

A NEW PERSPECTIVE ON PORT SUPPLY CHAIN MANAGEMENT ACCORDING TO THE SERVICE DOMINANT LOGIC

ABSTRACT

PURPOSE OF THE PAPER – The increasing role of ports in the whole logistics system invites a more detailed examination of port supply chain management (Christopher, 1992; Meersman and Van de Voorde, 1996; Coyle *et al.*, 2003; De Martino and Morvillo, 2009). The purpose of this paper is to provide a new perspective on port supply chain management according to the Service Dominant logic (S-D logic) perspective (Lusch *et al.*, 2010; Lusch, 2011). Thus, the concepts of service, value co-creation, value propositions, operant resources, networks, service ecosystems and information technology are explored through a case study approach.

APPROACH – A systematic analysis of the current supply chain (SCM) and port-related literature is carried out through the lens of the value co-creation process (actors, resources, actions for practice/service development and value). Drawing from the Service Dominant Logic perspective (Vargo and Lusch, 2008; Vargo, 2008; Gummesson *et al.*, 2010) and the Service Science, this paper offers a more complete understanding of SCM in an innovative way which potentially lead to co-create value. The study takes a qualitative approach adopting a case study (Yin, 2003) to understand and explain the role of S-D Logic in the conceptualization of port supply chain management.

FINDINGS – The adoption of S-D logic perspective to port supply chain management enables identifying a system of value co-creation and competitiveness development, individualized according to the key stakeholders involved and the purpose it is created for. As this paper demonstrates, the port supply chain is re-conceptualized as a network of service systems each representing distinct (mostly operant) resource according to the service-dominant logic perspective (Lusch and Vargo, 2006).

PRACTICAL IMPLICATIONS – Hence, the main practical implication of this paper is the definition of a value co-creation process as a suitable perspective to develop ports' competitiveness. The use of the model of S-D logic enables to design a comprehensive framework which allows planning the creation of competitive supply chains.

ORIGINALITY/VALUE – The study represents a first attempt to analyse relations between port supply chain management according to the S-D logic perspective. This enables a more rigorous and comprehensive approach to understand ports' competitiveness development.

TYPE OF PAPER – Case study paper/Research paper.

KEY WORDS: S-D logic, service science, port supply chain management, ports' competitiveness

1. INTRODUCTION

In the recent years, the study concerning port supply chain management and value creation has received a great emphasis in the academic literature with different approaches of analysis (Christopher, 1992; Carter and Ferrin, 1995; Meersman and Van de Voorde, 1996; De Martino and Morvillo, 2009). In particular, there has been a great interest in conceptualizing ports from a strategic management perspective, according to the idea that “competition is not unfolding between individual ports but between logistic chains” (Meersman and Van de Voorde, 1996). In line with this assumption, Christopher (1992) suggests that “a real competition is not company against company but rather supply chain against supply chain”. Hence, the supply chain management (SCM) approach is becoming of a great relevance in the analysis of port competitiveness (De Martino and Morvillo, 2009) with the aim to extend “the principle of logistic integration to all companies through strategic partnership and co-operations arrangements” (Carter and Ferrin, 1995). The aim of this paper is to provide a re-conceptualization of port supply chain management according to a different methodological approach: the Service Dominant logic (S-D logic) perspective. In this optic, the study explores the following research question:

“What is the contribution of the S-D logic in the development of a competitive port supply chain?”

From this proposition, some hypothesis are derived:

- The concept of port service system is essential in the planning a competitive port supply chain (yes or not);
- In the port supply chain management the process of value is an experience co-created in conjunction with other actors (yes or not).

Finally, these hypotheses are tested in order to demonstrate the validity or not of this framework in the port supply chain management.

From a theoretical viewpoint, a systematic analysis of the concepts of service, value co-creation, value propositions, operant resources, networks, service ecosystems and information technology is carried out through the lens of the value co-creation process.

From a methodological point of view, a case study approach is adopted to investigate the port of Genoa (north of Italy), which is involved in the “E-Port Project”, whose aim is to ensure the rationalization of data interchange and accelerates traffic flow.

From both a theoretical and methodological viewpoint, the choice of studying the sources of value creation in the port system leads to some relevant implications.

