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Digital platforms as factor transforming maritime education and industry

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Abstract: During the COVID-19 pandemic, many discussions arose about how digitalization is crucial for maintaining supply chains and ensuring the continuity of transport networks, especially shipping. At this stage, one of the most promising ways to improve efficiency is by introducing digitalization in the maritime industry. After all, the main goals in the information age are the digitalization of information and its proper use. Today, the business world expects faster service, simpler processes, and better efficiency from all companies and individuals. The transition of modern society to the information age challenges one of the main tasks of education to be the formation of the foundations of the information culture of the future specialist. However, all stakeholders are connected through a network, and illustrating the maritime transport process and the roles of its participants can elucidate the special features that are unique to the industry. Advances in information transfer, data analysis, and encryption techniques can reshape the business landscape and allow for managerial innovation, as well as new or complementary forms of learning to achieve it. But the pandemic has also led to a complete reorganization of the provision of education around the world. In practice, the learning process has been continued through a combination of different approaches. One of them is the implementation of web-based software for the shipping industry. Its products help make accurate and efficient business decisions and are designed for brokers, operators, shipowners, research firms, and financial institutions. The purpose of the article is to consider the presented software as a tool that may support maritime education and industry.

Keywords: digitalization, maritime education, maritime industry

1. Introduction

Since the beginning of the pandemic, measures have been taken in shipping to ensure the continuity of operations and thus the security of supply. The difficulties facing the industry are exacerbating the sector's efforts to adapt to a seemingly "new" normal pace of work. Maritime transport and logistics chains are trying to move quickly towards digital technologies. Even the expansion of world's container fleet and capacities of containerships did not happen without the facilitation to shipping industry brought by advanced computer technologies (Velinov, 2013). The companies gradually but completely focus on digitalizing their activities through online platforms and applications. Blockchain technology has gained its fair share of supporters and opponents, but it is still quickly adopted by the maritime industry due to its proven ability to optimize costs. The limitations of traditional business models and the capabilities of business models based on digital platforms and self-organization were revealed (Molodchik, Dimitrakiev, 2018). As the maritime industry gradually embraces digitalization, the use of complex systems such as AI and data monitoring tools will become commonplace. In response, professionals in the field will need to acquire additional skills. They will need to be trained to take advantage of and properly use the data generated by working in tandem with modern systems (Blockchain, 2019).

In the conditions of digitalization, the landmarks in the development of education, business, and the formation of a healthy lifestyle change invariably. Nowadays, with the help of digital technologies, not only the process of acquiring knowledge is being restructured, but also the knowledge itself. A specialist with digital thinking and digital competencies is more in demand in the labor market.

In this regard, the attention of the article is focused on the presentation of web-based software for the shipping industry, complementing the theoretical-abstract aspect with creative educational research and practical use of familiar theoretical concepts.

2. Issues and Challenges

The impact of technology on the nature and pace of the industry has forced companies to create new business models through which they can adapt to change and take full advantage of emerging opportunities. At the same time, universities, their connection to the business environment, and their impact on society have undergone significant changes over the last decade.

According to the traditional view, their role is mainly related to ensuring high-quality education and research in specific fields. At present, they are increasingly looking for different opportunities to influence the sustainable development of society and the environment in which they operate. In addition, they devote time and effort to identifying and putting into practice tools to help clarify the potential and role of technology in effectively addressing the issues in the maritime industry.

In today's globalized world with a rapidly changing environment and constant challenges, competition is not between individuals or organizations, but between systems of interconnected, interacting, and collaborating structures. Also known as the "knowledge triangle", this concept encompasses education, research, and innovation. The ability to think independently based on knowledge, experience, and the ability to apply this knowledge to solve specific problems, is becoming one of the core values of the information society. This is called the competence approach in education, which is most compatible with the concept of modern understanding of education. The main goal is to prepare specialists who have the necessary system of knowledge and large amounts of information. However, in addition to forming harmonious systems of knowledge, the efforts are focused on maximizing their enrichment, memorization, and free operation with them. The desired result is the shaping of a specialist with an orientation towards professional skills with the help of educational information, which provides an opportunity to perform a high-quality professional activity.

