AN OVERVIEW OF THE PORT COMMUNITY SYSTEM FROM ROMANIA

Andreea BARBU [(1)i], Gheorghe Militaru [(2)] and Dana Corina Deselnicu [(3)]

(1) Department of Entrepreneurship and Management, Polytechnic University of Bucharest, Bucharest, Romania,
barbu.andreeab@yahoo.com

(2) Department of Entrepreneurship and Management, Polytechnic University of Bucharest, Bucharest,
Romania, gheorghe.militaru@upb.ro

(3) Department of Entrepreneurship and Management, Polytechnic University of Bucharest, Bucharest,
Romania, d_deselnicu@yahoo.com

ABSTRACT: Seaports play an essential role in ensuring the access of the clients to the local and global markets through efficient transport, ensuring also a varied range of value-added services. Thus, it is hoped that seaports will become complex service platforms used to increase customer satisfaction. This can be achieved by digitizing the activities of the port administration and by creating a management information system. The management information system can be used to collect, classify and process data on the activity of seaports, providing data and statistics that can help the management team to carry out control, planning and decision making operations effectively and correctly. One of the most used integrated information systems developed for managing port operations is the Community Port System. This system ensures the connection between all the economic agents involved in port activities and authorities. Through this paper, the authors intend to highlight the main features of these systems, as well as the benefits of such investments in the port area. Also, there are analysed the information systems in the Black Sea port area, focusing on the port of Constanta and the situation existing in Romania. The authors present the computer application used on the official site of the port of Constanta, analysing some of the main activities that can be performed through a module of the Port Community System. There are also presented the problems and barriers that impede the proper development of such an integrated information system in Romania, also being mentioned the directions to be followed to improve the port activity of Romania.

INTRODUCTION

Seaports have a very important role to play in international trade. They must be built, used and driven to facilitate the rapid transfer of goods, thus ensuring the most efficient transportation of goods from or to the country (Li et al, 2018). Over the last 20 years, the UNECE Trade Facilitation Section and the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT, 2019) have continuously worked on solutions in order to connect traders to all relevant agencies through a unique portal, that they called "Single Window". Through this window, they wanted to improve the seaports performance by different aspects such as streamlining procedures, reducing costs or the

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waiting time due to administrative procedures (Tijan et al., 2019). Unfortunately, this kind of effort to create a single window between companies and government takes time and a lot of money, and things have changed too slow in this direction. But there are a lot of private companies that saw the benefits of implementing such a single window, so they have started to develop different platforms, their initiatives corresponding with the "Single Submission Portals" (SSP) as the UN/CEFACT (2019) have called them. By creating these Single Submission Portals, there have been opened different gates that allow traders to exchange information with government agencies and other relevant parties in a standard format. Among the most known SSP, we can mention Port Community System (PCS), Cargo Community System (CCS), Customs clearance systems, Freight Forwarding System (FFS) and Integrated Services for MSMEs in International Trade (ISMIT) (UN/CEFACT, 2019).

Port Community System is one of the most used Single Submission Portals that facilitates the connection between authorities and the other companies that are involved in port activities (Mendes Constante, 2019). Despite this fact, in Romania, the Port Community System is not so much developed and used like in other countries (Interreg Danube Transnational Programme, 2019).

This paper aims to present the information systems in the Black Sea port area, focusing on the port of Constanta and the situation existing in Romania. In order to achieve this goal, the authors present the computer application used on the official site of the port of Constanta, analyzing some of the main activities that can be performed through a module of the Community Port System.