The remainder of this paper is organized as follows. The next section outlines the theoretical background and the research questions. The research methodology is described in Section 4. The study concludes with a discussion of the findings, managerial implications and key challenges and suggestions for further research.

2. PORT SUPPLY CHAIN MANAGEMENT (SCM) APPROACH

The Supply Chain Management represents a strategic weapon for competitive advantage, being able to extend the principle of logistic integration to all companies in the supply chain through strategic partnership and co-operations arrangements. According to the SCM approach, the port serves as an intermodal/multimodal transport intersection and operates as a logistics centre for the flows of goods (cargo) and people (passengers) (Bichou and Gray, 2004). Academic studies evaluate the influence of SCM on port competitiveness, in fact, some approaches seem to be particularly significant from a review of the current port-related literature (table 1). As Robinson (2002) shows, the port is considered a Third Party Logistics (TPL) provider that intervenes in a series of different companies’ supply chains according to the conceptual categories of the value constellation. Paixão and Marlow (2003) apply the agile strategy in the supply chain management in order to ensure port’s competitiveness and contribute in the process of integration with the other actors of the supply chains. They state that “the new port measurement indicators [...] bring increasing visibility

within the port environment and across the transport chain, enhancing a better integration of all supply chain logistics elements” (p. 189). Carbone and Martino (2003) emphasize the role of the port according to the SCM approach, in fact, they state that inter-organisational relationships among port actors and other players of the supply chain are crucial in determining port competitiveness. Bichou and Gray (2004) conceptualise the port system according to the supply chain management perspective as an integral parts of supply chains with an important role in facilitating multimodal transport intersection, operating as a logistics centre, adding value, linking flows and creating supply chain patterns and processes of their own (Cosimato, Troisi, 2014; Tuccillo, Troisi, 2014).

Table 1: Contributions on port supply chain management

Literature review on supply chain management (SCM) approach and ports' competitiveness	
Authors	Contributions
Robinson (2002)	<i>The concept of port positioning is based on the conceptual categories of the value constellation.</i>
Paixão and Marlow (2003)	<i>The adoption of the agile strategy in the supply chain to ensure port's competitiveness.</i>
Carbone and De Martino (2003)	<i>The importance of relationship and cooperation in the process of value creation.</i>
Bichou and Gray (2004)	<i>The actors of the port community have a lack of familiarity with logistics integration and SCM concepts.</i>
Tongzon <i>et al.</i> , (2009)	<i>Port's supply chain orientation is studies from the perspective of port's services providers (the terminal operators) and users (the shipping companies).</i>
De Martino <i>et al.</i> , (2011)	<i>The port is viewed as a network of actors, resources and activities, which co-produce value by promoting a number of interdependencies among the supply chains.</i>

Source: our elaboration

Tongzon *et al.*, (2009) analyse port's supply chain orientation from the perspective of port's services providers (the terminal operators) and users (the shipping companies). De Martino and Morvillo (2008) proposed a general framework for port value creation. In particular, this model takes into consideration all the possible modalities of interaction among port network actors, by analysing the development of inter-organisational relationships in the management of business activities and resources in the process of creating value for clients.

Finally, De Martino *et al.*, (2011) view the port as a network of actors, resources and activities which co-produce value by promoting a number of interdependencies among the supply chains passing through the port.

2.1 SERVICE DOMINANT LOGIC PERSPECTIVE AND SERVICE SCIENCE: AN OVERVIEW

In the literature, Service-dominant logic is a growing perspective which reflects a different way of thinking about value and value creation (Golinelli, 2010; Vargo and Lusch, 2004, 2008a, 2008c, 2008b; Vargo 2009b). According to the S-D logic, value is constantly co-created and must be established in use, from the customers point of view with a transformation of the position of value creation from exchange to use (Vargo *et al.*, 2008). All exchange are based on service and “when goods are involved, they are tools for the delivery and application of resources” (Vargo and Lusch, 2006, p. 40). In this way, value results from the beneficial application of operant resources (Vargo and Lusch, 2004). Ten are the foundational premises of the service dominant logic perspective (Vargo and Lusch, 2008, p. 7):

1. Service is the fundamental basis of exchange
2. Indirect exchange masks the fundamental nature of exchange
3. Goods are distribution mechanism for service provision
4. Operant resources are the fundamental source of competitive advantage
5. All economies are service economies

