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## Abstract

**Purpose** – The purpose of this paper is to discuss and analyse how intellectual capital (IC) is created and deteriorated in a meta-organization by assessing the interdependency between the collective IC of the meta-organization and the individual IC of its members.

**Design/methodology/approach** – A case study conducted in a seaport is adopted to explore how creation or deterioration of IC at one level of analysis affects the IC at the other. Four different illustrations are provided, depicting different instances of articulation between both types of IC.

**Findings** – Evidence suggests that, in a meta-organization, IC appears as a function of both individual and collective IC dimensions. Changes in the meta-organization's IC or in its members' IC may have different impacts on each other, generating intellectual assets or intellectual liabilities at both levels. Evidence also suggests that those changes in IC should be analysed in a longitudinal way, since both levels affect each other in different ways over time.

**Research limitations/implications** – Despite the validity of the interpretations provided in the context of the case study, generalization to other situations should be conducted only in a theoretically framed manner.

**Practical implications** – This study provides important strategic and managerial implications for meta-organizations and their members, who are concerned with their performance.

**Originality/value** – Although there have been some efforts to apply the traditional IC methodologies to a bigger scope, such as regions or nations, some meso level empirical contexts are yet far unexplored, such as the case of meta-organizations. Furthermore there is a gap in management sciences' research on seaports.

**Keywords** Intellectual capital, Network, Meta-organization, Collective, Intellectual liabilities, Seaport

**Paper type** Case study

## 1. Introduction

The assertion that organizations are more dependent on intangible resources than on tangible ones for the creation of sustainable competitive advantages has become commonplace (Palacios and Galván, 2006). The term intellectual capital (IC) is used to refer to non-physical sources of future economic benefits (Cañibano *et al.*, 2002). Research on IC has focused mainly on individual business firms, treating knowledge in a static way (in terms of a knowledge stock), namely, by identifying and evaluating the intangible assets owned by an organization in a particular moment (Pöyhönen and Smedlund, 2004; Schiuma *et al.*, 2008).

In other types of settings, such as regions, nations, clusters and local production systems, economists have focused on natural, physical and financial capital in order to explain why some are able to create more value than others. However, in the last decade, the importance of knowledge as a source of regional and local development has

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been acknowledged and many argue that "macro" organizations can obtain competitive advantages from knowledge resources (Schiuma *et al.*, 2008).

Despite all the progress, there is still a great deal to know about IC in these broader, more "macro" and "meso", types of organizations. In particular, seldom have researchers used a network-level approach to explain how organizations and their actions might affect both individual and collective outcomes in the networks in which they are involved (Provan *et al.*, 2007). This paper analyzes IC at a "meso" level, namely, by focusing on the networking arrangements between organizations (Smedlund, 2006). By examining a whole network, insights can be gained about how it evolves, how it is governed and how collective outcomes (such as IC) might be generated (Provan *et al.*, 2007). Although theories concerned with organizational design emphasize several elements such as formal authority, control, incentives' design and formal roles, such elements may not be present in settings (e.g. clusters; networks) that perform as a single unit and can be called meta-organizations (Gulati *et al.*, 2012).

This is a study which aims to improve understanding about how IC is created and deteriorated in a meta-organization. It resorts to Provan *et al.*'s (2007) typology of inter-organizational network research to assess the impact of individual organizations on the whole network's IC and vice-versa. The main research questions addressed are:

*RQ1.* How does the creation and deterioration of IC at the individual level affect the CIC in a meta-organization?

*RQ2.* How does the creation and deterioration of IC at the collective level affect members' IIC in a meta-organization?

As far as the authors are aware, the processes of IC creation and deterioration, and namely, the relationship established between the IC of the meta-organization (collective IC, or CIC) and the IC of its members (individual IC, or IIC), have not been fully explored in the literature. This is an important gap, since such a relationship is not necessarily a straightforward one. This study discusses the possibility that an increase in the IIC of a member of the meta-organization may not mean a proportional increase of the CIC. Individual actions aimed at increasing the IIC can even deteriorate the CIC, i.e. lead to an intellectual liability (IL) for the entire meta-organization. Finally, it is conjectured that collective actions that increase or decrease the CIC may also have positive or negative impacts at the IIC level. These hypotheses have not been considered in extant literature.

This paper results from a case study conducted in a Portuguese seaport. Seaports can be seen as complex organizations that possess certain specific characteristics that differentiate them from other collective organizations. These characteristics allow them to be conceptualized as meta-organizations, hence turning them into valuable settings for the study of IC creation and deterioration, and more specifically, for the provision of evidence about the relationships between individual and collective IC. Seaports are complex network systems composed of interrelated organizations with common objectives, collaborating with each other in order to create value for themselves, for the network and for the final consumer. The traditional design logic of control, hierarchy, formality roles and financial incentives does not "fit" with this type of setting which function as an organization *per se* (Gulati *et al.*, 2012). The case study allows to better comprehend IC at a specific "meso" setting, namely, by depicting the interdependencies between a meta-organization's and its members' IC, offering some illustrations of different instances of articulation between individual creation/deterioration of IC and collective creation/deterioration. It also suggests that to assess CIC in this settings, due

to this multi-level interrelationship one has to go beyond the mere translation of micro-level models to higher levels.