LITERATURE REVIEW

Industry 4.0 and digitalization

The world is at the beginning of a new industrial revolution, this being considered the fourth revolution and is called "Industry 4.0". The concept of the 4.0 industry was launched in 2011, at the Hannover fair in Germany, as a result of a government initiative through which the authorities of this country set out to accelerate the adoption of new ICT technologies, such as Big Data, Artificial Intelligence) or Internet of Things, by traditional manufacturing industries (Ang et al., 2017). Technologies of all kinds, especially digital ones, combine using data analysis, artificial intelligence, cognitive technologies and the Internet of Things to create digital businesses that are not only interconnected but perfectly capable of making informed decisions. In short, this revolution incorporates smart, connected technologies, transcending the organization and interfering with our daily lives (Stefanini Group, 2019). The transition to the digitized industry occurs in all industrialized countries, but at different rates and with different expectations from country to country. Digitalization and new developments in artificial intelligence, as well as the Internet of Things, have begun to make their way in the field of maritime transport. This digitization helps maritime companies optimize their existing processes, also creating new business opportunities (United Nations Conference on Trade and Development, 2019). The combination of digital and physical connectivity will help transport operators, seaports and intermodal transport providers integrate their processes into the global supply chains of shippers, providing better visibility of transport at any time. This can be achieved through the adoption of digitization solutions, which makes it possible to analyze a large volume of data that can be reported, managed, stored securely and tracked by all stakeholders in the port area (United Nations Conference on Trade and Development, 2019).

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Even though the implementation of information technology can contribute to increasing productivity, knowledge management processes, company performance, or innovation (Barbu & Militaru, 2019), in the European Union, a lot of countries seem not to use the full potential of the new digital solutions, and so are not getting the maximum benefits from the advantages the digitalization could offer to them (Dumitriu et al., 2019). Thus, we should look more closely at the situation of ports in Europe to see how we can apply various digitization solutions to increase performance in the maritime area.

Port Community System

Ports around the world are becoming overloaded as the volume and complexity of freight flows increase (Ernst and Young, 2015). Also, there is the problem of bureaucracy, as there are legislative requirements that require all these types of cargo to be documented separately, which hinders the activity of the Port Community, but also the other agents involved in freight (Teperi et al., 2019).

To manage this complex process between the many parties involved, the concept of the Port Community System (PCS) has been developed. A PCS is defined by the European Port Community System Association (2011) as an open electronic platform that ensures the computerized and secure exchange of information between interested authorities and private stakeholders to improve the efficiency and the competitive position of the communities in the seaports. The goal of PCS is to optimize, manage and automate port and logistics processes by transmitting data once and by connecting transport and logistics chains (Ernst and Young, 2015). Thus, a PCS can be used to connect existing systems and databases through a web portal, the typical structure of a PCS being presented in Figure 1.
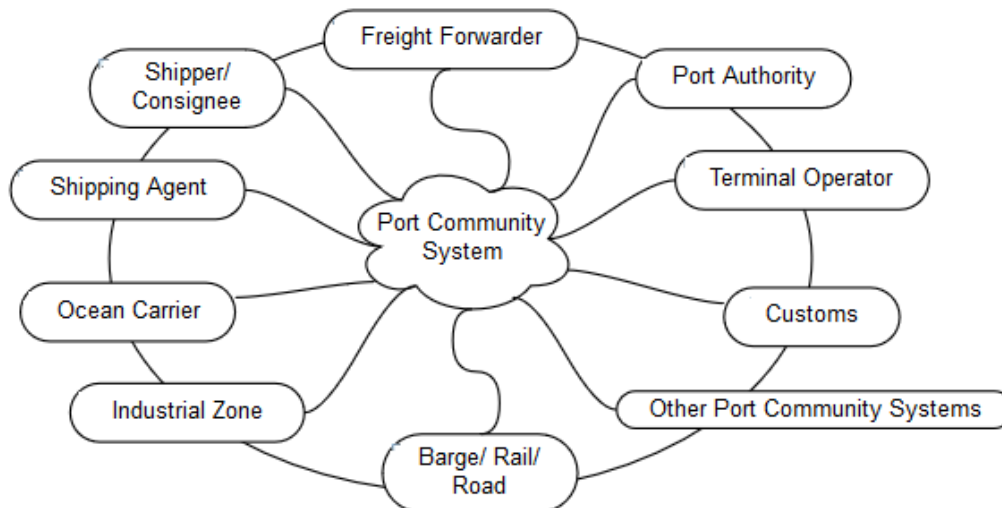

Figure 1: The typical structure of a PCS
Source: Adapted from Ernst and Young, 2015

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In terms of functionality, PCS has certain standard modules. These modules are presented in Table 1 (Ernst and Young, 2015), but depending on the applicable legislative, infrastructure and operational requirements, they can be developed and adapted as the case may be.