6. The customer is always a co-creator of value
7. The enterprise cannot deliver value, but only offer value propositions
8. A service-centered view is inherently customer oriented and relational
9. All economic and social actors are resource integrators
10. Value is always uniquely and phenomenologically determined by the beneficiary

Following S-D logic, the concept of co-creation suggests a system where producer and customer generate value in an interactive system through the integration of their resources (Lusch, 2011). As noted, in the S-D logic all exchange is based on service that is considered “the application of competences (such as knowledge and skills) by one party for the benefit of another” (Vargo *et al.*, 2008, p. 145). Moreover, the basic unit of analysis for service-for-service exchange is the service system, which is a configuration of resources, including people, information, and technology, connected to other systems by value propositions (Vargo *et al.*, 2008). Each service system is then, at the same time, a provider and user of services, structured according to the need as a value chain, a network of value, a system value (Vargo *et al.*, 2008). This integration of needs, resources, information and objectives among providers and users stimulates co-creation processes that have come to dominate the developed economies of the world. In service systems, interaction becomes the driver of value, the means through which service systems develop a joint process of value creation (Capunzo *et al.*, 2009; Polese *et al.*, 2009; Carrubbo, 2013); hence, service systems can create competitive advantage by improving the reticular relationships (Metallo *et al.*, 2007). In this context, service science is the study of service systems and of the co-creation of value within complex configurations of resources and competences. “When value creation is seen from a service systems perspective, the producer-consumer distinction disappears and all participants contribute to the creation of value for themselves and for others” (Vargo *et al.*, 2008, p. 149). Table 2 shows the definitions of the main elements composing service systems, including system, operant resource, service, value and economic exchange, according to Maglio *et al.*, (2009).

Table 2: Foundations of service systems

Definitions	
System	“configuration of resources, including at least one operant resource, in which the properties and behavior of the configuration is more than the properties and behavior of the individual resources”.
Operant resource	“an act on other resources (including other operant resources) to create change.
Service	“is the application of resources (including competences, skills, and knowledge) to make changes that have value for another (system).
Value	“is improvement in a system, as determined by the system or by the system’s ability to adapt to an environment”.
Economic exchange	“is the voluntary, reciprocal use of resources for mutual value creation by two or more interacting systems”.

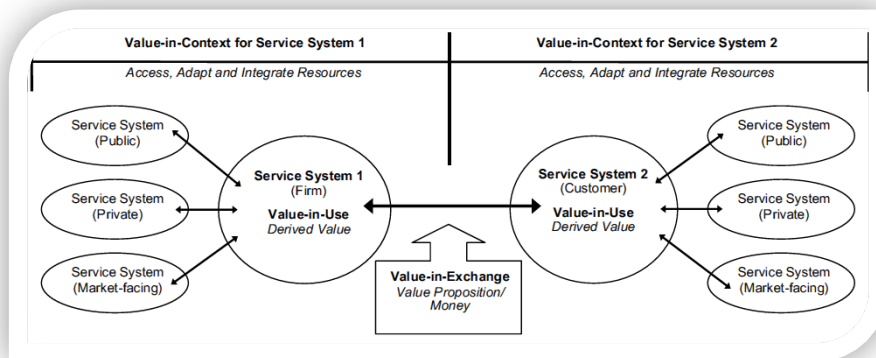
Source: Maglio *et al.*, 2009, p. 403

Thus, “a service system is an arrangement of resources (including people, technology, information, etc.) connected to other systems by value propositions. A service system’s function is to make use of its own resources and the resources of others to improve its circumstance and that of others” (Vargo *et al.*, 2008, p. 149). The capability of the service systems to co-create value, effectively depending on the resources of others in terms of interdependence of service-for-service exchange and resource integration. Value co-creation occurs through the integration of existing resources with those available from a variety of service systems that can contribute to system well-being as determined by the system’s environmental context. “Service systems interact through mutual service exchange relationships, improving the adaptability and survivability of all service systems engaged in exchange, by allowing integration of resources that are mutually beneficial” (Lusch and Vargo, 2006; Vargo *et al.*, 2008, p. 145). A description of the process of value co-creation through

interaction and integration of resources within and among service systems is proposed below (see fig. 1).