The next section is devoted to the review of relevant literature. Then, a conceptual framework that is theoretically grounded on the literature reviewed is proposed. In Section 3, the methodology adopted in the study is described. In Section 4, the case study is presented, providing the empirical material to validate the conceptual framework proposed. In Section 5 the case study's findings are discussed and in Section 6 some concluding remarks and some cues for future research are offered.

## 2. Background and relevant literature

### *2.1 IC creation and deterioration – IC as an asset or a liability*

IC is most often considered as the sum of an organization's intellectual assets (IA), and as such the expressions "IC" and "intellectual assets" have been used interchangeably (Caddy, 2000). A common approach to the conceptualization of IC is by decomposing it into three dimensions: human capital, structural capital and relational capital (Cañibano *et al.*, 2002; Roslender and Fincham, 2001). Human capital refers to employees' individual knowledge, attributes, attitudes and abilities like creativity, know-how, experiences or loyalty (Cañibano *et al.*, 2002; Habersam and Piber, 2003). Structural capital includes systems and networks, cultures and values, and elements of intellectual property like patents or trademarks (Cañibano *et al.*, 2002; Roslender and Fincham, 2001). Relational capital refers to the external relationships with the organization's stakeholders. It includes dimensions such as image, customer satisfaction or the achievement of financial support (Cañibano *et al.*, 2002; Habersam and Piber, 2003), also being related to the concept of "learning organization" (Nazari and Herremans, 2007).

The traditional view of IC is related to the creation of competitive advantages and value for organizations. However, investments in IC can also destroy value. Research on issues regarding organizational decline is still limited and IC research follows this same trend. IC literature mainly focus in the "mainstream" IA, underestimating the importance of ILs (Stam, 2009).

Harvey and Lusch (1999) were the first to address and theoretically discuss this topic. Caddy (2000) developed further such discussion, arguing that IC should be assessed in net terms by subtracting ILs to IAs, considering the factors that erode the value of intangible assets as intangible liabilities. Since 1999, ILs have been defined according to two different perspectives: a strategic and an accounting one (Garcia-Parra *et al.*, 2009). The strategic perspective is based on the depreciation of IC's value (Abeysekera, 2003; Caddy, 2000). This perspective is focused on the intangible causes of value loss such as the use of IAs on a bad idea, employees' lack of commitment, employees' lack of capabilities or loss of key employees (Garcia-Parra *et al.*, 2009). Hence, ILs can be defined as the "potential non-physical causes of organizational deterioration" Stam (2009, p. 95). Furthermore, internal and external intellectual liabilities can be distinguished (Stam, 2009). Stam (2009) adapted the traditional IC taxonomy to his internal IL concept: human liabilities, such as employee turnover or insufficient training, involve reductions in the value that employees bring to the organization, their knowledge, experience or motivation; structural liabilities are related to decreases in the value of procedures, processes and culture of the organization (weak strategic planning processes or a knowledge unfriendly culture are examples of such liabilities); relational liabilities are related to declines in the value of relationships with customers, suppliers and other stakeholders (e.g. negative word of mouth; poor corporate reputation).

The accounting perspective is considered to be closer to the classical definition of liabilities, viewing ILs as non-monetary obligations (Garcia-Parra *et al.*, 2009; Harvey and Lusch, 1999). This approach is based on Harvey and Lusch's (1999, p. 87) classification of intangible liability as representing "the responsibility of the firm to transfer economic resources or provide services to other entities in the future".

This paper adopts the definition of IL suggested by Garcia-Parra *et al.* (2009), which integrates both perspectives: "all non-monetary obligations related to the stakeholders that the company must fulfil, in order to avoid the depreciation of its intangible assets" (p. 827). For example, the non-fulfilment of working conditions may lead to changes in employees' attitudes, something which can have negative consequences regarding organizational processes or activities (depreciating its structural capital). These negative effects may also affect the organization's relationship with their stakeholders thus depreciating its relational capital (Garcia-Parra *et al.*, 2009). From a single firm perspective, organizations should try to fulfil non-monetary obligations to avoid the depreciation of its IAs (Garcia-Parra *et al.*, 2009). In order to minimize the negative impacts of ILs, organizations should react in quick and efficient ways by using IAs to decrease the IL's size and life span (Caddy, 2000). This is a crucial task since the process of value deterioration leads to negative consequences in a much faster way than when compared with the processes of value creation (Giuliani, 2015).

Giuliani (2015) argues that the time is crucial to assess the negative consequences that, from a dynamic perspective, may emerge from IC, something which has been neglected in IC research. As he puts it: "viewing IC as a process means taking into consideration its life cycle, its changes over time and thus, the time variable" (Giuliani, 2015, p. 5). IC creation/deterioration is a dynamic process that evolves over time and time, seen as in longitudinal studies, is essential to better comprehend this process. For instance, there is a lag between the investment in IC and its development (Giuliani, 2015). Although these themes are generally addressed from a firm's perspective, they may also be approached from a higher level of analysis.