The impact of Information and Communications Technology (ICT) on this process is enriched through the use of ICT opportunities (Ostenda, Nestorenko, 2021). They provide teachers with effective aids that enhance pedagogical design during specific maritime practical classes. An example in this direction is AXSMarine - a French company developing web-based software for the shipping industry. The key products and services of the company are AXSDry, AXSTanker and Alphaliner, covering the three main verticals in the industry – the dry bulk, tanker and container market.

The products are designed for brokers, operators, shipowners, research firms, and financial institutions, helping them make accurate and efficient decisions for their business. Each product has a number of modules unique to the business it serves – be it Dry Bulk, Wet Cargo, or Containers.

Figure 1. Commodity flows worldwide, AXSMarine

In the learning process, students have the opportunity to gain access to industry insights on vessel and commodity movements, AIS speeds, Ton-mile analyses, macro- and micro-level congestions and much more. They can also create search through the global fleet in a wide range of technical, commercial, and AIS criteria. They benefit from more than 50,000 proprietary landfills corresponding to advanced terrestrial and satellite tracking sources, including, but not limited to, Spire's state-of-the-art nanosatellites.

Students access a fully organized system of ports, terminals, berths, and anchorages. They quickly compare the voyages of competing vessels, bunker prices, channel costs, and DA. Identify commodity flows and ship trading patterns, making faster-informed decisions. Observe the difference between cargo and ballast travel. In addition, they analyze commodity types, volumes, and charterers' activities. The two main parties, shipowners and the charterers, determine the market (Dimitrakiev, Gunes, 2019). They also have access to macro and micro data of trade flows between zones, countries, ports, or berths. Pre-built graphs allow them to filter, segment, and interact with various parameters. These predefined data visualizations help them tell impactful stories by creating and sharing compelling reports.

Here are some practical examples from AXSMarine's AXSDry platform. The Voyage Calculator is an automated tool allowing its user to get an estimation for the cost of a voyage with minimum input. It can save default values for multiple parameters in each new sheet. This allows setting Terms, Sea Margins, Turn Time, TC or Voyage Commissions, and more, to the most common values of business routines.

