface, including illegal discharges of mineral oil;
- Identify potential polluters, and
- Monitor the spread of oil during maritime emergencies.

The service was developed and is operated by EMSA, and is available to all EU member states, European Free Trade Association/European Economic Area member states, candidate countries and European Neighborhoods Policy participating countries [7].

The EMSA CleanSeaNet system has been operating in Europe since April 2007. On March 10, 2015, an agreement was signed between the European Maritime Safety Agency and the Georgian Maritime Transport Agency.

Data from these satellites is processed into images and analyzed for oil spill, vessel detection and meteorological variables. The information retrieved includes among others: spill location, spill area and length, confidence level of the detection and supporting information on the potential source of the spill (i.e. detection of vessels and oil and gas installations). Optical satellite images can also be acquired upon request, depending on the situation and user's needs [8].

The EMSA CleanSeaNet system provides the following Service Chain:

- Architecture includes - Satellites, Service providers and CleanSeaNet Data Centre;

Figure 4. EMSA CleanSeaNet system - Architecture

- Near Real Time service – satellite images are acquired in segments up to 1400 km long. 30 min are for a 400 km long image;

Figure 5. EMSA CleanSeaNet system - Near Real Time service

- Planning the satellite scenes;

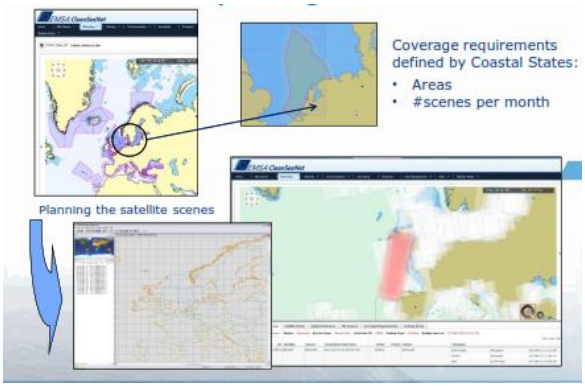
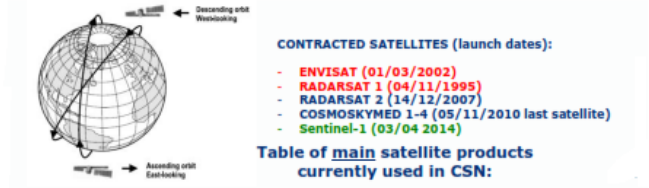


Figure 6. EMSA CleanSeaNet system - Planning

- Acquisition and Processing. Acquisition is normally done by direct real-time downlink when the satellite passes through the Ground Station Mask. The main aim of the processing is to make the raw radar data into a usable image with adequate resolution, by applying heavy digital processing and a number of corrections. The final format is called Level1b or Native1;



SATELLITE	PRODUCT IDENTIFICATION	Description	Resolution (Range x Azimuth, meters)	Spacing (Pixel x Line, meters)	Area Coverage (Range x Azimuth, km)
RADARSAT-2	RS2_SNA	ScanSAR Narrow	50 x 50	25 x 25	300 x 300
RADARSAT-2	RS2_SCW	ScanSAR Wide	100 x 100	50 x 50	500 x 500
COSMOSKYMED	CSK-HR	ScanSAR HUGE	100 x 100	50 x 50	200 x 200
COSMOSKYMED	CSK-HR	ScanSAR Wide	30 x 30	15 x 15	100 x 100

Figure 7. EMSA CleanSeaNet system - Acquisition and Processing

- RadarSat 2 (RS-2) usage in CSN. RadarSat 2 is a Canadian polar-orbiting C-Band SAR satellite, originally launched by the Canadian Space Agency, operated in a Public-Private Partnership by a Canadian Company, MacDonaldDettwiler (MDA). Orbits (North Pole – North Pole) have a duration of approx. 100 minutes. 24 days orbit cycle. Network and Coverage Ground stations RS-2 [9].

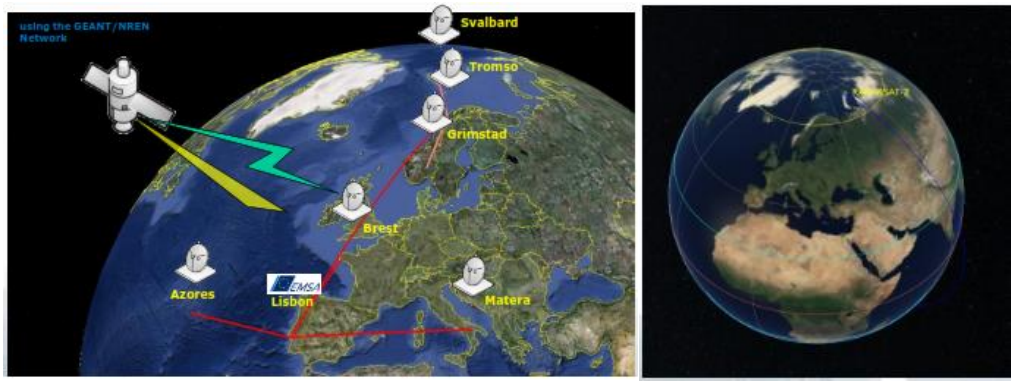


Figure 7. EMSA CleanSeaNet system - Network and Coverage Ground stations

How does work and what the measures Synthetic Aperture Radar (SAR): The radar emits electromagnetic waves in the direction of the earth's surface, after which the reflected waves are processed in the Synthetic Aperture Radar and it is possible to measure all the characteristics of the reflected wave.

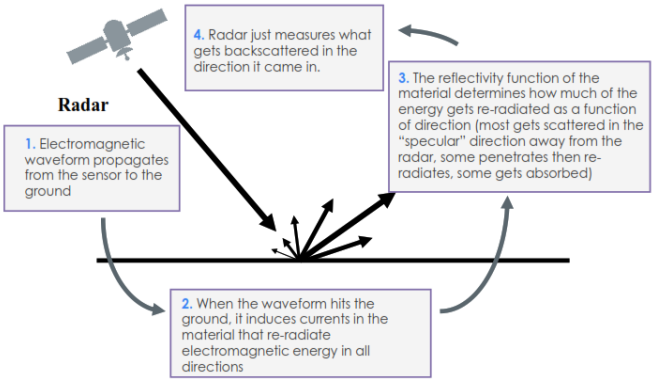


Figure 8. EMSA CleanSeaNet system - Synthetic Aperture Radar function

SAR images are highly influenced by the wind. The SAR images dependency with Wind varies within 2-3 m/s <wind<12-15 m/s. With Moderate winds: strong contrast between oil slick and surrounding waters [7].

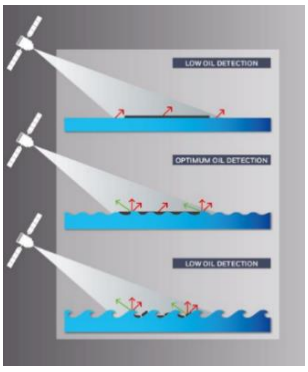


Figure 9. EMSA CleanSeaNet system - wind influence

Today 30 Maritime countries Service users. On average, more than 2000 cases are recorded per year, they are being monitored and analyzed. The probable source of the spill could be:

- Ship, sunken ship;
- Oil Pipeline;
- Natural source of oil from the seabed, or so-called, "Griffons".

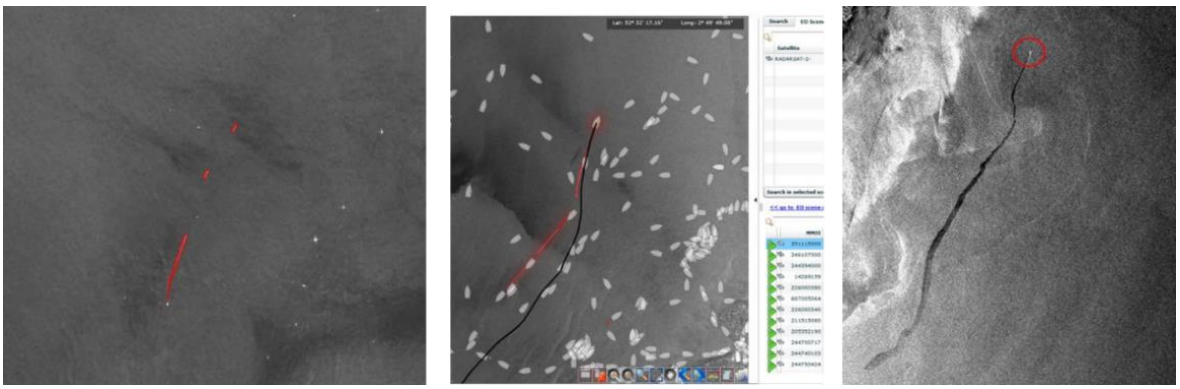


Figure 10. EMSA CleanSeaNet system - probable source of the spill

Often the probable source of the spill is false detections, in the form of lookalikes: low wind area, algae, current front, upwelling area, fish or vegetable oil cannot be discriminated in SAR from mineral oil. For validation, they are considered as true detections [7].