### *2.2 IC beyond individual organizations*

In the last decade, many researchers have pointed out the importance of knowledge resources as a source of regional and local development, advocating the importance of studying IC beyond individual firms (Schiuma *et al.*, 2008). As Lin and Edvinsson (2011, p. 8) put it, "as intangible assets are important to private enterprise organizations, they should also be important in increasing the productivity and competitiveness of the public sector, the nation, and the region".

IC research at "macro" and "meso" levels has been gaining some importance in the past decade. Nevertheless, a lack of academic discussion about IC at these levels still subsists (Krušinskas and Bruneckienė, 2015). Most IC research at higher levels of analysis has been focused on Nations, namely, as a means to support decision making with the aim of increasing wealth (Seleim and Bontis, 2013; Labra and Sánchez, 2013). The first countries to assess their Nation Intellectual Capitals (NIC) were Sweden and Israel (Bontis, 2004). Since then, several authors have been studying IC in Nations (Lin and Edvinsson, 2011). An important contribute was given by Bontis (2004), who developed a NIC index by assessing IC in Arab countries.

Intangible factors can create competitive advantages for "meso" level settings that compete with each other (Krušinskas and Bruneckienė, 2015). Several proposals have been made, such as those of Marti (2004), who applied his IC Benchmarking system model to a city or Palacios and Galván (2006), who studied the implementation of an IC model in a

network of cities. More recently, Krušinskas and Bruneckienė (2015) presented a city's IC balance index grounded on the analysis of the biggest three Lithunian's cities. Research on "regional IC" has also improved. For instance, Schiuma *et al.* (2008) considered value creation at a region level as a consequence of its knowledge-based capital, i.e. its regional intangible resources. Other settings such as industrial districts or clusters have also been addressed in extant literature (e.g. Pöyhönen and Smedlund, 2004).

Business models are, thus, being translated to wider settings (Lin and Edvinsson, 2011), although the complexity of higher level units turns the direct transposition of those methodologies into a virtual impossibility. Most academic National IC models were inspired in IC research at the firm level and, consequently, they usually make use of the traditional dimensions such as HC, SC or RC (Labra and Sánchez, 2013; Krušinskas and Bruneckienė, 2015).

Because competitiveness of regions can be increased through the development of strong regional clusters and networking (Smedlund and Toivonen, 2007), research in IC should be developed at both these levels, especially when referring inter-organizational networks. Indeed, research regarding IC in networks has been scarce. The work of Palacios and Galván (2006) can be seen as an exception. Nevertheless, this is a field of investigation that should be further explored.

According to Pöyhönen and Smedlund (2004, p. 356) "most of new knowledge creation happens in networks, not within organizations". Indeed, networking improves the flow of information (Sporleder and Peterson, 2003), providing organizations with the knowledge that they cannot obtain in-house. On the other hand, knowledge transfer may be limited by some barriers such as causal ambiguity, inability to absorb it or other motivational factors (e.g. resistance to change, struggles for power or trust) (Nieves and Osorio, 2013).

Although since the 1980s there has been a growth in collaborative relationships, theories of organizational design continued to focus on individual firms, giving emphasis to its traditional elements such as formal authority (Gulati *et al.*, 2012). Nonetheless, there are complex organizations that should be treated differently, such as meta-organizations. Meta-organizations "comprise networks of firms or individuals not bound by authority based on employment relationships, but characterized by a system-level goal" (Gulati *et al.*, 2012, p. 573). Although this type of organization has its own collective goals, its members might not share it. In fact, each member may have its individual motivations and incentives (Gulati *et al.*, 2012). Institutions and organizations can serve the network either through the roles they elect to play in it or by providing the infrastructure or the resources to support others in performing roles within the network (Allee, 2010). These characteristics are crucial to distinguish a meta-organization from other settings. For example, Gulati *et al.* (2012) claim that multinationals or business groups should not be contemplated by the above definition of meta-organization since formal authority is applied by central actors in these settings.

It is the authors' belief that there is a fundamental gap in IC literature concerning meta-organizations. Indeed, two types of IC that can coexist at different levels of analysis in such organizations should be distinguished: the meta-organization's own CIC and each of its members' IIC. These levels may affect each other mutually, an aspect that remains virtually unexplored.

### *2.3 IC at the meta-organization level – individual IC vs collective IC*

Collective knowledge can be conceptualized as the knowledge integrated in the forms of social and organizational practice, residing in the tacit experiences and enactment of the collective (Nahapiet and Ghoshal, 1998). Most literature on IC still focus on

individual firms, considering the importance of collaboration to develop collective knowledge by putting in action employees' capabilities of quickly sharing their insights (Muntean, 2009). Although Peng *et al.* (2007) use the concept of "Collective Intellectual Capital" to address both intra-organizational and inter-organizational knowledge at a "micro" level of analysis, it can also be adapted to higher levels. For instance, Lee and Song (2010) suggest that knowledge, which can be defined as useful information or know-how needed to develop value for the whole system, can be acquired both within and between organizations. They argue that learning (as the process of knowledge acquisition and application) can help individual organizations to maximize the "system value" (e.g. a maritime logistic system) by improving their operational efficiency and service effectiveness. Therefore, by investing in their own IC, individual actors may positively contribute to the development of the CIC of a meta-organization.

