ISSN 2092-724X

The Journal of Customs and Trade

Volume 3 Number 2 December 30 2011

Korea Research Society for Customs

The Journal of Customs-and Trade
Vol. 3, No. 2, December 30, 2011, pp. 3~14

Port Community Systems, customs one-stop-shops and their possible combination with a Single Window

Danilo Desiderio*

ABSTRACT

"Port community systems", "single windows" and "customs one-stop-shops" are all important tools for the facilitation of trade which have been experimented and successfully implemented in a number of Countries worldwide, with the explicit purpose of reducing both the time and the high cost associated with international trade operations.

Leaving aside the fact that the contribution of the above tools to the goal of simplification is not quantifiable in exact terms, there is apparently some confusion on the meaning and functions of these systems, partly because they are conceptually similar, being all based on the capture and reuse (usually, but not necessarily, through electronic means) of data generated during certain operations related to a cross-border transaction, partly because they often combine each other, and in this case it is not always clear how their specific functions can fit together.

This paper analyses the peculiarity of each system, showing the reason for which they are adopted, what kind of problems they try to solve and what solutions they offer.

Keywords : Single window, Port Community System, Supply chain, customs one-stop-shop

* Danilo Desiderio is an Italian attorney, a specialistin customs regulation and international trade, head researcher to the Centre for Study and Services of the Italian Council of Customs Brokers and consultant to various institutions, organizations, governmental agencies and trade associations in Italy and at European Union level. He is also author of a number of books and articles in the subject ofcustoms/tax law and international trade, published both in Italian and in English. For further information visit www.ddcustomslaw.com. Avv. Desiderio may be reached at d.desiderio@ddcustomslaw.com .

Ⅰ. INTRODUCTION

According to the International Maritime Organization, around 90% of the world's trade is transported by sea. Without shipping, intercontinental trade and the bulk transport of commodities and manufactured goods would be simply not possible.

The efficiency of shipping not only depends on port quality and on the economies of scale achievable through the use of large container ships: it is also closely related to the efficient management of ports and land transport services. And as much as world trade and freight traffic grow, the latter factor becomes increasingly important, to the point that many mainstream authors (e.g. Notteboom &Wilkelmans, 2004), argue that today competition is no longer amongports, but among alternate transport chains, where ships and cargo can easily switch from a port to another, each time that improved service levels and better connectivity with the inland areas able to avoid any disruption in the supply chain can be offered (Zhang, 2008).

Supply chain disruptions impact negatively on products cost and quality, as well as on the reputation and on the long-term stock performance of companies. Hendricks and Singhal (2005), for instance, estimate that the levels of abnormal stock returns[1] of companies that experience disruptions in the supply chain can reach a percentage up to 40%.

In ocean transportation, seaports and all the institutional and economic agents that that make up a "port community", and therefore carry out operations within a certain port area, both in frontline activities on the wharves and in supporting activities (e.g. warehousing and transport), play a vital role in the gateway logistics system[2]. A strong partnership between these agents is therefore a critical, and often overlooked factor, for the ocean-based supply chain performance.

Port communities today, work in an increasingly complex environment, where a considerable amount of data and information needsto be continually exchanged and shared between heterogeneous groups of both public and private actors or stakeholders each one adopting its own (usually not interoperable) IT system, and this can obviously be an obstacle to the development of cooperative relations among themselves. Typically, at each port where the ship docks, the same data need to be provided, electronically or even manually, to different categories of end-users and agencies, customs

1) Abnormal stock returns are commonly defined as the difference between the stock's actual return and its expected return, based on general market movement (M. Wiles, A. Morgan, L. Rego, *"The Effect of Brand Acquisition and Disposal on Stock Returns"*, Marketing Science Institute, 2009).

2) A gateway can be defined as a node in a globalized supply chain that serves as a critical link between geographical areas or regions by providing a system of road, rail, marine and air transportation infrastructure of particular significance for the international trade system (T. L. Tonghzon, T. Hoon Oum, *"The role of port performance in gateway logistics"*, 2007).

authorities included, in order to cover their respective needs.