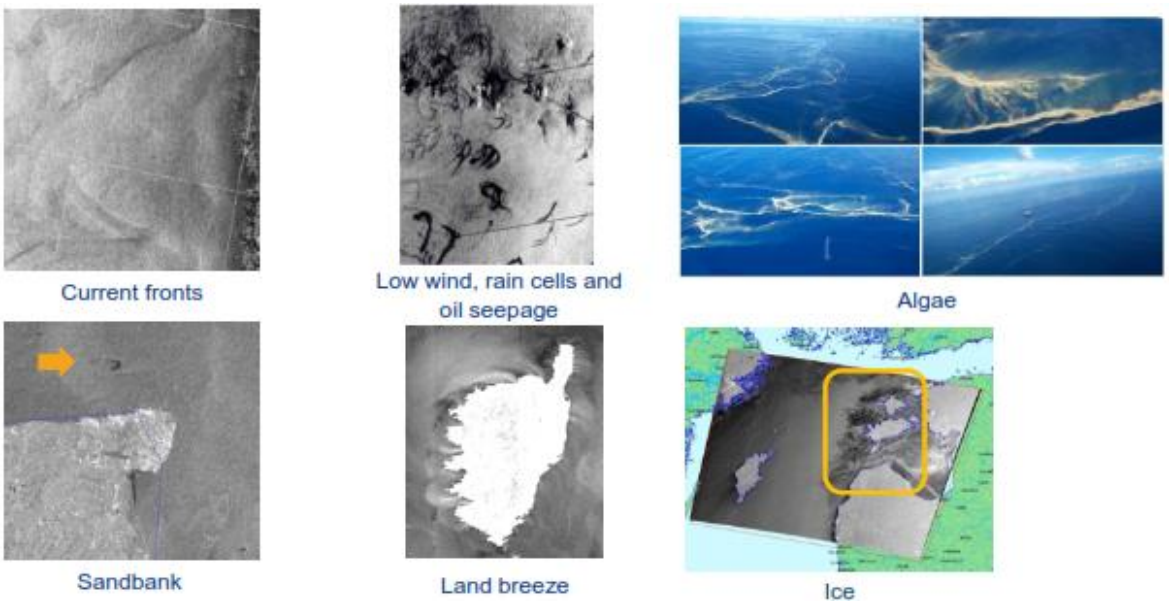


Figure 11. EMSA CleanSeaNet system - false detections

3. Practical use data of oil pollution using European Maritime Safety Agency satellite service

The satellite images are downloaded using antennae in Norway, Italy and Portugal (from 2008 onwards). The data is processed and analyzed to detect possible oil slicks. An alert report is produced for every planned image to inform the Coastal States on the results of the analysis, i.e. whether possible oil slicks are detected or not. In case slicks are detected, the affected Coastal State immediately receives an alert to enable the Coastal State to take quick actions in order to verify and quantify the slick and to identify the potential source. The complete process, from satellite overpass to the alert, takes a maximum of 30 minutes. Maritime Rescue Coordination Center (MRCC) Receives Possible Spill Information – Alert report, from the CleanSeaNet System (See Fig.12.) [2].

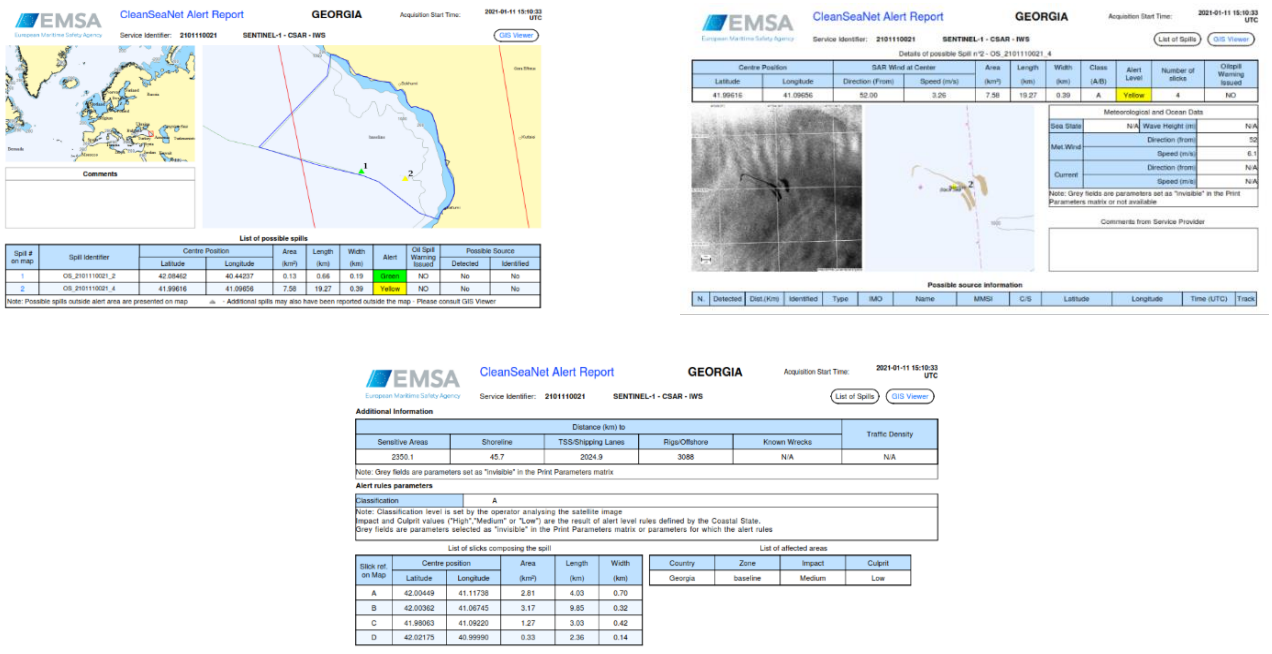


Figure 12. EMSA CleanSeaNet system - Alert report

Alert image and further e-mail (“Alert report”) consists of (See Fig.12):

- Position of the possible oil pollution,
- Date and time of observation,
- Estimated size of the polluted area,
- Wind speed and direction,
- Polluter category e.g. Ship, platform, industry,

- If available, the name of the platform or the geographical name in the case of release from onshore sites,
- Probability level (low, medium or high).

MRCC conducts an analysis of the CleanSeaNet Alert Report, determines where the oil slick may be at a given time, takes into account the weather (sea wave, current, wind direction, distance to the spill site, etc.) and accepts On the expediency of sending a special team to the site of the alleged spill, which should determine whether the information about the alleged spill is true, is there a polluting vessel, if we are dealing with a natural or any other type of spill [9].

The probable polluting vessel is identified as follows:

1. Vessel detected by satellite radar (bright spot);
2. According to the traces of spilled oil;
3. According to AIS information.