Furthermore, Nielsen and Dane-Nielsen (2010) argue that IC can be assessed at different levels of analysis and at the same time, namely, at the individual, organizational and market levels. IC at an organizational level "must to some extent emerge from a process where individual level knowledge, acting as a component with structural mechanisms in the form of communication, and the environment, which is constituted by the structural properties of the organization, interact to create a higher level phenomenon" Nielsen and Dane-Nielsen (2010, p. 7). On the other hand, this immediate higher level can be considered as the environment for the actual level and inversely, higher level phenomena have downwardly causal effects on lower level processes. Collaboration can be regarded as the mechanism that develop a higher level organizational IC (Nielsen and Dane-Nielsen, 2010).

This paper suggests that such effects occur in a meta-organization, where two types of IC (the individual and the collective) can coexist and can be assessed according the level of analysis that is being used. Furthermore, the authors argue that they are interconnected. The authors suggest, however, that an increase (or decrease) of the IIC will not necessarily lead to an increase or (decrease) of the CIC, respectively. These arguments are depicted in the framework presented in Figure 1.

## 3. Methodology

This paper reports on a single case study conducted at the Seaport of Aveiro. One of the advantages of the case study methodology in business and management research relates "to the possibilities of examining and understanding unique, rare, and atypical companies and organizations as well as complex and dynamic events and processes" (Mills *et al.*, 2010, p. 95). Given that a complex reality (a meta-organization) is being explored and there is no deep comprehension about the complex phenomenon under study, the case study research method was selected. This paper seeks to provide a deep comprehension about the phenomenon of IC creation/deterioration in a specific and complex setting.

Single case study methodology is a widely accepted one. Miles *et al.* (2013, p. 31) acknowledge that "much of qualitative research examines a single case". Although multiple-case studies offer the possibility of generating theoretical constructs by observing contrasting instances, the option for a single case study is advantageous because it can allow more attention to be given to distinctive and typical characteristics of a particular context. A seaport context is a complex one were interrelations between actors are of the utmost importance to comprehend the phenomenon. Hence, the authors considered that an in-depth understanding of the context was required, and chose the single case study method because it would allow more attention to be given to the seaport's specific characteristics. The usefulness of the single case study is stressed by Dyer and Wilkins (1991), who argue that an in-depth study of a single case allows a

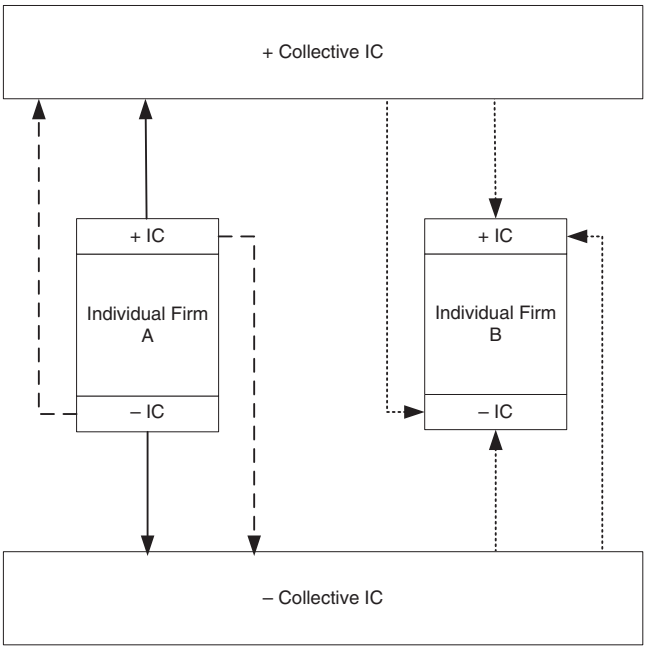


**Figure 1.** Interdependency between IIC and CIC in a meta-organization

deeper understanding of the setting under research and that the use of multiple cases to build theory may neglect important aspects of that setting.

A case study was conducted in a seaport setting because it has the necessary characteristics to differentiate it from other collective organizations (see Gulati *et al.*, 2012) and to provide evidence about the attended phenomenon, specifically: it is composed by a network of organizations with activities that may increase the value added output of the seaport (Roh *et al.*, 2007); the system level goal premise is present in this context, i.e. a seaport pursue its own collective goals (de Langen, 2004), notwithstanding the fact that each one of its members pursue their own goals; finally, and crucially, the extent of authority. Regarding authority, Marques *et al.* (2011) consider seaports as mixed-type networks where a public organization acts as a coordinator whose powers are not unbound. In "whole networks", not always coordinators have the legal power to impose actions to other network members (Marques *et al.*, 2011).