As you can see from the figure 1, the value proposition is proposed by service systems and it is accepted, rejected, or unnoticed by other service systems in need of resources. In this way, value is determined through use or integration and application of operant (and sometimes operand) resources (Lusch and Vargo, 2006).

FIG. 1: VALUE CO-CREATION AMONG SERVICE SYSTEMS



Source: Vargo et al., 2008, p. 149.

To sum up, service system is considered as “an open system (1) capable of improving the state of another system through sharing or applying its resources (i.e., the other system determines and agrees that the interaction has value), and (2) capable of improving its own state by acquiring external resources (i.e., the system itself sees value in its interaction with other systems). A service system can, therefore, act to supplement resources, interpretable in terms of the set of elements belonging to a single work system (Maglio et al., 2009), able to favor the specialized skills, be they operational and active, such as knowledge, skills, know-how, people, products, materials, finances (Vargo, Lusch, 2006; 2008).

Service systems are dynamic configurations of resources, both operant resources that perform actions on other resources and operand resources that are operated on. In this context, economic exchange depends on voluntary, reciprocal value creation between service systems (each system must willingly interact, and both systems must be improved)” (Maglio et al., 2009, p. 149). Recently, the researchers emphasize the complexity that surrounds the service system that is generally characterized by an open and emergent interaction that may generate conditions of complexity.

2.2 THE CONCEPT OF VALUE CO-CREATION

Value co-creation is one of the key components of service systems, which has been conceptualized by Service-Dominant (S-D) logic perspective as a phenomenon that spread from customer’s involvement in production, design, customization or association process (Vargo and Lusch, 2008; Vargo, 2008; Gummesson et al., 2010). Table 3 summarized the main characteristics related to value and value creation in the S-D logic perspective (Vargo et al., 2008).

This perspective has been used to emphasize the customer’s collaborative role in value creation, in fact, the customer is always a co-producer (Vargo and Lusch, 2004) and an active part of the system. This implies the evolution of value creation from a solely company-centric approach towards one with more interaction with the customer. In this optic, “co-creation is the process by which products, services, and experiences are developed jointly by companies and their

stakeholders, opening up a whole new world of value. Firms must stop thinking of individuals as mere passive recipients of value, to whom they have traditionally delivered goods, services, and experiences. Instead, firms must seek to engage people as active co-creators of value everywhere in the system” (Ramaswamy, 2009, p. 11).

Table 3: S-D logic on value creation

Value driver	Value-in-use or value-in-context
Creator of value	Firm, network partners, and customers
Process of value creation	Firms propose value through market offerings, customers continue value-creation process through use
Purpose of value	Increase adaptability, survivability, and system wellbeing through service (applied knowledge and skills) of others
Measurement of value	The adaptability and survivability of the beneficiary system
Resources used	Primarily operant resources, sometimes transferred by embedding them in operand resources-goods
Role of firms	Propose and co-create value, provide service
Role of goods	Vehicle for operant resources, enables access to benefits of firm competences
Role of customers	Co-create value through the integration of firm-provided resources with other private and public resources.

Source: Vargo et al., 2008, p. 148

A description of the process of value co-creation in this study is provided through a more detailed examination of ports in the supply chain.

3. THE IMPORTANT ROLE OF PORTS IN THE SUPPLY CHAIN

In the supply chain, the ports are critical nodes where value co-creation and logistics-related activities take place. Traditionally, ports have constituted the inter-modal interface between maritime, road and rail transport. Actually, they play a significant role in the management and coordination of materials and information flows in the entire supply chain (Carbone and De Martino). Subsequently, the port is considered as a cluster of organizations in which different logistics and transport operators are involved in bringing value to the final consumers. Moreover, ports are a good location for value added logistics in which different actors of different channels in the supply chain can interact and collaborate. Consequently, ports are considered a major sub-system of the broader production and logistics systems in the global supply chain (Bichou and Gray 2004). In fact, ports are characterized by seamless communication, elimination of wastage, cost reduction in operations through the just-in-time concept, interconnectivity and interoperability of modal infrastructure and operations, provision of value added services and customer satisfaction. For this reason, ports are seen as economic catalysts for the region and country and also a source of value creation for the firms involved in the process of services production (Robinson, 2002). In the next section, the adoption of S-D logic perspective in the port supply chain management enables identifying a system of value co-creation and competitiveness development, individualized according to the key stakeholders involved and the purpose it is created for (Lusch et al., 2009; Lusch, 2011).