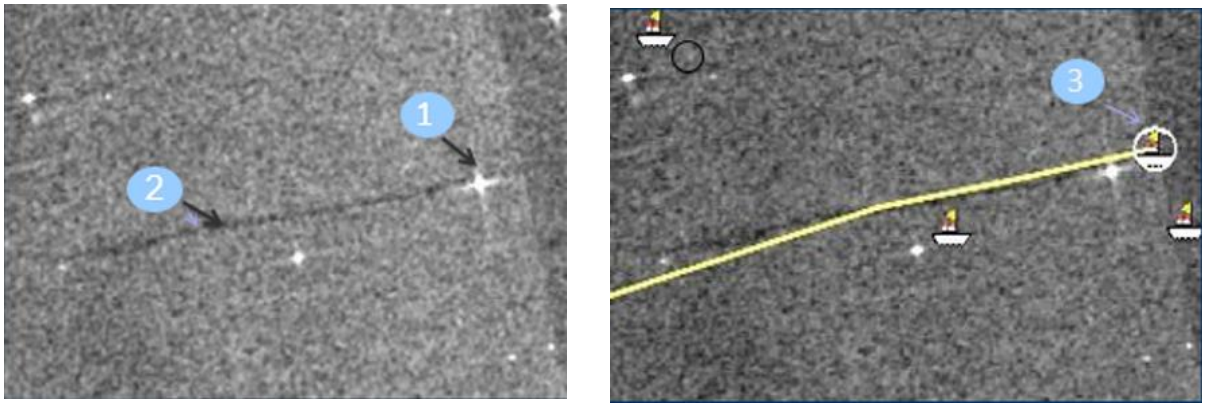


Figure 13. EMSA CleanSeaNet system - Types of identify

After receiving Alert report from CleanSeaNet when a potential source detected in satellite images MRCC promptly should identify a vessel which is potential contaminant.

Further rapid action is essential to ensure that at the time to identify sites of pollution and the vessel. Need to use all available means (AIS, VTS, RADAR) to identify and track suspected pollutant - in this case, if the potential polluter is a ship). If a potential source of the ship, which was determined by its delay in the sea to investigate, and if it fails to send a request to port State control to be checked at the next port of call. Proofs sent via e-mail at the next port of call. If the ship continues on his way, messages are transmitted MRCCs neighboring countries [9].

4. **Observation of possible spill images by using radar images acquired by Synthetic Aperture Radar sensors on polar orbiting satellites**

Observation and analysis of possible spill images obtained through polarized aperture of radar sensors of satellites in polar orbit significantly increases the likelihood of discovering natural sources of oil in the sea;

Long-term analysis of radar images obtained from satellites allows us to say:

- CleanSeaNet Alert reports from EMSA contain many natural oil sources from the last decade;
- The positions of the spots of the natural sources of oil and their shape do not differ greatly from one another, and they are all located in the south-eastern part of the Black Sea;
- Previous laboratory studies of natural sources of oil indicate their natural origin.

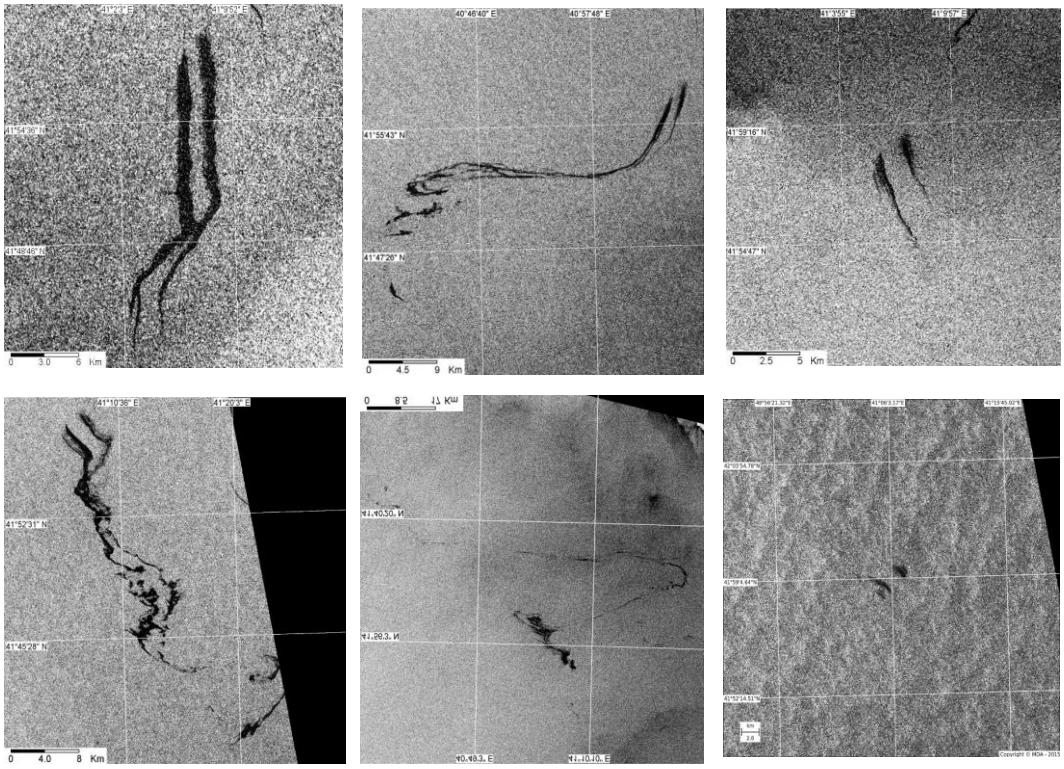


Figure 14. Types of identify Pictures of natural oil sources obtained by polarized aperture of radar sensors of satellites in polar orbit

5. Geoinformation methods used to analyze and study natural sources of oil detected using satellite radars

For the analysis and study of natural oil shows detected by radar survey, a geoinformation technique was used. This method has worked well and many natural sources of oil in different seas have been discovered with its help.

In particular, a geoinformation approach was used. With the help of the latter, natural sources of oil in the Caspian Sea have been investigated and even discovered.

Geoinformation System (GIS) is a multifunctional system designed for collecting, processing, modeling and analyzing spatial data, displaying and using them in solving problems, preparing and making decisions within an enterprise/organization, as well as for integration into various sites and public portals. The aggregate of heterogeneous layer-by-layer realized data and their precise binding to coordinates allow performing complex analysis of spatial objects.

Using space radar and GIS approach natural sources of oil in the Black Sea were investigated and even discovered [10].

The processing of radar images for these tasks is usually carried out according to a standard scheme and includes: geometric correction, geographic referencing of images to a digital map, and interactive interpretation of radar images with extraction/vectorization of dark spots (slicks) taking into account the environment and the presence of slick-forming phenomena of a different nature. In particular, the identification of detected natural oil slick spots occur by their shape, size, direction of drift, degree of clustering (repeatability in time and space), the presence of repeating signatures, etc. In addition, slicks of natural oil seepages, having a much greater thickness than biogenic slicks, exist on the sea surface in a wider range of wind speeds - up to 6-7 m/s, that is, they are also observed when biogenic slicks disappear from the sea surface (with a wind of more than 3-4 m / s) [11], [12].

An important feature of the interaction of electromagnetic radiation of the radio frequency spectrum with the water surface is the resonant scattering mechanism, known as the Wolfe-Bragg condition, which determines the so-called resonant wavelength of the water surface – Λ,

$$\Lambda = \frac{\lambda}{2 \cdot \sin\theta},$$

where λ - is the wavelength of electromagnetic radiation of the radio frequency spectrum,

θ - is the vertical angle of incidence of the electromagnetic radiation wave.

The Wolfe-Bragg condition allowed us to use GIS as a multifunctional system for collecting, processing, modeling and analyzing spatial data.

Mathematical modeling was carried out using the theory of frequency-angular spectrum using the coefficients of surface and of bottom friction.

To describe the fields of excitement uses the concept of frequency-angular spectrum

$$E(\sigma, \theta, x, y, t),$$

where, σ, θ - frequency and angular coordinates;

x, y, t - horizontal coordinates and time.

Appropriate equation for the determination of E is given by the law of conservation of energy:

$$\frac{\partial}{\partial t}N + \frac{\partial}{\partial x}(c_x N) + \frac{\partial}{\partial y}(c_y N) + \frac{\partial}{\partial \omega}(c_\omega N) + \frac{\partial}{\partial \theta}(c_\theta N) = \frac{S}{\omega} \quad (1)$$

Where, $N = \frac{E}{\omega}$ - density of wave action;

Magnitudes, $c_x, c_y, c_\omega, c_\theta$ - transport velocity along the appropriate spatial and frequency-angular coordinates.

For numerical solution of equation (1) is applied a modified version of the model, in which the source (oil) function is defined as

$$S = S_{in} + S_{nl} + S_{ws} + S_{bf} + S_{dib} \quad (2)$$

where,

S_{in} – the source of generation of waves by the wind;

S_{nl} – non-linear interactions spectral harmonics;

S_{ws} – dissipation of the energy due to the caving of the wave crests;

S_{bf} – dissipation of the energy due to of bottom friction;

S_{dib} – caving waves on the critical depths.