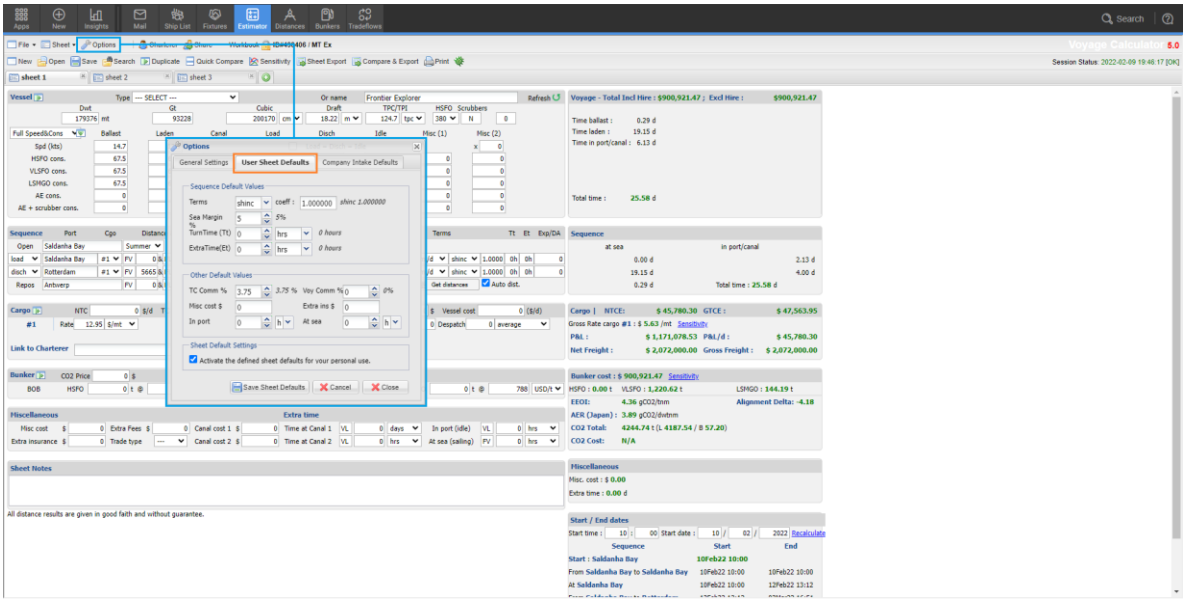

Figure 2. User sheet defaults, AXSMarine

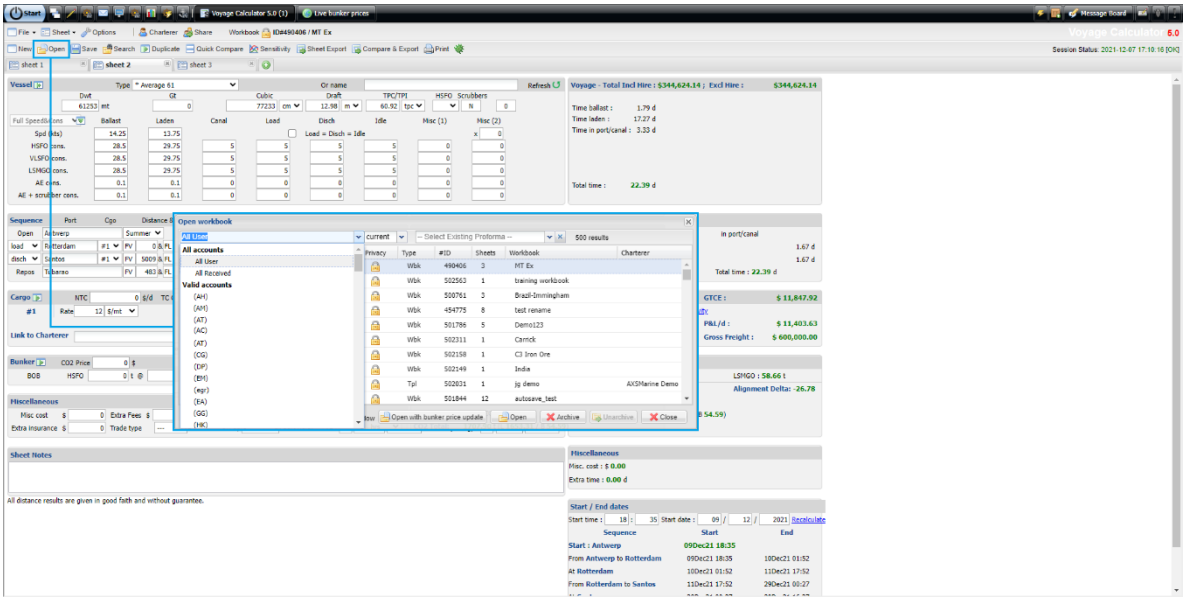

Figure 3. Voyage Calculator, AXSMarine

In addition, the Voyage Calculator is equipped with a powerful tool to help track compliance with the IMO GHG Strategy. The CO2-estimator is a fully automated tool that calculates emissions for each voyage. The results provided are compliant with both the EEOI and the AER methodologies. The calculation gives an Alignment Delta to the EEOI trajectory values, as well as the total CO2 emitted throughout the voyage.