3.1 A NEW PERSPECTIVE ON PORT SUPPLY CHAIN MANAGEMENT ACCORDING TO THE S-D LOGIC AND THE SERVICE SCIENCE

In the port supply chain management, the co-creation of value derived from a complex configurations of resources and competences and all participants contribute to the creation of value for themselves and for others (Vargo et al., 2008, p. 149). In this optic, the S-D logic supports the idea that the development of partnerships between actors and the integration of activities and

resources in the port supply chain are potential sources of competitive advantage. According to this perspective, ports are considered part of networks of organizations involved in various processes and activities that create value to the final client. Thus, the port is considered as a network of actors, resources and activities - the port service system - which co-produce value by promoting a number of interdependencies (fig. 2).

Based on these conceptualizations, in the port supply chain, the process of value is an experience created in conjunction with other actors:

- port authority;
- shipping agencies;
- container depot;
- freight forwarder;
- customers;
- carriers.

The capability of the port service systems to co-create value effectively depends on the resources of others in terms of interdependence of service-for-service exchange and resource integration. Thus, value co-creation occurs through the integration of existing resources with those available from a variety of service systems that can contribute to system well-being as determined by the port's environmental context. In this optic, "co-creation is the process by which products, services, and experiences are developed jointly by companies and their stakeholders. "On the basis of this concept, "all participants in the port value-creation process can be viewed as dynamic operant resources (fig. 2). Accordingly, they should be viewed as the primary source of innovation and value creation. The terms "co-creation", "co-production", and "prosumption" refer to situations in which they collaborate to produce things of value" (Humphreys and Grayson, 2008, p. 963).

3.2 THE PORT SERVICE SYSTEM

Traditionally, the concept of port supply chain has been viewed as tiers of suppliers and tiers of customers defined similarly. S-D logic replaces this idea with a network concept that refers to the port supply chain as a service ecosystem. In fact, the particular complexity that characterizes a port makes it belonging to the category of a complex service system. In fact, the functioning of a port is made possible thanks to the interaction of people, institutions and resources, which in turn depend on other systems.

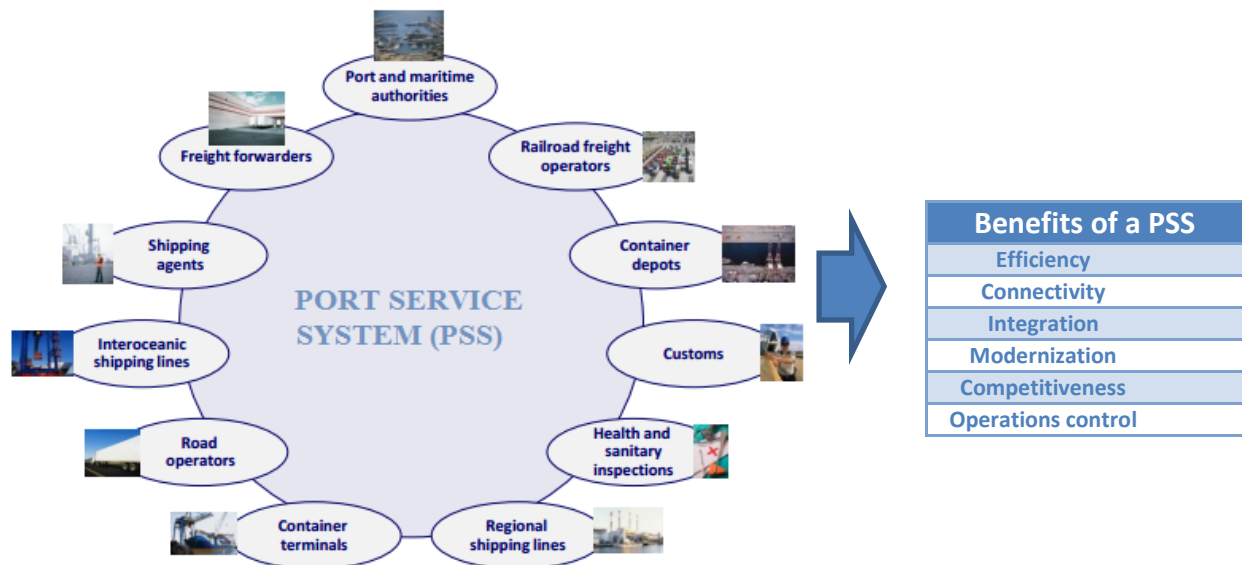
According to the Service Science, the port can be understood as a complex service eco-system because:

- is a formalized set of connected and interacting parties;
- is a set of complex elements;
- for its operation is connected with numerous subjects.