As the information flows around a modern seaport are overabundant and involve a large number of agents, errors caused by manual re-keying of data and delays to the movement of goods are quite frequent. The larger is the number of data and messages that need to be exchanged between all actors involved in vessel, cargo, terminal, truck and train operations performed within a port, the higher is the risk of delays in the shipments and delivery of goods[3]. Moreover, this situation frequently leads to a waste of both human and financial resources, due to the duplication and compartmentalisation of work between a series of organisations administering and processing high volumes of data,information and messages which are most of time identical or partially identical (Portel, 2009).

In order to better plan and effectively perform their functions, shipping lines and agents, freight forwarders, customs brokers, terminal operators, carriers, Customs and other government authorities, should have a prompt access to the information held by each other. Terminal operators, for instance, can more efficiently allocate berth space for vessels and quay side cranes if shipping lines provide them in advance with the date of departure or arrival of the ship and the container data. For Customs, the transmission of clearance data by traders or their customs representatives before the arrival or the departure of the vessel, means the possibility to anticipate the risk analysis, reducing dwell time and avoiding unnecessary movements of goods within the terminal areas, because once unloaded from the vessel, (for import operations) cargo can be immediately headed toward the inspection areas, the spaces where the scanner devices are placed, or directly to the exit gate, ensuring precise positioning without extra movement.

This is the reason why assuring fluidity in each segment of the operations occurring in a sea port can greatly increase the overall gateway's competitiveness, allowing a faster movement and a swift release of goods[4].

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3) With the increased physical flow of containers, the number of messages that accompany transports have increased, especially for security related issues. Theft of goods and terrorist attacks risks push government authorities and companies to exchange more information, to be able to track shipments with a higher security risk (Wijngaarden, H., *"Business Intelligence in Supply Chains. A Study on Business Performance Management in the port of Rotterdam"*, Erasmus University – Rotterdam, 2008. It is estimated that in international transport up to 200 documents can be needed to transport one single container from shipper to consignee (Grizell, P, *"The economic potentials for a port community system in the ports of The Netherlands"*, Erasmus University – Rotterdam, 2001).

4) A, Long, *"Port Community Systems"*, World Customs Journal, Vol 3, n. 1.

Ⅱ. DEVELOPING THE COMPETITIVENESS OF PORTS THROUGH THE IT

A good example of how ports can improve their competitiveness through the use of the information technology is offered by a "Port Community System" (PCS).

A PCS is defined (Keceli et al., 2008) as a *"computer network which links up the port with all the companies that use it, including hauliers, rail companies, shipping lines, feeder ports, shippers and customs officers"*.

A Port Community System is therefore an electronic platform that, in theory, can be used to automate and streamline all the information flow gravitating around whatever kind of transport infrastructure, includinginland shipping, rail or air transport facilities. In practice however, PCSs are adopted mainly by seaports, as a solution to facilitate the dialogue amongdifferent IT systems managed by a variety of both public and private organisations operating within them[5], included Customs, port authorities and other institutions or control bodies such as sanitary or veterinary authorities or coastguard.

This is also the reason why a PCS solution can hardly be standardized or started from scratch, requiring a preliminary assessment, adaptation and integration of the preexisting systems operated by the actors of the port community, and this circumstance significantly influences the entire process of implementation of the platform (Rodon & Pujol, 2006).

A recent study[6] tries to categorize the existing Port Community Systems into at least 30 main different organizational models (see the following table), each one corresponding to a specific solution adopted by a seaport (or a group of seaports).

It is interesting to point out how the geographical distribution of PCS is primarily concentrated in Western Europe and in southern, eastern and south-eastern parts of Asia.

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5) In reality, Port Community Systems can be used for whatever form of transport infrastructure, included inland shipping, rail or air transport.

6) Posti, J. Häkkinen, U. Tapaninen, *"Promoting information exchange with a port community system – case Finland"*, published in "International Supply Chain Management and Collaboration Practices", Joseph Eul Verlag Editions, 2011.