From a systems perspective, seaports can be seen as "open systems interacting with their turbulent environments and affecting from the changes in the logistics and supply chain, transport industry, and in a broader concept, the trade and manufacturing industry". They can also be conceptualized as networks of interrelated subsystems interacting with each other in order to function as a whole (Cetin and Cerit, 2010).

To attest the arguments presented in the previous sections and depicted in Figure 1, the authors made use of four episodes, entailing situations where the creation or deterioration of IC at one level (individual or collective) has positive or negative impacts at the other. These episodes were chosen according to a conceptual question, not by a concern for representativeness (Miles *et al.*, 2013).

During the collection of the data, multiple sources of evidence were used and also a chain if evidence was established. The necessary information was collected through

informal discussions and semi-structured interviews with members of the Aveiros's Port Authority (APA) and also by documentary analysis. Finally, although briefly, the direct observation method was used in order to understand the operation of a seaport. The selection of the interviewees was based on their knowledge about the seaport processes and about specific episodes and their potential contribution to this paper. Notes were taken of all discussions and interviews. The semi-structured interviews were recorded, and the most important parts were transcribed. Some were attended by the three authors of this paper. In this paper, interviewees are identified by a code number ranging from "INT1" to "INT4".

In a first stage (April 2010-January 2012) four informal discussions were held and two semi-structured interviews were conducted with INT1, which had an approximate length of 90 minutes each. The authors sought to gain a better knowledge about the seaport and its internal processes by identifying the various types of firms that compose it and understanding the relationships they establish with each other. It was also the authors' intention to gather details about events that could illustrate the aforementioned relations.

In a second stage (2012-2013) the authors focused on the chosen events in order to identify how the different actors create and deteriorate their own IC and, chiefly, to determine the impact that those actions had in other actors' IC and on the CIC. Also, the (positive or negative) impact of changes in CIC on individual firms' IC was explored. In this stage, four semi-structured interviews with INT1 were conducted. This interviewee was fundamental to the research not only due to his technical knowledge regarding maritime transportation and logistics but also due to his knowledge about several important events that occurred or were occurring in the seaport. These interviews were complemented and triangulated with a two hour semi-structured interview with INT2 in June 2012, and another two interviews (in June 2012 and February 2013) with INT3 (the first was a preliminary one lasting about 30 minutes and the second lasting two hours). The interview with INT2 was very fruitful since the interviewee had a general knowledge about all the episodes under analysis. The interviews conducted with INT3 helped to collect information regarding the technical details of the Seaport of Aveiro's IT system, and also about the whole developments and main events that occurred since its beginning. Finally, an informal discussion was held with INT4, who not only described how the APA's environmental system works, but also provided important insights about its impact on the port community. This discussion took about 75 minutes.

In 2014, two complementary semi-structured interviews were conducted with INT1 and INT3 in order to better precise some information regarding two illustrations that will be depicted below: "The Strikes" and "The IT system". These interviews had a length of 30 minutes each.

Documentary analysis was also made and it was crucial in this research. Documents included e-mails, faxes, contracts and internal memos concerning relationships between the port authority and other members of the seaport, and also between members themselves. A deep analysis regarding the APA's strategic plan and its environmental management system (EMS) was also conducted. All those documents were available when requested due to the fact that the Port Authority is a public and state owned organization. Furthermore, several other documents were collected from external sources, such as sustainability reports or annual reports and accounts. The high media coverage regarding the problem of the strikes occurring in the seaport (as it is illustrated bellow), provided significant records such as interviews held to the

press by different actors. Regarding the data analysis, the authors followed the five stages of analysis suggested by Yin (2011): compiling, disassembling and reassembling data, and then interpreting and concluding.

## 4. The case study

The Seaport of Aveiro is a multi-functional Portuguese seaport with an important role in serving the industrial sector in Central and North of Portugal, as well as in Central Spain. Within the Seaport of Aveiro, several private actors develop their activities along with public ones, such as the Port Authority. The seaport is administered by APA, a corporation with exclusively public capitals. In this paper, APA is considered as the one entity that "represents" the collective.

### *4.1 The new business unit*

Within the Seaport of Aveiro there is an organization (an operator) that belongs to a big Portuguese corporation, providing services of cargo handling, warehousing, distribution and logistics. Having already been granted (in 2001) with the concession of the Aveiro South Terminal, this operator was in 2008 granted with the use of a space in the Dry Bulk Terminal of the Seaport. This involved a considerable investment, including the creation of a new business unit and a new brand. This new business unit (an agribulk terminal) started its commercial operations in August 2008. Along with the (major) investment in tangible assets, this project led to an increase of the operator's IC through several different ways. For example, the concession of the space and the creation and licensing of the new brand are by definition investments in structural capital. They also developed certified internal procedures regarding quality management and food safety management system, respectively, which is one more example of IC development.