Thus, a service ecosystem aims to: coproduce service offerings, exchange service offerings and co-create value. The concept of service ecosystem can also be viewed as a value network" (Lusch et al., 2010), which may better capture the nesting of supply chains with larger and more encompassing value networks. In conclusion, the concept of port service system is an outcome of resource integration and value co-creation. As this paper demonstrates, the port supply chain is re-conceptualized as a network of service systems each representing distinct (mostly operant) resource according to the service-dominant logic perspective (Lusch et al., 2008). The concept of a service ecosystem can also be viewed as a port value network (Lusch et al., 2010). The service ecosystem concept views actors as making value propositions to each other versus delivering or adding value. It also puts emphasis on the co-production and co-creation that occurs between actors in the service ecosystem and hence has a strong focus on collaborative processes.

Adopting this perspective, the port is considered an open systems, influenced by the other actors in the environment with related benefits in terms of efficiency, integration, modernization, competitiveness and operations control (fig. 2).

Fig 2: Port Service System (PSS) and related benefits



Through different forms of interactions the port can have access to and make use of external resources owned by other network actors. The actors are defined by the activities they carry out and by the resources they control; they are connected to the other network actors through relationships. In this environment, the inter-organisational relationships are considered to be the most relevant strategic resources, “bridges of value”, as they access to other actors’ resources in the network and they strongly contribute to the value co-production.

In this way, the port is represented as a network of actors that carry out a number of activities in close collaboration, sharing different resources. The higher level of collaboration (integration) among actors, the greater benefits that they will perceive in promoting interdependencies also among various supply chains. In this way, the features of the supply chain composing the network play a key role in both assessing, and then eventually redefining, the port development policies, because they determine the importance of the resources to be controlled and the activities to carry out in the port in order to improve port value creation. Only through an understanding of these needs, the port can exploit the chance of becoming an active part of the supply chains to which it belongs and thus, gain the advantages of better integration.

4. RESEARCH METHODOLOGY

A literature review was primarily used to investigate port supply chain management. After an analysis of some significant approaches in the current port- related literature, the paper offers a systematic analysis of the fundamental premises of the S-D logic perspective and of the Service Science. Starting from these, the study aims to provide a new perspective on port supply chain management. The research, essentially exploratory in nature, was developed using a case study methodology (Yin, 2003; Fayolle, 2004). The case study approach, as suggested in literature has the dual aim of “grasping in detail the main characteristics of phenomena being studied” and of understanding the dynamics of a given process (Ryan et al., 2002). Thus, the paper proposes an analysis of the E-Port project in the Port of Genoa according to the S-D logic perspective in order to understand the role of all participants in the co-creation of value. The study has been conducted on

the basis of the following items: 1. configuration of resources; 2. at least one operant resources; 3. service as the application of resources; 4. value as improvement in a system (ability to adapt to an environment); 4.1 value in use (value driver); 5. economic exchange on a voluntary basis; 6. value creators; 7. process of (co-)creation; 8. purpose of value; 9. role of good (operant resources). All of these elements derives from the S-D Logic theoretical framework explained in the previous sections.

In this paper, the choice of the Genoa port is motivated by the fact that it constitutes the pivot of the North Western Italy Logistic Network, in fact, it is the first Italian port in terms of overall handling and it is among the first Mediterranean ports of final destination as to containerized transport. Moreover, with the development of a competitive and sustainable transport system, it is bidding to become one of Europe's first smart ports.