Port Community System		Port(s) where the system is in use
1	ADEMAR	Le Havre
2	BHT	Bremen
4	Destin8	Interconnects 17 UK major ports (Felixstowe, Harwich, Ipswich, Immingham, Hull, Teesport, Tyne, Grangemouth, Aberdeen, Glasgow, Liverpool, Medway Ports, Greenock Bristol, London Thamesport, Tilbury, Great Yarmouth) and more than 50 inland clearance locations. 70 inside customs place
5	Easyport	Yantai
10	GASYNET	National system in Madagascar
11	Harbour View	E.g. Melbourne, Tanzania and several Belgian ports
12	Indian Port Community System	National system in India
19	PortBIS	National system in Australia
20	PortIC	Barcelona
28	TradeNet	National system in several countries (e.g. Ivory Coast and Singapore)
29	TradeXchange	Singapore

1. Main benefits of the PCSs

The benefits of using a common framework for the documental exchange between the members of a port community can be summarised as follows:

a) avoidance of bilateral data transfer (Grizell, 2001)

b) better coordination of all the actors operatingwithin the port and

c) full integration of their sub-systems into a service-oriented automation system that can optimize the overall port logistics and the hinterland transport chains.

Furthermore, PCSs can increase transparency within the logistics chain, allowing both companies to work more efficiently (through the facilitation of the process of tracking & tracing of goods and by guaranteeing a rapid access to accurate and consistent information) and government authorities to inspect goods more effectively, withthe possibility to easily retrieve and rebuild at whatever time the documents needed for the accomplishment their institutional tasks[7]. Another important advantage

7) Smit S., *"A Comparison of Port Community Systems"*, Erasmus University Rotterdam, 2004.

indirectly offered by these systems is represented by the possibility for the authority or organisation/s that manages the PCS, to elaborate at any time detailed and updated statistics on port/ports traffic.

Functions offered by PCSs are so numerous that it is impossible to list them in an exhaustive way, being modelled upon the specific needs of the different categories of actors that compose each port community.A recent analysis of the functionalities and services offered by PCSs worldwide, highlights however that only a small part of these systems covers the full range of services required by the local port community, being PCSs focused only on a portion of them, and in particular on those services that are required by the major stakeholders of the community[8]. This choice is probably determined by the need to favour the acceptance of the system by those that are identified as the main users of the platform and involved in its implementation. This suggeststhat a large involvement of users since the first stages of design and development cycle of the PCS, is one of the main success factors of these systems.

Today most seaports have a PCS that provides nautical services, cargo handling, and terminal operations capabilities that tie together the multiple parties involved in the activities performed within the port facilities. Only in smaller ports, where the managing authority of the PCS usually cannot afford the significant capital investments in ICT that the implementation of this tool implies, and where sometimes private actors and stakeholders are not equipped with electronic data transmission systems at all, operating procedures are burdened by extra administrative paperwork that negatively affects the global performance of the port infrastructure in itself. This constraint can be however overcome, if those ports connect to an already existing PCS of a larger port (or group of ports) or if they join their forces to set up a common PCS[9].

Another aspect that is strictly connected with the functions of the PCSs is the security and reliability of transmitted information, which is particularly important in the internet-based PCS, and most of time arejudged by the same users more important than cost (Keceli et al., 2008). This implies the need to take into due account, during the PCS development, all the available encryption methods of dataexchanged, especially when using interfaces, connectors or hosting services that allow the transfer of data from an IT system to another.

2. Operational and maintenance practices

8) Keceli, Y., Choi H. R., Cha Y.S. , Aydogdu Y. V., *"A Study on Adoption of Port Community Systems According to Organization Size"*, 2008.

9) European Port Community Systems Association (EPCSA), *"The role of port Community systems in the development of the Single Window"*, white paper, June 2011.

The operational and maintenance practices of a PCS are very diverse. Owner and responsible for the management of the platform can be a public authority (usually the Port Authority), local or national governments or a public-private partnership. Less frequently they are managed by a company (with capital owned by more members of the Port Community) or by a group of private stakeholders, usually under the co-ordination of a firm active in the IT sector. Concerning the remuneration for services offered by the PCS to itsusers, they can be provided completely free on charge or based on various payment schemes (fixed price per year or month, price per transaction, or a combination of them).