This investment in a new brand not only created awareness of the new service provided by the operator, thus developing relational IC for the operator, but also increased the reputation of the whole seaport. According to INT1:

> The Seaport's image clearly was reinforced. It is a new variable in terms of value proposition for our clients. We didn't have any facilities with those characteristics. Also, by making such a huge investment, the operator gave a proof of confidence in the Seaport, which is a positive signal for the Seaports' reputation […]. When they sell themselves [the new brand] to their clients, they also sell the Seaport.

This means that there was an improvement of CIC as a consequence of the increase in the operator's IIC. On the other hand, by including the operator in its promotion actions, the seaport was developing not only its CIC, but also the operator's IIC. The same INT1 added that:

> In presentations of the Seaport promoted by the Port Authority, they started to include a presentation of the operator's new brand in order to create awareness towards the Port brand.

IIC and CIC were also developed in other ways. This investment led to the creation of new procedures and new competencies for the operator. In addition, given that within a seaport, organizations are part of a larger network intended to provide a collective service to the customer, new competencies had to be developed for the whole seaport. The INT1 claimed that:

> There was [now] a new market segment that would have to be handled in a different way […] and the operator cannot act alone. For example, they had to train stevedores specifically for that unit.

However, in 2013 there were reasons to consider that the investment was also leading to a collective liability. Clients had certain expectations regarding the use of this new installation and these expectations were somewhat unfulfilled. Indeed, the INT1 argued that:

> The project was expected to have a much higher market share than the one we are experiencing. Customers had expectations that the project would be very successful. [But the lack of success means that] the reverse happens. The initial proof of trust also becomes a proof of distrust.

*4.2 The strikes*

Dockers pools are organizations responsible for managing ports' workforce. In the Seaport of Aveiro, the Dockers Pool is a legal association which employs most of the stevedores' work force. This association includes port operators and the stevedores' Union (henceforth, the "Union"). When port operators need to perform any operation, they contract stevedores, paying their hourly fees. The Union aims to protect the stevedores' interests.

Conflicts between port operators and the Union are relatively frequent in the Seaport of Aveiro. In 2009 a major conflict has arisen. Dockers Pool's costs surpassed their revenues, and in order to solve this situation, its management proposed a decrease in the stevedores' wages, but the Union was against this solution. After several meetings between the Dockers Pool, the National Regulator and the Port Authority, no agreement was reached and the Union went on strike. As a consequence the seaport closed for three weeks.

In 2011 another conflict led to another strike. In the first week of December 2011, the Dockers Pool declared its insolvency, affecting more than 60 seaport workers. The problems were similar to those felt in 2009. The Union reacted by issuing a pre-warning for strike dated for the 24 and 29 December. This warning threatened to spread to other Portuguese seaports, and the presidents of the five biggest Portuguese port communities issued a joint communication were they alerted for the "situation of imminent rupture in national ports"[1]. They also alerted to the serious consequences that a paralysis of the seaports might have on the Portuguese economy.

In a comment to the Portuguese press[2], APA's president of the board considered that this strike was "unacceptable and [would] only contribute to worsen the situation of the Port". In an interview to a newspaper[3] the Vice President of the Portuguese "Confederation of Maritime and Port Unions" considered that the stop would have a serious impact on exports. He also claimed that "It will affect the deadlines and the confidence of customers who may switch to other ports causing [Portugal] to lose competitiveness".

These strikes not only resulted in financial losses for the seaport and several other entities, but also had a negative impact on the IC of the seaport, namely, regarding its image, which was the main concern for the president of the Portuguese "Institute for Ports and Maritime Transport" in an interview given to one of the most important Portuguese economic newspapers[4]. Also according to the Executive Director of the association of shipping agents "the worst is that a port that starts to have strikes loses ships and cannot persuade the ship-owners to use Portugal as a scale"[5]. Once again, the authors can infer from these statements that strikes deteriorated the seaport's relational capital. According to APA's INT2:

> [The Seaport] will take a lot of time to recover his image after all this.

The strikes also had negative consequences for the several organizations within the seaport. They were also suffering, with their own logistic procedures being affected.

Several processes had to be changed in order to respond to the contingency of not having the full workforce at disposal. According to the president of one of the biggest Portuguese transport firms "the strike is jeopardizing the deadlines" and he was absolutely certain "that many companies will lose orders"[6]. Also, perishable products were being diverted to Spanish ports. Thus, evidence collected suggested that, at an individual level, there was a deterioration of IC, namely, in terms of structural and relational capital.

*4.3 The EMS*

In September 2001, APA implemented an EMS, thus investing in IC. Given that APA's goals are linked with the seaport's goals, APA tried to change not only its own environmental culture but all the seaport culture. Indeed, APA has made several commitments in its environmental management manuals in order to sensitize and involve the port community in adopting good environmental management practices. This means that APA also had a collective goal, i.e. to increase the IC of the whole seaport. This EMS should thus be regarded as an investment in structural capital not only for APA, but at the same time for the collective, aiming to create value for the whole seaport. Thus, the EMS is also considered as an investment in "structural capital" for the whole seaport: this action increased the CIC.