5. THE GENOA PORT: CHARACTERISTICS AND PERFORMANCE

The Port of Genoa is a “one stop multi-purpose and multi-tasking port” with more than twenty private operational terminals, equipped to welcome every type of ship for each type of goods: containers, general cargo, perishable products, metals, forestry products, solid and liquid bulk, petroleum products and passengers. The Port has several companies offering a wide range of complementary services, from ship repair to the environment. The Genoa Port traffic has been fairly increasing in the last few years indicating a traffic resilience also in difficult time. The total traffic volume in 2012 was 2,064 ml TEUs¹, in 2011 the Port of Genoa handled more than 18.9 million tons of containerized cargo in nearly 1.7 million TEUs. Growth expressed in TEU terms increases in the last year of about 18% since 2005. The challenge for the future of the Port of Genoa will be the interception of the foreseen incremental traffic volumes: this is only possible on condition that the system of technologies will be improved in terms of quality, times, punctuality, reliability, safety, security and variety. More in depth, it seems that a successful strategy in the port of Genoa includes the implementation of smart and green technologies to ensure proper quality of services offered.

5.1 THE E-PORT SYSTEM

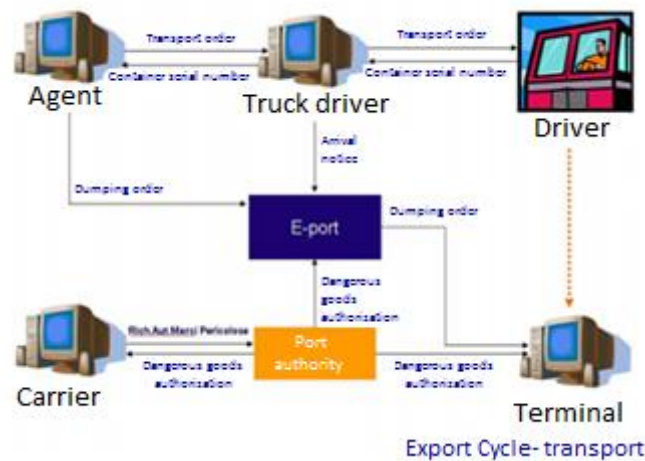
The Genoa Port Authority developed a virtual infrastructure, called E-port system, that would allow the tracking of goods handled in the port and the dialogue between operators and between them and the government (fig. 3). This telematics solution ensures the rationalization of data interchange and accelerates traffic flow. E-port integrates the system with the other technological assets already operating in the port of Genoa in order to ensure the availability of “sea side” information for the whole port community and an effective integration with the “land side” documentation process. In terms of performance, according to time perspective, a drastic reduction of transit time has been obtained through the process of computerization (i.e. reduction of time to send paper documents respect to electronic documents or to go to the proper offices of Port and Maritime Authority with the paper documentation). According to cost perspective, the time savings can be considered into a generalized cost perspective, so generating a significant reduction of costs for the operators and for the Public Authorities. According to process perspective, a reduction of transit time implied directly customer satisfaction and loyalty improvements, security of the information flows and reduction of the risk of losing paper documentation with relevant effects on time savings at the port accesses and terminals gates.

In particular, this telematics system shows competitive advantages in terms of:

¹ The twenty-foot equivalent unit (TEU or teu) is the unit of cargo capacity often used to describe the capacity of container ships and container terminals.

- data sharing: now the port operators input the data only one time considering that there are protocols for the data sharing among the different applications on the system with a significant reduction of the wasting of time.
- communication and interoperability among the informatics systems of public authorities involved;
- paper documents exchange via telematics: with the new system the paper's circulation has been reduced or eliminated.
- traceability of the flows of information and of the cargo: now all the public and private entities involved in the supply chain can have a detailed, comprehensive and on real time basis vision of material and immaterial flows related to dangerous port traffics.
- safety and security: the possibility of tracking constantly the cargo flows and of having a full visibility of the cargo information considerably increases the safety and security of the chemicals traffics.

Fig. 3: E-port System



Source: <http://e-port.almaviva.it/>

There are numerous factors, well understood by the operators, which are driving the port towards a more intensive use of the existing technologies. With this in mind, one of the most important results in the E-port implementation has been to reveal the need for some regulatory adjustments in the port documentation processes capable of moving the port community towards the shared objectives of a competitive, reliable and effective system. This telematics system improve the supply chain in terms of effectiveness, efficiency, security and safety and promote the integration of existing port operations information systems of port authorities, institutions and operators. The effectiveness of the effort in the port of Genoa is depending on the cooperation level among the different projects that are developed by the port Community (i.e. the Maritime Authority is developing activities to ensure coherence of the “sea side” information; the platform for the national logistics network management - UIRNet developed by the Ministry of Transport).