3. PCS' s key stakeholders and main documents exchanged

The range of PCS key stakeholders consists of private companies on the one hand (shipping agents, terminal operators, freight forwarders, customs brokers, carriers and other logistics service providers) and public or government agencies on the other hand (Customs, Port Authorities, etc.). In terms of the client structure, shipping lines and freight forwarders play the most important role, followed by importers and exporters in general or Customs and shipping agents.

For what concerns Customs, since the acceptance and registration of customs documents (e.g. customs declarations, cargo manifests, customsrelease notes, etc.) is preliminary to the intervention of other governmental agencies for control and risk profiling purposes (e.g. sanitary, veterinary and police authorities), as well as for the execution of the other logistics activities within the port (e.g. on and off loading, warehousing, etc.), data received in connection with the entry, exit or transit of goods are among the first information that need to be communicated to the various members of the Port Community. Customs data are also essentialfor the logistics companies operating within the port, in order to immediately locate and take delivery of cargo, reduce handling and transport costs and allow a speedy evacuation of containers from the port areas (terminals, wharves, quays, warehouses, etc.), that will assure an improved availability of these spaces. For all these reasons, the participation of Customs in the system design of a PCS is deemed essential (Lee et al, 2000).

The main documents that are dematerialised and replaced through the use of electronic messages within a PCS system include, apart from customs documents, also a wide rangeof shipping documents covering both vessel, container and terminal-related messages, such as: bills of lading, delivery orders, ship's arrival/departure notices, quay orders, container loading plans, container movement and stuffing /de-stuffing reports, empty container release orders, delivery instructions to transport operators (road/rail), ship planning notifications and their amendments, dangerous/hazardous goods notifications

and reporting, etc.

4. PCSs models within the European Union

PCSs have a long tradition within the European Union. Germany, France and UK are among the first and more active Member States of the European Union involved in the development of such systems[10]. On June 2011, six of the leading European companies that currently operate PCSs, have decided to create the Port Community Systems Association (EPCSA)[11] to represent the interests of the Port Community Systems Operators in Europe.

Germany, in particular, adopted a PCS since the beginning of '80s, named "DAKOSY" (which is also the name of the company that manages the platform), with the main aim of improving the efficiency of the transportation system within the port of Hamburg through the speeding up of the flow of information between the members of the Port Community. This project started on the results and conclusions of a previous pilot project of 1974 called "Datenbank Hamburger Hafen", initially based on the idea of a central mainframe serverinstalled at the port, with dialogue interface (i.e. terminals) for users[12]. Currently, this platform hosts more than 700, both private and public organisations,active in the transport/logistics sector, like as forwarders, exporters, importers,terminal and container packing companies, tally companies, liner agents, shipping lines, carriers and public authorities (Customs, naval police, fire service).

In the Netherlands, a group of companies (ABN AMRO Bank, CMG information technology, ECT transhipment company and Port CommunITy Rotterdam), launched on 2001 with the support of the Erasmus University in Rotterdam an ambitious project named "Virtuele Haven"(Virtual Port), to explore the possibility to improve business activities through close collaboration among all the partners in the port of Rotterdam[13] and multiple connectivity options, ranging from a Bilateral Information Model (where information is exchanged directly between the different actors on a bilateral basis), to a Centralised Information Model (where data are first stored in a central database at an information service provider, and can be retrieved by the authorized users), to a Decentralised Information Model (where data are stored and controlled by each individual party, with a broker

10) For what concerns the experience of United Kingdom, see the FCP80 project (Felixstowe Cargo Processing for the 80s, latterly known as "Felixstowe Cargo Processing System, or FCPS), described by A, Long, in "Port Community Systems" (see the note n.4 above).

11) http://www.epcsa.eu/

12) United Nations, Economic Commission for Europe, Centre for Trade Facilitation and Electronic Business (UN/CEFACT), *"Case Studies on Implementing a Single Window"*, 2005.

13) Boertien et al, *"Blue Print for a Virtual Port, Virtuele Haven, Port of Rotterdam"*, Jan 2002.

service that helpsthem in retrieving the information needed from the right source).