Table 1. Standard PCS modules

Standard PCS modules	Description
Managing the ships that dock in the port	It offers the possibility of receiving the docking and anchorage calls by the operators of the terminals and ships at the same time, with the notification of the relevant public authorities. At the same time, port service providers such as pilotage and tugboat operators may receive applications.
Managing container handling activities	It involves the use of the same operating system by terminal operators, carriers and customs authorities to facilitate the carrying out of certain operations such as customs/import/export duties.
Managing the terminals	It provides the possibility for a single electronic document to connect all the parties involved in the movements of entry and exit of the goods on the terminal gate, thus allowing the complete preparation of the documentation in a timely and efficient manner.
Managing security	The competent authorities can observe the activity in real-time by installing the electronic system and the necessary infrastructure, such as the cameras for the recognition of the means of transport and the containers.
Managing the tracking system	By computer-integration it is possible to track the cargo loaded in containers, thus ensuring better management of the logistics chain and the use of assets in the Port.

Source: adapted from Ernst and Young, 2015

To implement a PCS does not necessarily mean to create a software from scratch, but it can also mean the development of certain existing applications so that they allow the exchange of information between the parties involved in the maritime activity. For example, you can modify some existing ERP programs, so that they communicate through a cloud to perform different activities (SIVECO, 2019).

Benefits of the Port Community System

The adoption of the Port Community System has a lot of benefits either we refer to economic or community attendance benefits (Varbanova, 2017). The economic benefits can be described by analyzing three dimensions: costs, quality, and performance. By choosing to use a port community system, the cost of communication and information access can be reduced, also preventing the illegal transactions. The quality of information can be improved through the elimination of data inconsistency, information that can be verified analyzing time and labor consumed to correct errors, to sort and verify data (Carlan et al., 2015). The performance can be increased by fast access to information, efficient use of resources and equipment, which contribute to increasing labor productivity (Figure 2). Community attendance benefits refer to increasing competitiveness at the stakeholder level by increasing access to information, saving costs of information and added value services, and also it refers to increase efficiency, that can be realized through Compliance with Community standards and regulations and by making fewer investments for business development.
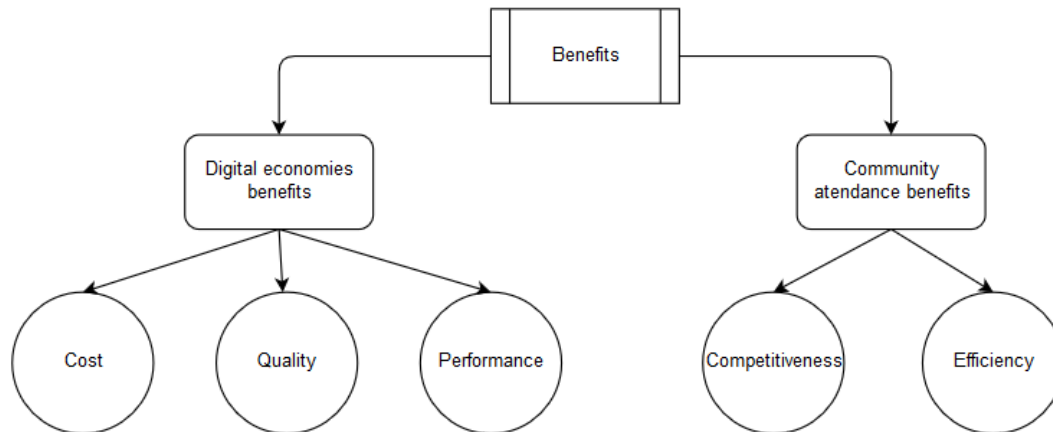
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Figure 2: Benefits of the adoption of the Port Community system
Source: adapted from Varbanova, 2017