The EMS was extended to the whole seaport through the use of internal audits. Also, since 2005, APA has made annual environmental surveys of the whole port community. According to INT4, the main goal is to detect non-conformities regarding environmental issues. After these are analysed, corrective and preventive actions are defined and then communicated to the organizations. APA cannot impose rules: they can only issue recommendations.

The documentary analysis provided several examples of non-conformities, such as vestiges of burnings, oil drums or even spills of cereals into the Aveiro estuary. APA's actions were to communicate these facts to the intervening firms, trying to sensitize them to take appropriate measures. In addition, several complaints about pollution were found, due to the fact that some organizations were following bad procedures regarding environmental issues. A serious case referred to a company that was polluting the air with dust that resulted from the movement of their cargos (cement). Their procedures in terms of environmental safety were not appropriate. Consequently, the Port Authority received several complaints from the population living near the seaport and acted by sending a letter to this company asking for measures to minimize the pollution. The INT1 told that in this case:

> APA was perceived as representing the whole Seaport.

These examples help to illustrate how bad procedures that can be perceived as individual ILs were leading to a collective liability (by deteriorating the relational capital of the seaport).

Although APA cannot intervene in each organization's environmental procedures, most seaport's organizations usually tried to solve the non-conformities detected. The INT4 considered that the survey itself:

> Created some awareness about environmental issues in many of the targeted organizations.

The internal audits to the port community and the subsequent communication of non-conformities developed an environmental concern on those audited. Thus, APA has the perception that organizations within the seaport are committed with the

improvement of their environmental procedures. This study suggests that the EMS resulted in an increase of several audited firms' IC, namely, by promoting the development of an environmental orientation within those firms. Furthermore, as a consequence of the implementation of the EMS, APA has been making several investments in training, thus developing new competencies for those organizations, and consequently their own IC. Numerous environmental training courses were offered in APA, additional training was given to some agents from stevedoring companies and simulations in firefighting and combating oil pollution involving different actors were made. These are all examples of how individual capacities and thus IIC were created through the implementation of an EMS aimed to develop the CIC.

### *4.4 The IT system*

In 1997, a network IT system was implemented in the Seaport of Aveiro, aiming to facilitate ship dispatch. Before that, all the procedures and relationships between the seaport's members involved the use of paper, telephone or fax, for example, with all related inconveniences, such as higher costs, leading to higher prices.

By implementing and developing the IT system in the whole seaport, APA was investing in intangibles (the software), and also in the development of new and better procedures, thus increasing the whole seaport's collective structural IC. The Port Authority wanted to change procedures in order to increase seaport performance. On the other hand, this investment allowed for the development of IIC for the involved seaport's members, due to the fact that their own processes were improved. The INT3 told that:

> They quickly understood the benefits of having new and better procedures […]. Before, all was done on paper, they had to deliver those papers in a certain place, they had to use phone or fax […] and a number of these operations (travel, phone calls, […] was not necessary anymore […] and quickly they realized that there was much to gain.

Along time, this system has known several improvements, which meant a reduction in physical documents exchanged between entities. At stake is the creation of CIC in the form of IAs.

However, not all investments in the IT system software were successful. When the seaport upgraded the software for the windows version, thus investing once again in collective IC, the results were not the expected ones. Due to the interface of the software, communication between the organizations worsened. Thus, organizations could not do their work remotely as they were used to. Consequently, although there was an investment in collective IC, an individual IL emerged for several actors due to the fact that they had to follow the newly implemented procedures, which diminished performance, and they could not do anything to change it. According to the INT3:

> The organizations would rather prefer to return to the previous system, the use of paper, because it was impossible to work in those conditions […]. In this period of time we [APA] received a lot of complaints.

As a result of this, APA had to work on a new solution that involved the creation of an intranet where most members could participate (due to their physical proximity) and on which they could exchange information at the speed they were used to.

In October 2005, the system's technological platforms were updated and new functions were introduced, allowing for the planning of operations and the electronic exchange of data (operational information) in a web environment. It also allowed for the alignment of processes, information exchange and also the creation of collective goals.

Several public authorities could thus exchange data between them. These new procedures were also a consequence of a project developed by the Portuguese ports' association with external consultants, which aimed to simplify, normalize and harmonize all the Portuguese ports' procedures. One of the main procedures that the Seaport of Aveiro intended to implement in its IT system software was one involving Customs – the electronic cargo manifest – one which is related to cargo control.

With the electronic manifest, which had to be electronically approved by Customs, APA and other Portuguese port authorities intended to implement an electronic procedure aimed to decrease bureaucracy, specifically the number of documents that were exchanged in the circuit and also the average time of cargo manifest approval.

The main problem was that in 2005 Seaport of Aveiro's Customs had their own procedures implemented (most of them part of their own IT system) and they preferred to continue using them, developing a resistance to change regarding cargo dispatch. According to the APA's INT3:

> Customs evolved in a different way […] they did not want to leave the stamps and the embossed presses, and thus developed their IT systems in parallel with the Port management systems until the moment it was absolutely necessary.