In the original version the source of wave generation Sin - is determined by assuming that the friction coefficient Cd only depends on the wind speed.

Solution of problem (1), (2) makes it possible to obtain estimates a number of spectral wave characteristics, in particular the significant wave height and root mean square wave height [14].

A characteristic feature of this model is allows use of geoinformation methodologies for accounting and analysis of natural sources of oil.

At the final stage of radar image processing, the vector layers of the spots and the geological and geophysical information required for analysis are combined on specialized geoportals of a web-based cartographic service that allows interactive analysis of the collected data [13].

6. Conclusions

1. Long-term observations show that the EMSA SAR sensors have the capability to detect oil slicks on the sea surface in darkness as well as daylight hours and to see through clouds;
2. The analysis CleanSeaNet Alert Report possible spills, based on the radar images, it's safe to say that we are observing a natural expression of oil on the sea surface, which is formed by the migration of oil hydrocarbons in the sedimentary complex of the southeastern part of the Black Sea;
3. Their connection with underwater sources has been established and processes of formation, migration and seepage petroleum hydrocarbons in the sedimentary complex of the Black Sea;
4. Based on the analysis of spots detected at different times of radar images obtained in 2015–2020, the position of the sources on the bottom, as well as a number of their other characteristics, were determined;
5. According to various estimates, the unloading of reservoir oils in the southeastern part of the Black Sea only from this source, taking into account the constant flow, can provide an average supply of 1 to 8 tons per day or from 400 to 3000 tons of oil per year.
6. In particular, the results of studies in the southeastern part of the Black Sea showed that at present it is not difficult to detect and study the outflows of liquid petroleum hydrocarbons using satellite and related geoinformation and geophysical methods.

References

[1] Извержение радиации, https://itogi.ru/archive/2003/10/79700.html;

[2] Avtandil Gegenava, Abdul Kakhiddze. “EMSA CLEANSEANET System in its practical implementation”. Proceeding of the 11th Annual General Assembly and conference of the IAMU. Gdynia, Poland, 2011;

[3] Спутники обнаружили естественные источники нефти в Черном море, http://www.gisa.ru/75706.html;

[4] Заграничный К. А. “К вопросу об источниках и объемах поступления нефтяных компонентов в акваторию Черного моря”. https://cyberleninka.ru/article/n/k;

[5] Иванов А.Ю., Евтушенко Н.В. Естественные нефтепроявления в юговосточной части Черного моря по данным космической радиолокации [Текст] // Земля из Космоса. 2012. № 12. С. 64-71.

[6] Ещё один естественный источник нефти в Черном море исследован с помощью космической радиолокации, http://gisa.ru/77516.html;

[7] “01.02.01-Introduction to CSN Service.pdf”, http://www.emsa.europa.eu/workshops-a-events/training-materials.html, 2021;

[8] “CleanSeaNet Service”, http://www.emsa.europa.eu/csn-menu.html, 2021;

[9] CleanSeaNet Information Session. “04_Introduction_CSN_2014_TRACECA.pdf” http://www.emsa.europa.eu/workshops-a-events/workshop-materials-reports.html?start=140;

[10] Evtushenko N.V., Ivanov A.Yu. Oil seeps in the Southeastern Black Sea studied from space using SAR images. Issledovanie Zemli iz kosmosa, 2012, No. 3, pp. 24–30.

[11] Williams A. and Lawrence G. The role of satellite seep detection in exploring the South Atlantic’s ultra-deep water. AAPG Studies in Geology, 2002, No. 48, and SEG Geophysical References Series, 2002, No. 11, pp. 327–344.

[12] Ivanov A.Yu. Slicks and oil films signatures on synthetic aperture radar images. Issledovanie Zemli iz kosmosa, 2007, No. 3, pp. 73–96.

[13] Иванов А.Ю. Естественные нефтепроявления в Каспийском и Баренцевом морях: обноружение и анализ по данным дистанционного зондирования. Океанологические исследования. 2019. Том 47. № 5. С. 52–64

[14] A. Gegenava, I. Sharabidze, A. Kakhidze, G. Khaidarov. “Mathematical Modelling of Wave Situation for Creation of Protective Hydro technical Constructions in Port Kulevi”. TransNav 2015, Gdynia, 2015.

Professional Training for Involvement in Maritime Education

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Abstract. The article is devoted to the issues of involvement of teachers and maritime professionals in maritime education. In particular, authors discuss professional training for basic subject teachers in order to become experts in teaching e.g. Ships Stability, MARPOL, and Environmental Pollution etc.

The higher education institutions have specific qualification requirements for their academic staff members. This also applies to maritime lecturers who in addition need an appropriate sea experience as well as sufficient knowledge of related subject(s). Maritime professionals need to pass special trainings on order to get permission to deliver lectures in Maritime Academy. The authors make an attempt to analyze the possibility of passing professional training for those who are not involved in Maritime field and get special expertise to become specialist of profile subjects.

Keywords: MET, STCW, Professional Training, Basic Subject, Profile Subject, qualification.

Actuality of the Article*:* Due to the fact that MET in general is of a vital importance, all the issues related to Maritime Education are relevant and this applies to our article.

The aim*:* The aim of the article is to eliminate all the issues related to Professional Instructors/Trainers/Teachers qualifications.

The Objectives*:* The objective of the article is to work out so called Professional Training for basic subject teachers in order to have more qualified personnel engaged in Maritime Education.

The Subject*:* The subject of the article is the need of specialized training for Maritime Professionals and Basic Subject Teachers.

Research methods*:* For this article we used derived/Compiled Data method. We used existing data points, from different data sources, to create new data through some sort of transformation. Our intention is to make survey-oriented research and get the result we are trying to achieve.

The Education and Training of Seafarers plays vital role in Maritime Safety and Protection of Marine Environment. Maritime Education is regulated by STCW convention (Standards of Training, Certification and Watch keeping for Seafarers 1978), with Manila amendment 2010. The stated purpose of this document is "… to promote safety of life and property at sea and the protection of the marine environment by establishing in common agreement international standards of training, certification and watchkeeping for seafarers". ([3]). STCW imposes a skill-based training framework upon mariner qualification, with deep roots in the apprenticeship model. In addition, the regulations of MET vary from country to country and in case of Georgia besides STCW convention MET is regulated by Law on Education and Certification of Seafarers (2012 with amend. 2014), Law on Higher Education (2005), Law on Vocational Education (2007).

" Each graduate of the maritime institutions should be well educated and trained as an Officer of Watch (OOW) hence well-versed with the operational and management responsibilities on-board an ocean-going vessel. At the same time that s/he must be prepared to fulfill the officer's role ashore. A well-developed MET programme must include theoretical and practical education and training in a well-balanced curriculum and must ensure there are well-designed and internationally recognized programmes of education and training leading to higher qualifications and certifications for career progression as well as for job diversification. There is therefore a need for clear education and training pathways recognized internationally with clear progression routes onto degree and higher qualifications in the related subjects." ([1], p 63)

STCW code reads "… instructors, supervisors and assessors are appropriately qualified for the particular types and levels of training or assessment of competence of seafarers either on board r ashore, as required under the Convention, in accordance with the provisions of this sections". To be an instructor in the world of Maritime Education and Training means to be a different person, special one having instructional techniques and training and assessment methods, besides maritime educational background. The knowledge, skills and attributes required for maritime instructors and trainers varies. A goods instructor/trainer needs to be aware of the human element issues that can affect the design, management and operations of ships. They need to be aware of how humans interact with other humans, machines and systems, and they need to be aware of how social conditions can affect wellbeing of crews. Maritime instructors/trainers must be good teachers in its true sense. "They must be capable of engaging with their students; they must possess good leadership and motivation skills; they must demonstrate solid presentation and classroom management skills; and they must seek feedback from their students so as to build confidence and promote credibility". ([2], p 1).

The higher education institutions have specific qualification requirements for their academic staff members. Maritime lecturers follow the same rules; in addition, they need an appropriate sea experience as well as sufficient knowledge of related subject(s). It's not possible for academic maritime staff member to continuously update their seafaring skills and competence as opportunities of going to sea is not reasonable. This is an issue - to be experienced seafarer or a profile subject lecturer. This specific situation creates a difficulty to find qualified seafarer background academics to teach in the MET institutions.