METHODOLOGY

In order to meet the proposed objectives, the authors conducted qualitative research, which analyses the situation of the Port Community System (PCS) in Romania. First of all, the authors analysed the European directions regarding the need to introduce a PCS. Then the research focused on the Danube Transnational Program analysis. The issues regarding the EU Strategy for the Danube Region were investigated, looking for information on the situation of Romania. The research continued with the analysis of two important documents of the Danube Transnational Program: Danube Ports Network (2018) and the Danube Port Development Strategy & Network Formation (2019). The last part of the research focused on the situation existence in Romania, using for analysis the information available on the official site of the Port of Constanta. Also, official documents of a company operating in Constanta Port were analyzed, these documents containing information regarding the adaptation of the PCS programs. The results of the analysis of the mentioned documents are presented below, focusing on the description of the current situation existing in Romania regarding the development and use of the programs that help to support the PCS.

THE CASE OF CONSTANTA PORT

Constanta Port is both a maritime and a river port. The Port of Constanta is located on the Western coast of the Black Sea, covering almost 4 ha of which almost 1.5 ha is land and the rest of the surface is water. Constanta Port has a handling capacity of over 100 million tons per year and 156 berths, of which 140 berths are operational (Port of Constanta, 2019). The Romanian port of Constanta has very good connections with the Central and Eastern European countries, providing quality services to the customers of the ports. The connections with the rest of the world can be made will all modes of transport: railway, road, river, airway, and pipelines. According to the official site of the Port of Constanta (2019), there are several projects in progress, to improve the transport connections between

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the Romanian port and its hinterland.

Even though there are a lot of actors in the seaport area, interested parties in the maritime field communicate with each other through different means (paper documents, fax, telephone, e-mail, radio communications). Unfortunately, the communication processes are not efficient, the documents being sent separately to each stakeholder, being also copied several times, edited and retransmitted, which leads to the difficulty of the processes in the seaports as well as the appearance of errors (Interreg Danube Transnational Programme, 2018). Figure 3 presents the process of transmitting information for the Romanian ports situation, noting that the information transfer is varied and seemingly chaotic. The transmitted documents are transferred between parties in physical format, scanned or reported orally, so less in electronic format, for which this information must be manually uploaded into the system for each port operator and each category of goods. Taking into account the fact that all the administrative processes related to the arrival and departure of the ships in and from the port require numerous documents and certificates, in the existing systems of Romania, there is a lot of data that is repeated for the same ship, which leads to the increase of the possibility of occurrence of the ship errors (Interreg Danube Transnational Programme, 2019). Thus, not having a common system in which all this information is collected and the electronic transfer between the parties can be made, unnecessary losses can occur due to the multiple introductions of the manual data.
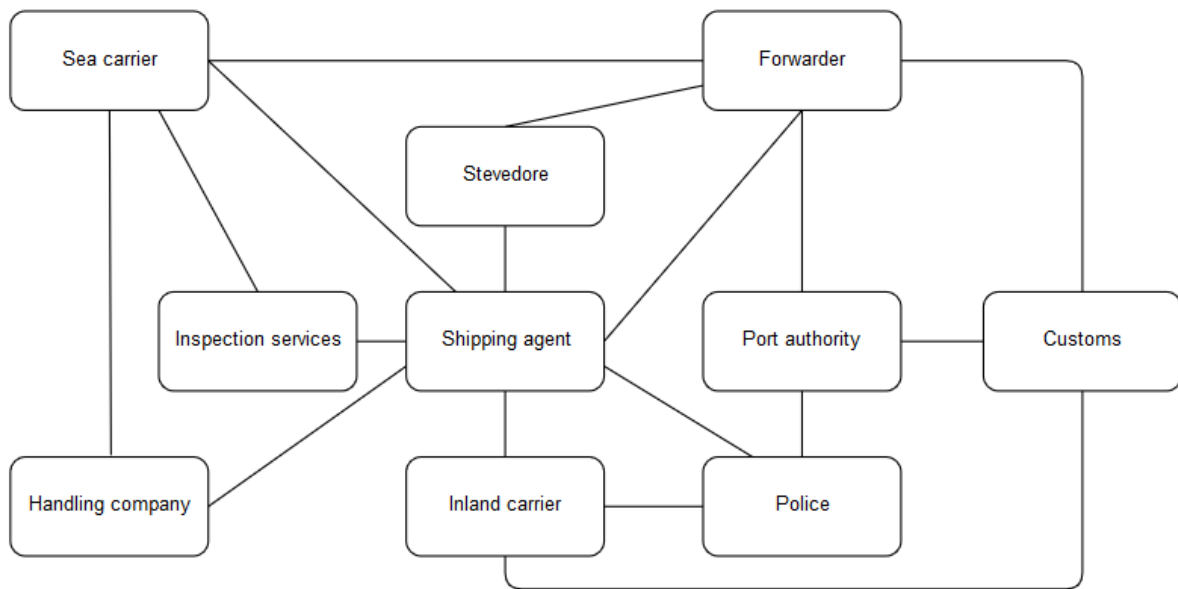