6. FINDINGS AND DISCUSSION

In this section the E-Port project is discussed according to the S-D logic in order to better understand the contribution of this perspective in the co-creation of value in the port system. In particular, the presence or not of some S-D logic items concerning value is evaluated and summarized in the table 4. Starting from the first item, “configurations of resources”, the project include people, information, and technology. For this reason, the first assumption is validated. Continuing with the second assumption, the role of operant resources is fundamental to enable access to benefits of firm competences. In the E-Port, information technology is considered as an

operant resource. According with the definition of service as “the application of resources, including competences, skills, and knowledge, to make changes that have value for another (system)”, it is clear that this project describes the process of value co-creation through interaction and integration of resources within and among service systems. Thus, these systems interact through mutual service exchange relationships, improving the adaptability and survivability of all service systems engaged in exchange, by allowing integration of resources that are mutually beneficial. In this context, value represents the improvement in a system, as determined by the system or by the system’s ability to adapt to an environment. Value is fundamentally derived and determined in use. Certainly, customers are value creators. Customers co-create value through the integration of firm-provided resources with other private and public resources. The purpose of value increase adaptability, survivability, and system wellbeing through service (applied knowledge and skills) of others.

TABLE 4: S-D LOGIC AND E-PORT

S-D logic	E-Port
1. Configuration of resources	Yes
2. At least one operant resources	Information Technology
3. Service as the application of resources	Yes
4. Value is improvement in a system (ability to adapt to an environment)	Yes
4.1. Value in use (value driver)	Yes
5. Economic exchange on a voluntary basis	Yes
6. Value creators	Yes: human and IT
7. Process of (co-)creation	Yes

Source: our elaboration

7. IMPLICATIONS AND CONCLUSIONS

The adoption of S-D logic perspective to port supply chain management enables the identification of a system of value co-creation and competitiveness development, individualized according to the key stakeholders involved and to the purpose it is created for. As this paper demonstrates, the port supply chain is re-conceptualized as a network of service systems each representing distinct (mostly operant) resource (Martino and Morvillo, 2008; Lusch et al., 2008). Thus, the S-D logic perspective is useful to represent the complex port environment including all the possible interaction among actors within and outside the port itself. In particular, it would be particularly helpful in the context of port operation and management as it allows to identify all the sources of port value creation, potentially arising from the network of actors, resources and activities. Under this perspective, the port can be considered an important springboard for the economic development of its hinterland.

S-D logic replaces the concept of a port supply chain with a network concept that is referred to supply chain as a complex service system in line with the literature review (Bichou and Gray, 2004; Tongzon et al., 2009, De Martino et al., 2011). In fact, port’s competitiveness increasingly depends on external co-ordination and control by outside actors. In fact, ports are a subsystem in the logistics chain. As it can be deduced by the evidence of this study, the port is considered a complex service systems with dynamic characteristics (the first hypothesis is validated). It is recognized the ability of the port service system to fully exploit synergies with other transport nodes and other players within the logistics networks of which they are part.

This framework proves to be particularly useful in representing the port value creation in supply chains. In fact, the port is represented as a network of actors that carry out a number of activities in close collaboration, sharing different resources (the second hypothesis is validated). The higher level of collaboration (integration) among actors provide important benefits that promote

interdependencies also among various supply chains (Esposito De Falco, 2014). Following this approach, the competitiveness of port supply chain management increasingly depends on its “organisational component” as it affects the quality of services including: range of logistics services, Information and Communication Technology solutions, know-how, and relationships (Esposito De Falco, 2015).

Hence, the main practical implication of this paper is the definition of a value co-creation process as a suitable perspective to develop ports’ competitiveness. The use of the model of S-D logic enables to design a comprehensive framework which allows the planning of the creation of competitive supply chains. The study offers valuable insights for managers and practitioners in dealing with the supply chain management approach. It represents a first attempt to analyse the port supply chain management adopting an innovative perspective. However, it has to be said that the paper is limited by the analysis of a single case study.

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