In Spain, the first PCSs project was started in the mid-1990s, named "ePortSys"[14]. Its main aim was to coordinate the activity of companies in the port's landside transport network , included the transport of containers between the port and the hinterland (and vice versa), integrating all the information being exchanged between the various members of the port community. The functions of ePortSys include the implementation of precise standards for the processing of the messages exchanged, with the complete elimination of paperdocuments and the capture of all the information produced in any exchange within the community (so to avoid the need to retype the same data multiple times and reduce the errors and processing costs).

In Italy, the ports of Genoa and Venice are among the first to have adopted a PCS. The Genoa's platform, named "Cargo Community System"(CCS), is an interesting example of integration of electronic and manual procedures into a single access point, which demonstrates how a PCScan be adapted to different categories of users, through different levels of integration. CCS users are divided into 3 groups: 1) non automated users (i.e. users that still use manual procedures or do not have an ICT system capable to handle and exchange information with external systems); 2. users with legacy systems[15] not enabled for B2B exchange (these categories of users have an IT system, but that cannot be interconnected with theIT systems of other partners for the exchange of documents and information; 3) users with advanced IT systems B2B/B2G that enable the exchange of all the documents and information with the other members of the port community through the traditional web technologies based on FTP, HTTP, SMTP protocols.

The first category of users can upload and exchange information and data directly via an Internet portal that is interconnected to a Centre of Service which provides all the services offered by the platform and which is connected with other external IT systems, like bank and insurance systems, railways, customs, etc. The second category of operators can access to the platform through a specific application (legacy connector) that links the user's IT system to the Centre of Service. CCS offers messaging services that support the document exchange between the logistic operators in the electronic transactions and allows the conversion of different data formats among different categories of documents. Furthermore, a number of "vertical"applications fully integrated into the CCS provideadditional services like as the electronic payments of transport services, tracing and tracking of goods, automatic numbering of customs manifests, etc.

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14) J. Rodon, J. R. Pujol, *"Exploring theIntricacies of Integrating with a Port Community System"*, 2006.

15) Legacy, in the context of computing, refers to outdated computer systems that may present problems in terms of compatibility, obsoletion or lack of security support. In reality pretty much any organization today, to some extent, has legacy systems that are still used instead of available upgraded versions (Source: Techopedia.com).

The Port of Venice has developed the "LogIS" Port Community System, a web platform developed by the Port Authority and made up of a series of modular applications that allow the management of: a) security and ship-related procedures (with the relevant authorisations), b) information on the companies working in the port, included on their workforce, c) functions and activities falling within the competence of the Port Authority.

Another module fully integrated in LogIS and freely accessible to all the categories of user of the platform, allows the online generation of customs documents needed for exporting containers, included the Outbound Cargo Manifest (MMP), whose information can be retrieved by the system at all times. Another interesting development of LogIS is represented by its future interconnection with the PCSs of other ports which are part of the "NAPA" (North Adriatic Ports Association) cooperative network, within the "ITS Adriatic multi-port gateway" initiative, whose aim is to integrate the port information systems of Venice, Trieste, Ravenna (Italy), Capodistria (Slovenia) and Fiume (Croatia) in a single uniform system that will allow improved co-ordination of port operations as well as the exchange of information between ports and their clients (e.g. ship owners, forwarding agents and other logistics providers).

Ⅲ. SINGLE WINDOW AND CUSTOMS ONE-STOP-SHOP

A Single Window (SW), and in particular, an International Trade Single Windowis commonly defined as *"a facility that allows parties involved in trade and transport to lodge standardized information and documents with a single entry point to fulfil all import, export, and transit-related regulatory requirements"*[16]. The principle behind this concept is that the process of exchange of information between trade and government can be standardised and the same data reused to comply with multiple regulatory requirements of several agencies, both private and public active in the international trade sector. Once transmitted to the SW, data sent by the operator are processed, elaborated using auxiliary data and re-transmitted to all the actors connected to this system (usually the SW is an electronic interface), that will produce all the documents needed for the completion of the international trade operation and upload on to the interfaceso that all the interested stakeholders (firstly, the operator) can access them.

The concept of single submission of data is considered by many as the main advantage of

16) United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), *"Recommendation and Guidelines on Establishing a Single Window"*, ECE/TRADE/352, September 2004.