If we compare difficulties of working ashore for seafarers, we can say that working ashore is completely different. The traditional hierarchy on board a ship provides a structure of responsibility and authority not usually replicated on shore. The desire to help others learn is very much a pre-requisite for the aspiring educator. Helping others to learn requires a number of key attributes such as: subject knowledge, communicating, integrity, cultural awareness, patience, pedagogy etc. We encountered many issues on how a professional seafarer becomes a good, qualified instructor/trainer. In order to facilitate the delivery of training in the competence standards required by the IMO Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended training course for instructors (6.09) was implemented. Its aim is to provide a useful introduction for those with limited teaching experience and introduce new approaches or serve as a reminder of skills and techniques for those who have been teaching for some time. It is not the aim to provide a full course of trainee instructor training. In addition, it provides a sound basis for the delivery of other training programmes.

Moreover, Train the Simulator Trainer and Assessor based on the IMO Model course 6.10, is largely practical and experiential in nature and each course participant will have adequate hands on training on the simulator. This course is intended to provide a conceptual understanding of the importance of maritime education and simulator training with a view of the human element in shipping and the special working environment on board a ship. In addition, trainees will understand the psychology of learning in a simulator, in order to design and conduct simulator based training programmes, including exercises and detailed briefing and debriefing. (4)

Let's look at the issue of a professional instructor/trainer from different point of view. Coming out of the fact that lack of professional seafarers involved in educational process is worldwide issue we should find a solution. It's very hard to attract an acting seafarer to be involved in educational process because of many reasons: long vacation, low salary, need of CoC refreshment, etc. In our

educational institution we have Non-Profile Subject (Basic Subjects) instructors/trainers with high expertise and experience with no experience in maritime field. What is the solution in this case? How should we assist the professional of basic subjects to become experts in teaching e.g., Ships Stability, MARPOL, and Environmental Pollution etc. A very experienced teacher of physics trained in specialized course of Maritime Field will become an expert instructor of Ship's Stability; a teacher of Chemistry will teach MARPOL or Environmental protection with more precise units. Of course, this will not cover all subjects, only the ones which have so called pre-requisite of the Maritime Education.

Let's imagine teachers with absolutely no practical background coming from various industries and trying to adopt seagoing experience by literature only. In this case the professionals of different subjects should pass specialized refreshment courses in order to get more specialized knowledge in the subject. In order to achieve the set goal, we need to carry put a fundamental research. The specialized courses are to be created (coming out of the specification of profile subject) in order to enhance the expertise of the profile subject teacher in maritime field. This course will help a teacher to acquire more practical skills; s/he will learn specification of the subject, usage of the knowledge in practice or in industry; so that the profile subject lecture will be equivalent to the lecture delivered by professional seafarer or a representative of a maritime field. These courses will change the approach to the maritime education; it will be more flexible than a model course or a training course.

The fundamental research should be carried out in the following directions:

1. Qualification/Background Requirement;
2. Experience in the field;
3. The basic subject to be delivered (possibility to deliver the subject);
4. Which profile subjects need practical experience (sea experience)

In diagram 1, created based on our survey, we can see what stages are needed for a seafarer or a PhD Student in order to become a professional teacher and we will see the difference.

We are going to do a survey concerning the seafarers engaged in Maritime Educational process worldwide. We are working on a survey which will help us to find out what we need to do in order to achieve the set goal.

Instructors need to develop competence in explaining quite difficult and complex tasks in a simple manner in order to reach the students and to motivate them. The basic elements of didactics and learning methodology are crucial and a key to the learning success. Further, instructors in maritime institutions bear a high responsibility with regard to the development of interpersonal skills

of the students. Past experiences have shown that human negligence and lack of responsibility have caused a lot of major incidents in shipping. The experienced instructors are good enough in all above mentioned but need to develop expertise in new areas.

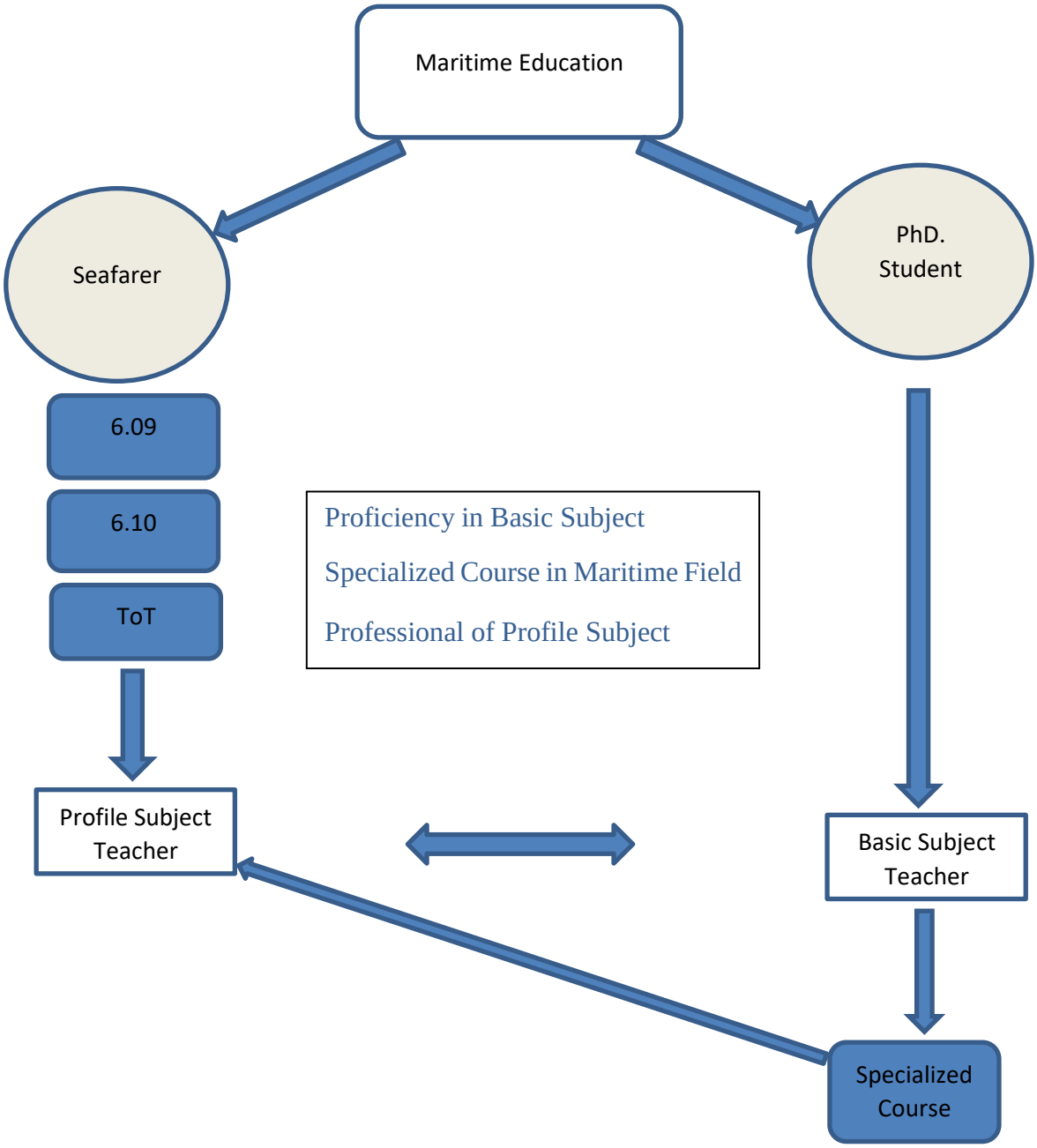

Diagram 1

Based on our own experience, we would say that teaching offers a lot of direct response and feedback from the students and working with young people daily is brainstorming in every respect. It's essential for teachers to continuously update their know-how and keep track of the latest

developments – not only within the technical elements such as engineering, ship building, nautical and forensic development, the daily shipping business etc., but also within the social aspects and skills, which are not to be underestimated. Being an instructor/trainer means daily self-study if you take your job seriously. On the one hand, it's a great opportunity to take part of laying foundation for young people's future career development and on the other hand, to work on key issues within shipping whilst taking advantages of the previously gained valuable skills.

References

[1] Albayrak T., Ziarati R. "New Methodologies and Technologies an Met", Conference: International Maritime Lecturers Association (IMLA) 2008, https://www.researchgate.net/publication/263479072_Methodologies_and_Technologies_In_Maritime_Education_and_Training_MET;

[2] The international Maritime Human Element Bulletin. "It take a special sort of person to be a Maritime Educator and instructor…". https://www.he-alert.org/objects_store/29.pdf;

[3] The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978, was adopted by the International Conference on Training and Certification of Seafarers on 7 July 1978;

[4] IMO Model course 6.09, 2017;

[5] IMO Model course 6.10, 2013.