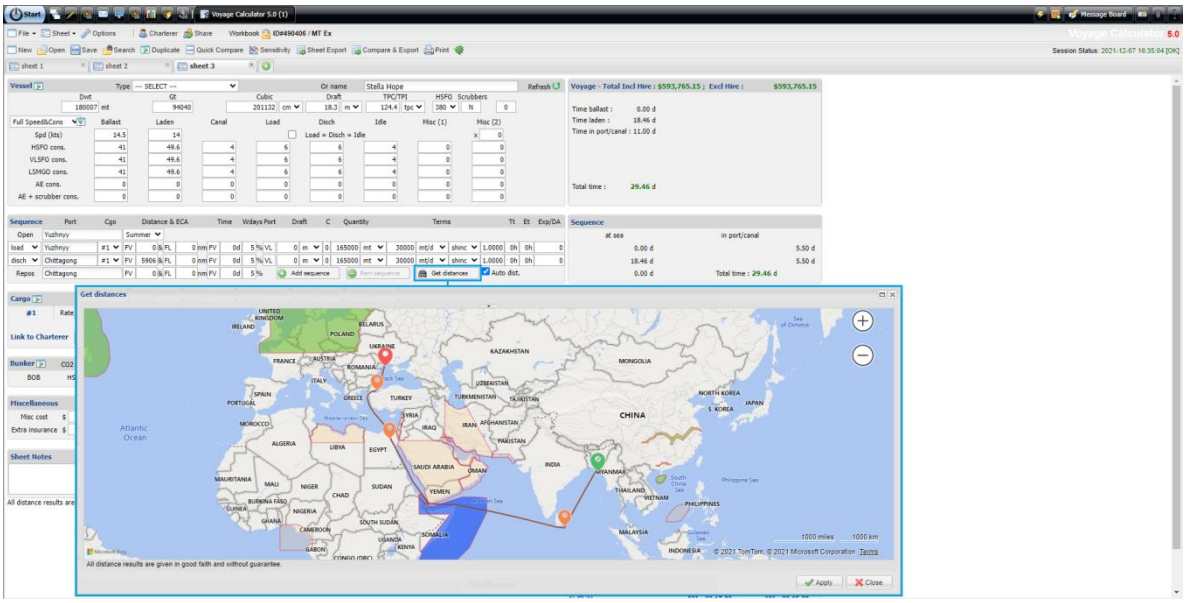

Figure 4. Canal pass, AXSMarine

Calculating whether a vessel could pass through a particular canal is also available. The logic behind the calculation is sophisticated. It takes into account not only the vessel's maximum deadweight and draft as per her technical specifications but also the currently loaded quantity and laden or ballast status of the vessel's voyage. While students can create and save their own calculations, Voyage Calculator also allows access to all of their team members' workbooks. In the "Open" dialogue, there is the option to select each account in the academy. The relevant workbooks saved under that account are then available for opening and editing. There is also the option to open them in new windows or load them with a bunker price update. In a business company, this feature can be used to check and revise calculations before moving forward with a fixture.

Students also have access to the Trade Flows solution which helps users follow fleet performance and trade pattems. Trade Flows is a new-generation software tool providing virtually limitless options when analyzing the global vessel and commodity movements and trends. It allows its user to isolate different fleet segments, trade regions, time periods, types of voyages in a fully customizable grid, which provides details from individual shipments to entire nations' imports.