Figure 3: Exchange of information and documents between stakeholders in the port area of Romania
Source: adapted from DAPhNE Danube Ports Network, 2018

Over the years, in Romania, according to National Company Maritime Danube Ports Administration Galati (2020), there were developed several projects for port development (completed projects-GIFT, LNG, CODENAV, PSDPG, CO-WANDA, DAHAR, Dana 23-25, CAPRICO; project in progress- PMG1, Daphne). Because there were no specific standard information systems for collecting and monitoring statistics and/or Management Information Systems for Inland Ports, it was

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proposed to adopt the Community Port Systems (Interreg Danube Transnational Programme, 2018). By using these systems, strong and efficient links can be created between all the economic agents involved in port activities (operators, charterers, ship owners, agents, and others) and the authorities (Customs, Border Police, Port Captain).

One of the most used Port Community Systems for the port activities in Romania is the Naval Catalog. This is an application specially developed to improve the performance of the services regarding the activity of port communications. The Naval catalog is used by different companies in the port community, such as the Maritime Port Administration of Constanta, Romanian Naval Authority, Administration of Navigable Canals, ship agents, ship owners, port operators, pilot companies and other representatives of the port community. All these agencies help to update the information from the system according to the identified data flows (UTI SYSTEMS, 2009).

The Naval Catalog information system ensures the management of the shipping activities carried out in the Romanian seaports. It is a system integrated with other systems within the Port Community Information System (SIP) such as the Commercial Catalog and the Portal. The Commercial Catalog includes the Management system of economic agents and shipping activities, while the Portal is used for displaying information regarding the situation of ships. Through the Naval Catalog, the following activities are managed: the movement of the ships (entrances, exits, maneuvers in the port); the operations of unloading/loading of goods; other services provided for ships stationed in the port; different events/accidents in the port where ships may be involved (UTI SYSTEMS, 2009).

In order to access the informational system, the official site of the Port of Constanta should be accessed https://www.portofConstanta.com. To access the Naval Catalog, you must log in, using a username and a password. Once you are logged in, you are redirected to a page where only the menus for which the user has rights will be active. The Naval Catalog module has the following main menus: Documents, Ship management, Naval Catalog Companies, and Reports. By accessing the Documents menu, you can find information about: Maritime endorsement, River approval, Port endorsement, Pilotage bulletin, Maneuver acceptance. At the Ship management menu, you can use information about: ships, convoys, movements, freight traffic, ship services or shipping lines. If you are exploring the Reports menu, you can find different newsletters or operating situations. The operations available by categories of users, according to the access rights that can be granted, are described in figure 4.