Modern vision in the use of liquid cargo operation simulators

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Abstract. The cargo operation planning, the process of implementation is one of the most difficult tasks carried out on liquid cargo vessels. The chief officer's task is to process a huge amount of information, accurately enter data into a special computer, consistently calculate the stages of the work, and finally the most important is to complete the task in the shortest period of time. In the implementation, less attention is paid to the economic use of cargo mechanisms, their wear, and fuel costs.

Despite the recommendations and strategies for the effective management of cargo operations, modern artificial intelligence has not yet fully replaced the mankind. We offer a modern and effective way to solve problems, such as maritime universities and maritime training center simulator classes' students will search the most effective ways of cargo operation. The collaboration among vessel, university and terminal would be distance in the internet cloud, which provides: the ships' crew work schedule reduction, a wide choice of cargo operations plans, selection of the optimal option, energy-saving, only target use of mechanisms, which finally lead to less wear and tear, fuel economy and, consequently reduction of CO2 pollution in the atmosphere. It will also reduce cargo operation time, thus reducing port and terminal fees. More over this principle of operation will increase the number of qualified personnel in the future and will be used in the future for remote control liquid cargo operations on unmanned vessels of future.

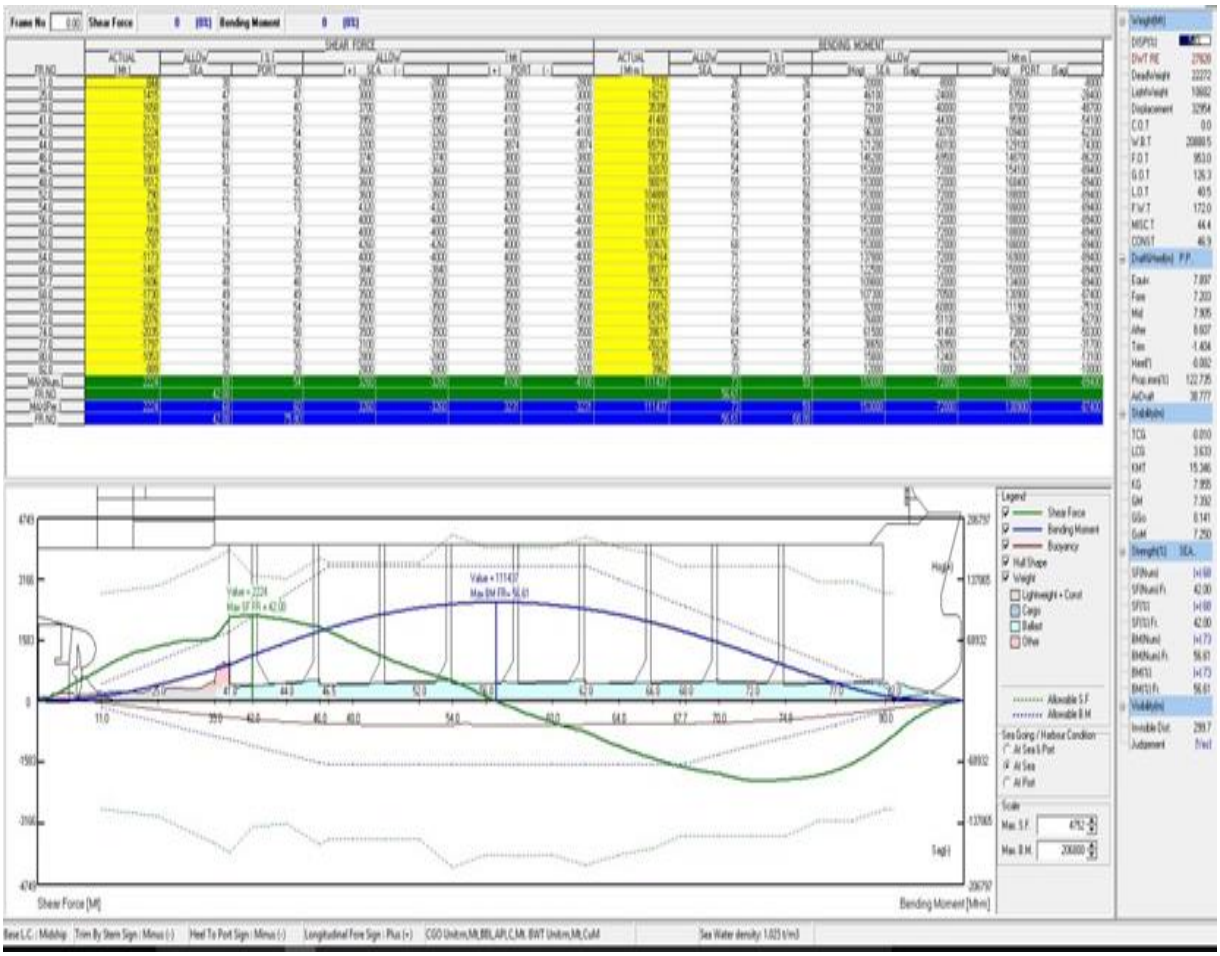
Keywords: Cargo operation, Simulator, E-cloud.

Introduction

Cargo Officer- is the responsible officer for a long list of tasks performed onboard the vessel, such as planning cargo operation, handling and stowage of cargo, the cargo spaces preparation, the ship's cargo gear operation and inspection, to ensure ship's stability during loading, discharging and the sea passage, to ensure the proper handling of cargo, to properly delegate duties to Junior Officers and the operation plan is later sent to the office for improvement.

Upon receipt of the cargo nomination data from the charterers, the cargo officer prepares a cargo stowage plan in which he must take into account various conditions, such as the specification of the loading and unloading ports, Cargo Properties, Environment conditions and requirements for proper cargo carriage. This and many other details should be taken in to consideration and collected before commencement of stowage plan preparation.

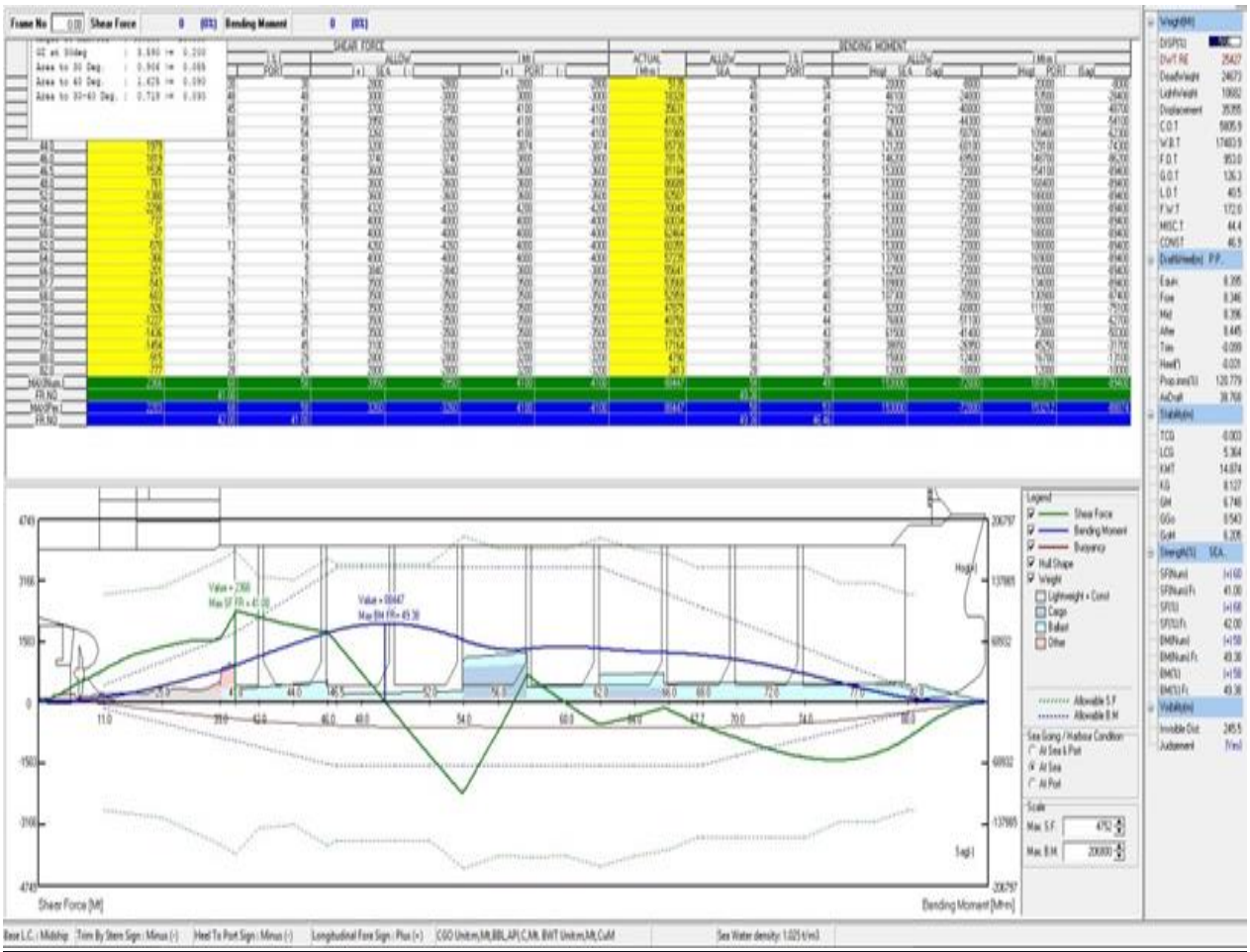
Each tanker has a cargo operations computer program approved by the classification society, in which the officer enters cargo information provided by the charterer. The type of cargo, specific