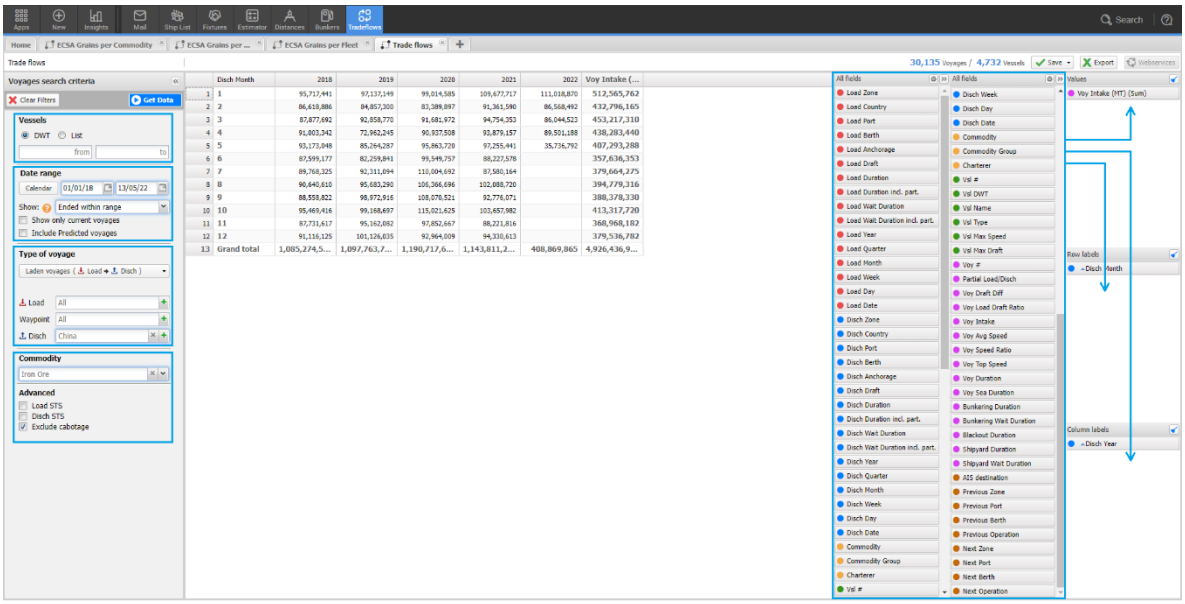

Figure 5. AXSMarine

Trade Flows also has a set of pre-rendered analyses created by AXSMarine to cover the most common maritime trades and routes. These can also be viewed in graphs, instead of data grids. All data is exportable for ease of further analysis by the user.

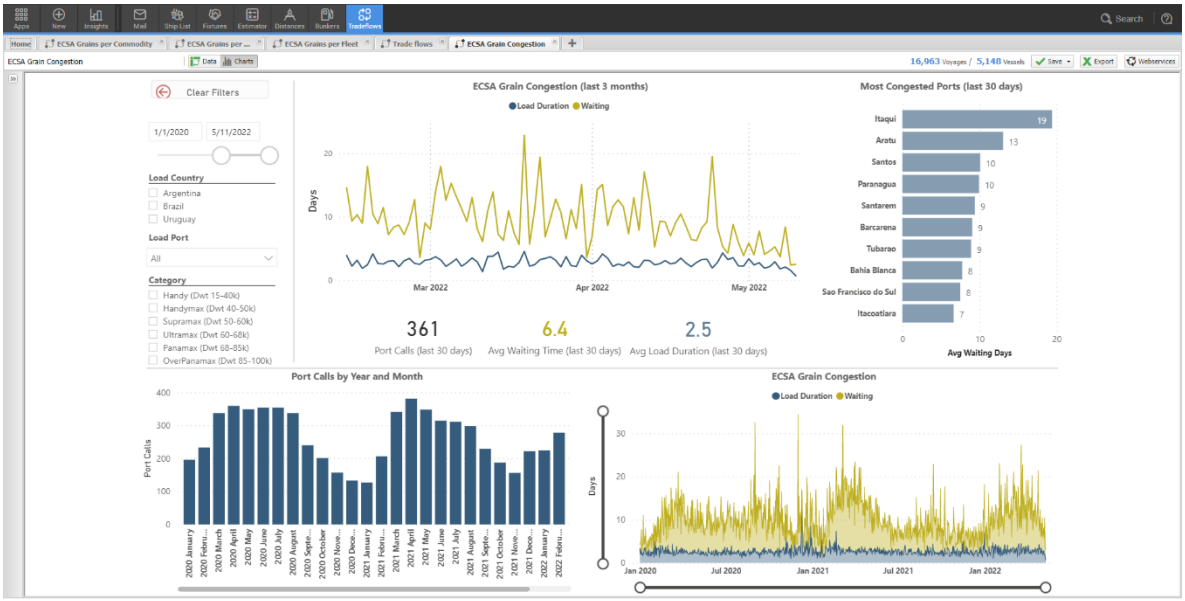

Figure 6. AXSMarine

The Bunkers module provides the latest global pricing data. Apart from giving a fresh picture of the current market, historical fluctuations at each bunker location are also available.