In this case, we will give an example of how a module of the Documents menu works. We chose the Pilotage bulletin submenu. This Pilotage bulletin is a very important document completed by the vessel agent in order to make any movement activity of his ship. After the pilotage bulletin is completed by the ship's agent, then it is sent for acceptance to the port operator, then to the authorities, with the generation of the pilot order which is then confirmed by the pilot company. If more than 24 hours have passed since acceptance by the authorities and the maneuver has not been completed, then the bulletin and the related order are automatically canceled by the system. The authorities that can be involved in the flow of approval (with the right to issue resolutions or to view the pilot bulletins) are the following: The Administration of the Constanta Maritime Ports, Romanian Naval Authority, the Police Inspectorate, the Regional Customs Directorate, and others (UTI SYSTEMS, 2009).
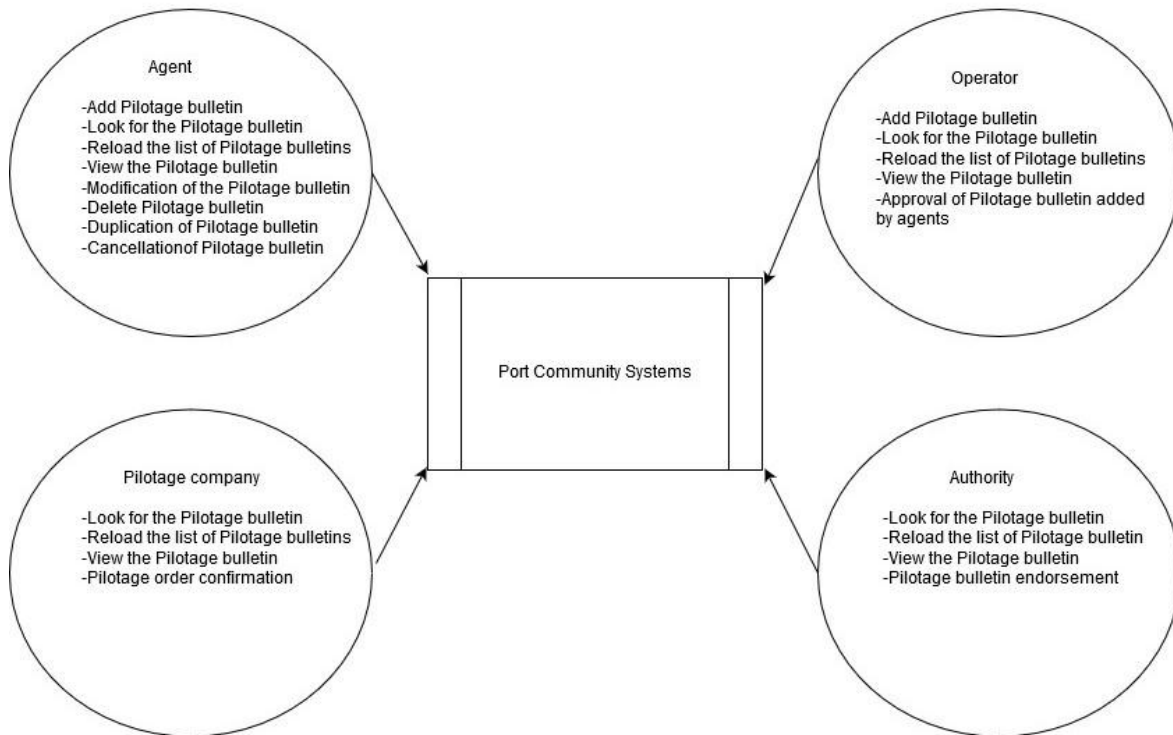
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Figure 4: The operations available in The Naval Catalog

Source: adapted from UTI SYSTEMS, SIP APMC– Naval Catalog - Information services on activities of
the port community, 2009

For instance, when the Pilotage bulletin menu is accessed, the application displays the window
containing the complete list of the Pilotage bulletins displayed in tabular form (Figure 5). Then the
user can access any Pilotage bulletins he wishes, subjecting it to one of the operations described in
figure 4.