Sequential load table with a positive load rate

characteristics, quantity, season period, geographical location, port of loading-unloading, ship passage, course details play an important role in the planning of cargo operations, as well as the distribution of cargo in tanks, which makes *almost* all cargo operations unique.

When developing the cargo operation plan, the responsible Officer or Senior Assistant should consider some nuances of the *future cargo* operation which could take several days or weeks to complete. The process of stowage planning is time-consuming and requires processing and numerous calculations. Finally, the plan is completed, the document is sent to the operator's office and the cargo terminal for approval, where along with the approval, the document is corrected as needed. Even after the final version of the plan is approved, it is impossible to change anything in it without going through the full approval procedure.



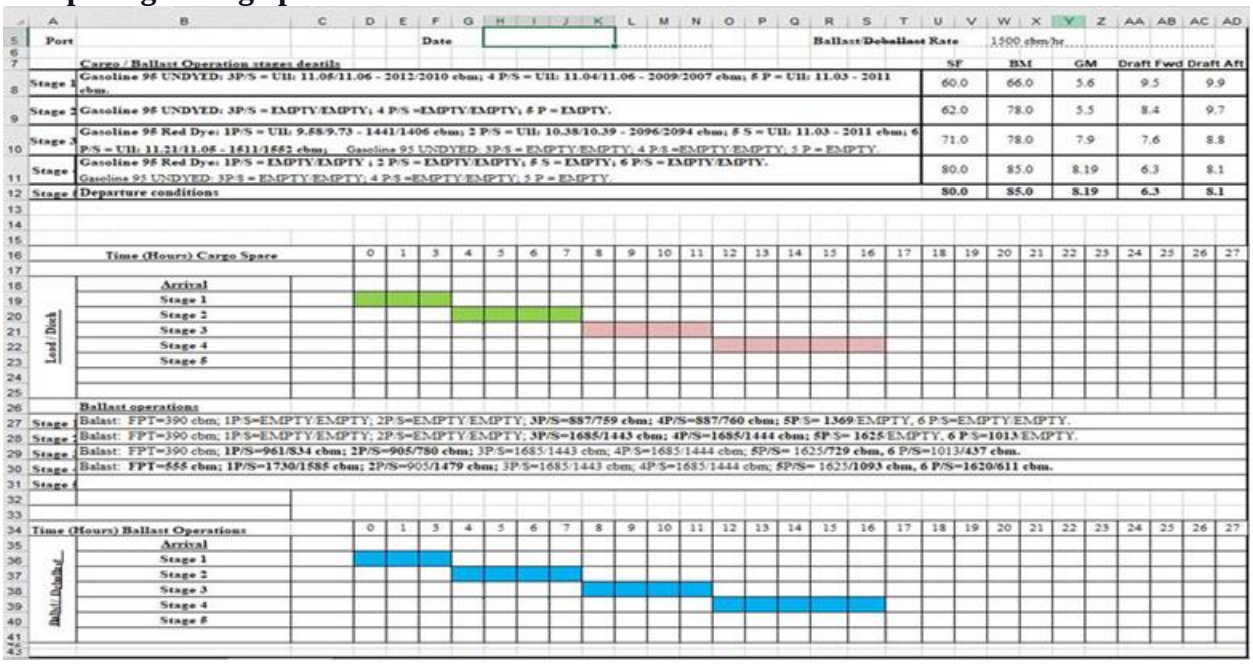
Sequential load table with a negative load rate

Disadvantages of the existing approach

Presented tables above, show that the planning of the ship's cargo operation is one of the most difficult tasks performed by the Cargo Officer. He must process large amounts of information, accurately enter data into a special computer, consistently calculate the steps of the work and the most important is that everything must be done in the shortest time, often under the stress, generally caused by passage, raff weather, time-shifting lags and more other stressful conditions, which make it difficult for the cargo officer to carry out the imposed job.

In the given situation, the chief officer often chooses a more comfortable setting for him to operate the cargo operations machinery, in which less attention is paid to the economy of using the cargo machinery. Due to the working conditions, it is more important for the officer to perform the job in the shortest possible time. Therefore, the mechanisms operate with maximum load from the start of the cargo operation, regardless of the need for their maximum or minimum load at a particular moment. The variability of the load is directly related to the variability of the approved cargo plan, so any change in the work plan must go through the plan approval procedure, which in turn increases the working time, therefore the officer avoids the variability of the load during the work and chooses the short-term non-economic way of loading, where the cargo operation is described in just a few steps, for example as shown in the graph below.

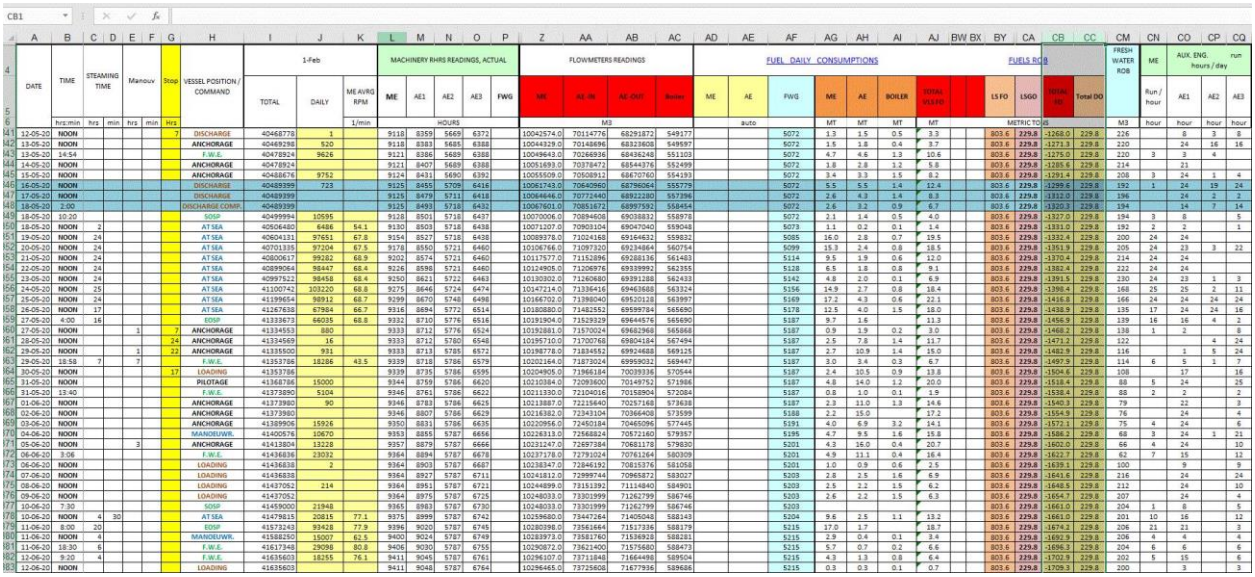
4-step freight/cargo plan model:



The reality on the ship

In 2020, the Chemical Tanker's "MARVIN FAITH" cargo operations comparative studies, the workflow tables' **analyses**, sharply highlighted the shortcomings of the work process on tankers and made us think about ways to improve it.