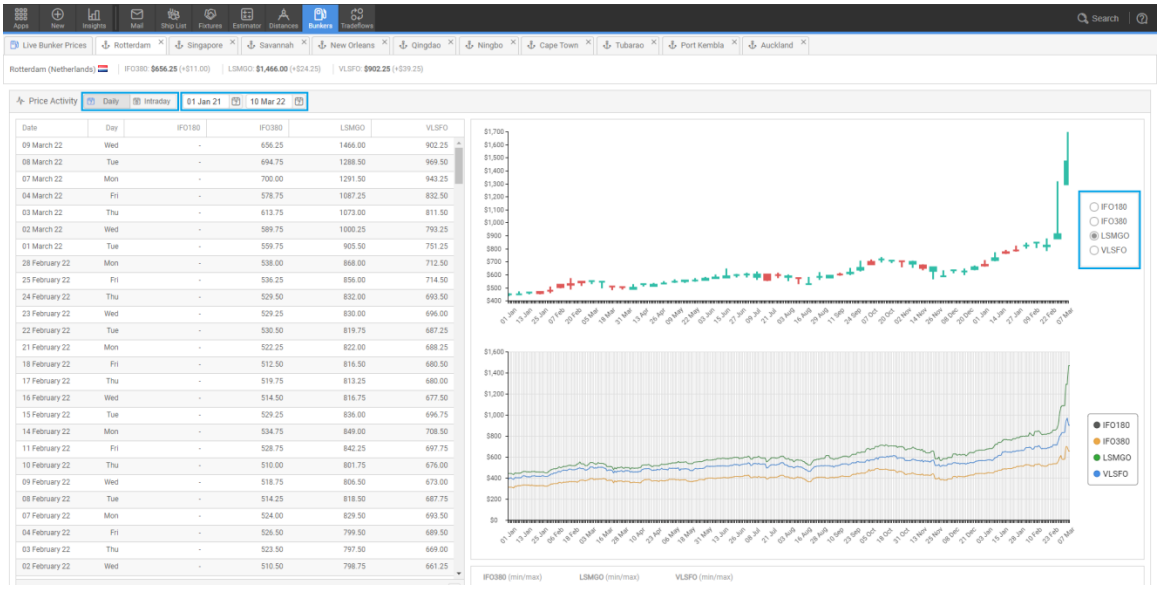

Figure 7. Bunker prices, AXSMarine

The Dry Fleet Disposition Timeseries report gives an overall summary of vessel counts per their laden, ballast or at port status, as well as disposition in the world's oceans. Moreover, AXSMarine is constantly improving its tools. The Dry Fleet Disposition Timeseries report now includes several new features. In the Congestion tab, there are two new categories – Waiting at Anchorage and Waiting Shipyard. While the latter category is self-explanatory, the former includes all vessels waiting at anchorages for reasons unrelated to loading or discharging of cargo, such as bunkering, crew changes, canal passage, etc.