International Trade Single Windows.In fact, economic operators are often obliged to submit large volumes of information and documents to both governmental authorities and private organisations,in order to fulfil a variety of regulatory requirements and conditions. Most of time, this information is fragmented and must be transmitted through several channels or communication systems[17].

Like the PCS, also the single window is essentially a collecting mechanism for information flows, but its distinctive characteristic is that it does not gather the flows generated within a port community or another kind of transport infrastructure (as in the case of the PCSs). A single window collects all those data and documents that operators must generate and submit to the entities intervening in an international trade transaction, both for regulatory purposes (e.g. Customs, and other government authorities or control bodies, chambers of commerce, etc.) and for commercial, logistics or financial reasons (e.g. banks, insurances, forwarding agents/customs brokers, independent inspection companies[18], etc.).

The concept of SW can, in turn, be further distinguished from that one of "customs one-stop-shop", a system of coordination of the action of all those authorities intervening with inspection purposes in respect of the same goods. A process that must be conducted under the supervision of a lead agency (usuallythe Customs administration), so that the different typologies of control (e.g. sanitary, veterinary, phytosanitary, security inspections, etc.), can be carried out in an integrated form, i.e. in a single place and atthe same time.

This mechanism, whose aim is to accelerate the clearance of goods, has been recently transposed into the EU legislation, with the Regulation (EC) No 450/2008 of the European Parliament and of the Council of 23 April 2008, laying down the "Modernised Customs Code", that states (article 26): *"Where, in respect of the same goods, controls other than customs controls are to be performed by competent authorities other than the customs authorities, customs authorities shall, in close cooperation with those other authorities, endeavour to have those controls performed, wherever possible, at the same time and place as customs controls (one-stop-shop), with customs authorities having the coordinating role in achieving this".*

17) It must be noted that normally each entity adopts its own specific systems, procedures and forms. Moreover, the latter are sometimes available only in paper format.

18) An example of services provided by independent inspection companies is the Pre-Shipment Inspection (PSI), that is a set of import verification services, carried out in the country of supply, developed to assist Customs in their mission.

Ⅳ. CONCLUSION

PCS, Single Window and the customs one-stop-shop are three modern tools implemented by numerous Countries in the world to simplify trade, reduce transaction time and cost, especially at ports, considered almost every[19] as the main gateway of entry for the majority of goods globally traded. The contribution of these tools to the goal of simplifying trade procedures is not exactly quantifiable, but even if each one of these systems can be developed separately from the others, only their combination can guarantee the maximum results in terms of facilitation of trade.

A Single Window system, in particular, can be used as a "one-stop shop"for traders and other commercial organizations if it foresees also the possibility to exchange information with the government agencies (other than Customs) endowed with inspection powers. However, the main difficulty rests in the need of assuring the execution of the different controls *"at the same place":* an action that if concretely implemented can allow a more rational management of the areas inside the ports and airports, and can contribute to raise the competitiveness of the whole logistics system.

A solution that has been recently proposed in Italy and that probably will start in the next years as a pilot project in the Port of Genoa, is the establishment of "unified centres of control" within the main ports and airports of the Country, where all the control authorities are put under the same roof, so that they act sinergically and carry out their inspection activities in an integrated fashion, so increasing their efficiency and harmonizing their respective procedures.

With regard to the PCSs, only few Countries that have adopted such platforms for the exchange of information have interconnected them each other and, above all, only in rare cases they dialogue with national single window systems. Accordingly,the only result they produce is an acceleration and simplification of theinformation flows between commercial/logistics operators and public authorities exclusively within one or more major ports. The SW, compared to PCS,is a broader tool, that aims to allow the reuse of data coming from a single submissionfor different purposes, not only for logistics reasons. In most cases however, SWs do not offers also Business-to-Business (B2B) information exchange, which conversely is provided by PCSs. Governments intending to develop a Single Window project should therefore take into due account the possibly to interlink their national SW initiative to existing PCSs, in order to optimise the use of information and provide their "customers" with an unique, integrated communication exchange network.

19) where The so-called "landlocked Countries" are obviously an exception, as they have no territorial access to the sea.