Records 1-5 from 73 |◄ ◄ 1 2 3 4 5 ► |→! Next 5 records |► 5 ▼

No.	TYPE	Ship	Berth	Agent	Operator	Pilotage company	Planned date	Planned time	Confirmation date	Confirmation time	Document status	
1	I	ERMAK	Berth 102	United Shipping Agency	United Shipping Agency	Canal Sea Services	30.01.2020	9:01	-		Notifying the authorities	
2	P	ZAMM	Berth 80	Tomini Trading	Tomini Trading	Agigea Pilot	30.01.2020	10:15	30.01.2020	9:30	Confirmed by the pilot company	
3	I	BARON	Berth 31	United Shipping Agency	United Shipping Agency	Agigea Pilot	31.01.2020	11:30	30.01.2020	18:10	Confirmed by the pilot company	
4	I	ZAHYAK	Berth 46	Ademar Transport Line	North Star SH.	Agigea Pilot	31.01.2020	14:55	31.01.2020	10:50	Confirmed by the pilot company	
5	I	AYRA	Berth 41	United Shipping Agency	SOCEP	Agigea Pilot	31.01.2020	16:10			Accepted by authorities	

Figure 5: Example of Pilotage bulletins list

Source: adapted from UTI SYSTEMS, SIP APMC– Naval Catalog - Information services on activities of
the port community, 2009

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Aspects to consider when choosing to implement a PCS solution in Romania

A lot of companies are operating in the port, and this activity could be carried out under better conditions if the respective company could have access to one of the port community system applications. When deciding to use a particular program of the port community system type, the following 3 important problems should be taken into account: the possibility of accommodating the employees with the application, the possibility of adapting the application to the requirements of the companies, managing the problems following the installation of the application (Socep, 2019).

In Romanian companies that are operating in the Port of Constanta, there are still a lot of employees that are not so familiar with the new technologies and also a lot of them have not English knowledge or computer operation abilities. This is a big problem for the companies because the knowledge of English and basic computer operation are essential for people to accommodate the program. The less staff has less knowledge of this type, the longer is the period of accommodation and implementation of the program. In the case of the Terminal of Piraeus, in the south of Greece, where employees were familiar with the English language or the computer operating knowledge, the period of implementation and accommodation was about a year and a half according to developer of the CATOS application, which means that it would be harder for Romanian employees to get to know better this kind of software (Socep, 2019).

The application of the port community system that is desired to be implemented should be adapted to the requirements of each terminal. The following aspects should be considered in this process (Socep, 2019):

- The configuration of the terminal and the working mode must be known/completed before starting the configuration;

- Ship operations- have a high degree of standardization, so the adaptation effort will be minimal;

- Operations on the ground: the adaptation should not raise particular problems, but first requires establishing the way of organizing the terrain, which depends on the type of equipment used;

- Gate operations: difficult adaptation because the application has no facilities to change the procedures according to the local conditions;

- Reporting: the application offers a standard set of reports, configurable within certain limits; managing extracted data requires Excel operating knowledge;

- IT infrastructure: a whole new infrastructure must be created: servers, network, wireless network throughout the terminal, mobile terminals for people and machines.