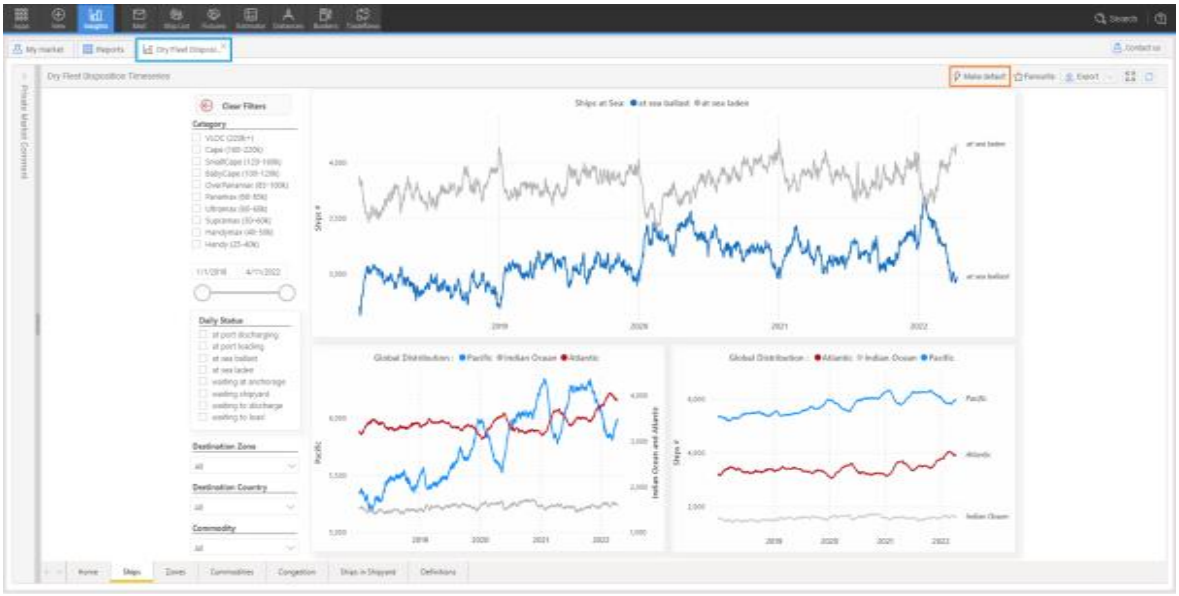

Figure 8. Dry Fleet Disposition Timeseries report, AXSMarine

The Global Congestion Monitor report provides an extensive breakdown of current and historical vessel data following their current operational status at sea or in port. Students can explore individual ship data, cumulative waiting times, and most congested ports, as well as filter by vessel category, commodity transported, points of origin or destination, etc.

Figure 9. Global Congestion Monitor report, AXSMarine

These are just a few of the functionalities AXSMarine's system provides to students in their journey to knowledge and skills in the maritime industry.

However, the main challenge remains to balance the fundamentals with the practical-applied knowledge and skills. It is becoming even more difficult because of the need to be in tune with changes in the maritime industry. That is why the search for answers to managerial and pragmatic tasks, and the extraction of practical postulates, models, and strategies, occupy an increasingly important place in the learning process. Getting acquainted with the state of the freight market presupposes the practical use of theoretical concepts. Academic staff consider the usage of ICT in teaching process has positive impact on the quality of training of maritime specialists as students develop skills of self-organization, hence their performance level increases, they receive positive emotions and motivation and efforts in the area of knowledge acquiring increase (Slyusarenko, Zadorozhnya, 2021).

However, one of the vital advantages of technology is the use of easily accessible and objective information, as well as the achievement of clear interpretive results. Further development and improvement of the study is possible in the direction of development of the use of intelligent and information systems in the field of multimodal transportations (Fedotova et al., 2019).

3. Conclusion

Digitalization and new business opportunities in shipping will increase the demand for qualified professionals, especially in logistics, information technology, and related fields. To reap the full benefits of new business opportunities, the human, institutional and technological capacity must be improved at the same pace as technological advances in the industry. Some international organizations closely monitore all these developments and are actively involved in acceleration programs with start-ups on all fronts in the maritime sector. The future in which growth is activated by technological development is not so far from the horizon (Blockchain, 2019). Undoubtedly, modern technologies are fundamentally changing our lifestyle and work, creating new opportunities and challenges for all of us (Bartusevičienė, Mickienė, 2021). Creating the conditions for specialists to use technology to empower people instead of replacing them is crucial for Maritime Education and Training.

Future port specialists` preparation should include “digital twin” and “virtual reality” technologies (). The focus of learning design and techniques is to facilitate the acquisition of knowledge and skills in the learning environment, which can later be transferred to the work environment. Good practices with applicated theoretical concepts are a guarantee for dealing with the real problems of the maritime industry. And achieving this symbiosis is vital to the success of the idea.

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