The data above gives us information about the auxiliary mechanisms, generators, hourly load of the Boilers, Diesel Generators, Diesel driven Hydraulic Power packs and the fuel spent for their work, which are involved in the unloading of cargo.



AD	AE	AF	AG	AH	AI	AJ	BW BX	BY	CA	CB	CC	CM	CN	CO	CP	CQ
FUEL DAILY CONSUMPTIONS								FUELS ROB				FRESH WATER ROB	ME	AUX. ENG. run hours / day		
ME	AE	FWG	ME	AE	BOILER	TOTAL VLS FO		LS FO	LSGO	TOTAL FO	Total DO		Run / hour	AE1	AE2	AE3
auto			MT	MT	MT	MT		METRIC TONS				M3	hour	hour	hour	hour
		5072	1.3	1.5	0.5	3.3		803.6	229.8	-1268.0	229.8	226		8	3	8
		5072	1.5	1.8	0.4	3.7		803.6	229.8	-1271.3	229.8	220		24	16	16
		5072	4.7	4.6	1.3	10.6		803.6	229.8	-1275.0	229.8	220	3	3	4	
		5072	1.8	2.8	1.2	5.8		803.6	229.8	-1285.6	229.8	214		21		
		5072	3.4	3.3	1.5	8.2		803.6	229.8	-1291.4	229.8	208	3	24	1	4
		5072	5.5	5.5	1.4	12.4		803.6	229.8	-1299.6	229.8	192	1	24	19	24
		5072	2.6	4.3	1.4	8.3		803.6	229.8	-1312.0	229.8	196		24	2	2
		5072	2.6	3.2	0.9	6.7		803.6	229.8	-1320.3	229.8	194		14	7	14
		5072	2.1	1.4	0.5	4.0		803.6	229.8	-1327.0	229.8	194	3	8		5
		5073	1.1	0.2	0.1	1.4		803.6	229.8	-1331.0	229.8	192	2	2		1
		5085	16.0	2.8	0.7	19.5		803.6	229.8	-1332.4	229.8	200	24	24		
		5099	15.3	2.4	0.8	18.5		803.6	229.8	-1351.9	229.8	205	24	23	3	22
		5114	9.5	1.9	0.6	12.0		803.6	229.8	-1370.4	229.8	214	24	24		
		5128	6.5	1.8	0.8	9.1		803.6	229.8	-1382.4	229.8	222	24	24		

The table shows the hourly load and fuel consumption of the mechanisms involved in the work, although the load experienced by these mechanisms does not necessarily mean that the work

of all of them was fully required from the beginning to the end of the cargo operation. The cargo operation plans studies and data **analyses** showed that the ship spends about 4% of its fuel on unloading operation, which is up to 600 liters of fuel, equivalent to 1056 (kW) kWh of energy. According to the International Certificate of Engine Standard (IAPP), 80,240 mg of NOx-nitrogen oxide was released into the atmosphere, which in addition to the cost also includes excessive air pollution. That is the other side of the coin, which remains practically unnoticed, but if we go deeper into the issue, it is possible to get quite a lot of benefits, both for the ship-owner and for the protection of the ship's crew and the environment.

Difficulty

Despite the abundance of recommendations for the effective management of cargo operations, work strategies, and modern computer software, modernity has not yet developed the artificial intelligence that would use the extensive experience of an officer and the recommendations of the classification society to plan cargo operations efficiently. That is why still all data is entered into the program manually and then a separate situation is processed and analyzed, such as increase-decrease the rate of loads on mechanisms, regulation of cargo flow rate in pipes, pressure and temperature changes in cargo tanks, pipelines, manifolds and others.

Today, on ships, due to lack of time it is impossible for one person to design multiple variants of different cargo operations. The super-modern equipment needs few minutes to compute simulation of cargo operation by the simulator, **but the data entry in software,** takes a long time to calculate the most convenient version for the officer. Time for the chief officer is chronically deficient due to the abundance of tasks assigned to him.

Effective problem-solving

We offer a modern and effective way to solve the problem together, which will help us to divide one big common task (cargo operation plan) into separate small tasks. By sharing these tasks among the executing team members, developing multiple options by the group, analyse cases and find the best way.

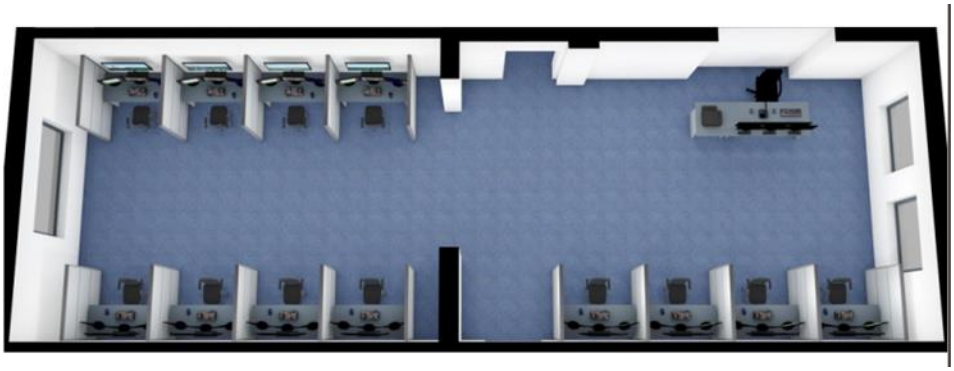
Today all leading maritime universities are equipped with cargo operation training simulators, which are identical to the ship’s cargo operations system. We offer to use the E- cloud for connecting the ship’s cargo operation base with maritime universities/ training centers, where students under the supervision of experienced officers or course teachers will develop/create multiple versions of cargo operations, and software program will choose the most effective one, which significantly reduce the

time to plan cargo operations on a ship, make the process more flexible, transparent and significantly reduces the workload of personnel involved in cargo operations. Target and correct use of mechanisms will reduce air pollution.

Advantages of the new approach

The new approach in cargo operations, simplifying the process of planning a cargo operation, reducing the workload of the Senior Assistant will result in:

1. The busy and fatigue schedule of the senior assistant will be alleviated. The safety will increase and the risk of pollution will decrease.
2. The number of staff working on the cargo simulators at the base of the universities will give us a variety of options for the appropriate number of cargo operations plans, which will be verified and validated under the supervision of a specialist by computer-based criteria. For example, Batumi State Maritime Academy has 12 sits on the simulator, therefore 12 versions of cargo operations will be more efficient than just one that is more tailored to the interests of the senior assistant.



BSMA class model

3. The simulator can be programmed to select the best results. Suppose only the best 4 out of 80 tasks are selected, the results are uploaded to the cloud, the Chief Officer on the ship will see an already prepared plan with all the details such as settings, Cargo gear start sequence and more other details. Processed plans uploaded to the cloud will help the officer to select the optimal modes. At the same time, the Operation Department and Cargo Terminal will be able to see the same information and make adjustments if desired, which are considered online.
4. Choosing a rational option of work will help us to save energy, provide the target use of mechanisms.
5. Economical fuel consumption and consequent reduction of CO2 pollution in the atmosphere.
6. Targeted and correct use of mechanisms will increase their service life and reduce the depreciation costs of these mechanisms.
7. The time of cargo t operations will be significantly reduced, thus reducing the port stay period and terminal fee, which is in the interest of the ship-owner.

Conclusion

The inclusion of maritime universities and training centers in the planning of cargo operations onboard the vessel, will help not only to improve the financial, physical, technical, and environmental issues of the ship-owner but also the implementation of real tasks and the variety of tasks assigned will provide highly qualified seafarers in the future. Moreover, this working principle will be actively used in the future for remotely controlling cargo operation onboard MASS(marine autonomous surface ship).

References

[1] ISGOT- international safety guide for oil tankers and terminals / International Chamber of Shipping, Oil Companies International Marine Forum Association of Ports & Harbors, 2006;

[2] SHIP STABILITY OOW / Martin Rhodes, 2012;

[3] Tanker Safety Guide, Chemicals 4th Edition; International Chamber of shipping. Published 2014.