With the implementation of a Terminal Operating System (TOS), the interruption of the operation of the system leads to the impossibility of operating the Terminal. Similarly, the system's cumbersome operation decreases the operating parameters and can lead to negative consequences for the Terminal. In this context, the potential causes that may compromise the functioning of the TOS should be identified (Socep, 2019):

- Procedures: working procedures must be defined to harmonize the company infrastructure with the TOS system; for example, the procedure for retrieval of data at the entrance of trucks - without producing door locks and without giving up the use of computer terminals (mobile or fixed);

- Terminal infrastructure: if the modification of the procedures cannot solve the possible problems of the operation, then the infrastructure will have to be adapted;

- 24/7 operation: IT infrastructure must ensure continuous operation, even in the event of malfunctions; therefore, for all sectors, there must be spare equipment, which will allow the

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replacement and restart in the shortest time;

 - 24/7 administration: the system requires specialized personnel who can intervene at any time to treat errors or blockages; at the Greek terminal, apart from the normal users, on each exchange, there are 1 IT specialist, 1 Power User, 2 System administrators;

 - Personal training: as the TOS system works integrated, an error introduced by an operator propagates throughout the system - that is why it is very important to train the employees.

CONCLUSIONS

Although we are in an era of digitalization, and this digitalization is easily beginning to emerge in the maritime field, unfortunately, a large part of the port services is still made through paper-based solutions, bureaucracy being one of the major problems encountered in the area of Romania. Although the introduction of a port community system is supported by many European directives, there are still problems regarding the technological development of this solution and its implementation at the national or international level.

The Port Community Systems may be a possible solution for companies operating in the Port of Constanta. However, the implementation seems rather complicated, this solution requiring the initial definition of the procedures and the development of external computer applications. Although at first the operation of the program may seem complicated and requires a long period of staff training (with additional costs), once this period is over, the operation can run smoothly.

In the case of the Port of Constanta, there are already several applications that can be used for the adoption of a Port Community System, among which the Naval Catalog or the solutions offered by the ones from Navis, the situation in Romania being slightly directed towards what is desired at European level: communication, unity, and performance in the seaport area. However, the Naval Catalog does not seem to be the best solution that the Romanian ports can use in the future. Considering that the system was created more than 10 years ago, it does not fully respond to the requirements of a Port Community System, Romania not being able to enjoy all the benefits of implementing such a system. For example, in the case of the existing PCS solutions, there are still problems regarding the efficiency at all stages of the port processes, from unloading and loading the ship, to customs clearance, to health formalities and up to the delivery management to and from the terminal (Port of Constanta, 2019). Thus, to align with the existing European directives, at the end of 2019, the "Maritime Ports Administration" S.A. Constanta has launched a call for the realization of an integrated computer system dedicated to the management of activities and information flows on the Port Community System platform of Constanta (Port of Constanta, 2019). It is intended that the integrated computer system to be a Single Window type system that does not require data entry in several places, to allow the traceability of the data entered, their uniqueness and security. The new electronic platform should include several functions like reporting of exports, imports, transshipments, consolidations and dangerous loads.

Thereby, to improve their activity, ports from other countries should learn from the problems arising in the case of Romania. When they decide they want to implement PCS solutions, they should define their objectives, the desired functionalities, and the procedures through which they can perform their activity using PCS. Companies in the maritime area should not forget about the advantages conferred by the existence of a community that includes all stakeholders in the port area. Moreover,

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the existence of a simulator module in this community could give stakeholders a clear picture of the benefits of working together. It is also very important to keep in mind that although PCS solutions make port activities more efficient, those who use them need to be trained on their functionality. Besides, it is necessary to consider the existence of periods of accommodation with the new PCS systems, the possibility of their adoption on other platforms or computer applications, as well as maintaining continuous communication between the parties involved in the maritime activity.

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[i] Andreea Barbu is Assistant Professor at the Department of Entrepreneurship and Management at University POLITEHNICA of Bucharest (Romania), where she teaches Financial Management, Business Research Methods, Technological Entrepreneurship, and Risk Assessment Techniques. She is a Ph.D. student, her Ph.D. thesis title is "Research on improving the performance of organizations in the field of industrial services".