APA's INT2 claimed that:

> Besides breaking with procedures, there was a risk of loss of reliability of this new computer system regarding what they [Customs] intended.

The Customs considered that a full integration between the two separate systems would bring safety risks and that the new procedures might destroy value for them. Consequently, they perceived that electronic cargo manifest would translate itself into an IL. This impasse lasted for several years. Customs had their own procedures, their own culture and also APA could not impose the IT system to them as, like APA, they are a public authority.

The point here is that what was (by then) an IA for the Customs – its own procedures – led to an IL for the collective in several ways: on the one hand there was an investment that was not fully exploited. On the other hand, there was a negative impact on the development of a collective culture: the entire port community was being joined around a single system and a key member was not aligned. Also, according to the INT3:

> The Seaport as a whole was being negatively affected because [without the Custom's resistance] procedures could be more expedited and the Seaport more efficient.

However, throughout the process, what started to be seen by Customs as an IL ended up by being considered as a potential IA. This was due to APA's actions. The INT1 commented that:

> The Customs changed from a position of resistance to a position of collaboration and acceptance of the system […] why? It came a time where [the Customs] understood that [JUP] was a good system and that it would help them in its own work.

When Customs abdicated of some of their old procedures, the seaport as whole started to benefit of a more complete and integrated system that could allow it to provide a better service to the end client and thus the collective IC increased.

## 5. Results and discussion

The case study allowed to illustrate how IC is created and deteriorated at both individual and meta-organizational levels of analysis. On the one hand, the

relationships between the meta-organization's members are crucial for transmitting the knowledge that is embedded in their core competencies and core capabilities (Marti, 2004; Sporleder and Peterson, 2003). Knowledge transfer is a consequence of collaboration and communication and seaports have specific characteristics that encourage these. The "new business unit" illustration provides evidence of how a member of the seaport, by investing in its own IIC (a new brand or new procedures), enhances other organizations' IIC (new and better competencies). This is in line with Lee and Song (2010), who claim that maritime operators' behaviours can affect other actors' strategic decisions by being part of a cooperative network in the same business. To produce collective knowledge in a meta-organization (and consequently CIC), it is critical the way firms work together, how their tasks interrelate and how their knowledge is integrated in order to create value and competitive advantage for the meta-organization (Kianto, 2007). On the other hand, the case study provides strong evidence regarding the interconnectedness between the meta-organization's and its members' IC. For instance, "The new business unit" illustrates how the seaport's CIC (specifically its reputation) increased as a consequence of one of its members' investment in a new brand (i.e. in IIC). It also illustrates how APA, by creating CIC (namely, relational capital), increased the operator's IIC. This IC micro-meso link is supported by Nielsen and Dane-Nielsen (2010), who argue that collaboration between entities can be seen as the means to transform knowledge into emergent proprieties at a higher level of analysis and also that higher level phenomena may have downwardly causal effects on lower level processes.

The interconnection between ICs at different levels of analysis is also portrayed in "the strikes" illustration, although with a different (and negative) collective outcome. CIC decreased as a consequence of the actions of a particular actor – the Union. By defending their associates' interests, the Union was itself increasing its reputation towards its main stakeholders – the stevedores – thus developing its own IIC. However, as time went by, financial and intangible negative consequences arose for both individual members and for the meta-organization as a whole.

The case study also captures the importance of assessing IC in a longitudinal stance. Time is crucial to comprehend changes in IC (Giuliani, 2015). This is portrayed in the "new business unit" illustration, which provides evidence of both IC creation and deterioration over time. On the one hand, iterative collaborative processes between the seaport and the port operator eventually led to an improved IIC and CIC. On the other hand, there is also evidence that, from a dynamic perspective, negative consequences may also emerge from IC (Giuliani, 2015). Although CIC grew due to this collaboration, a collective liability emerged over time as a consequence of the individual investment. Garcia-Parra *et al.*'s (2009) definition of IL neatly fits this "meta-organizational" approach: the non-fulfilment (by the seaport) of non-monetary obligations (the seaport's clients expected a much higher service level due to the dimension of the project) negatively impacted the meta-organization's relationship with its customers. "The strikes" illustration also captured this phenomenon. The actions of the Union eventually brought about negative impacts for itself. Its reputation decreased at the eyes of several actors, and its IIC suffered. Initially the Union pursued its own interests at the expense of CIC, but over time this fact had negative consequences for that member. INT1 agrees with this rational, by stating that:

> Today [2013], my opinion is that [the strike] destroyed [IC for the Union], but if we had this meeting at the time [2011], probably [its IC] was increasing.

Both this "temporal" perspective of IC and the micro-meso link proposed by Nielsen and Dane-Nielsen (2010) are present in the "EMS" illustration. This illustration depicts how individual ILs gave place to IAs and how individual firms saw its IC raising as a consequence of an increase in the CIC. In a dynamic and longitudinal perspective, individual ILs (bad procedures) were leading to collective ILs (seaport's bad environmental reputation). These collective ILs were then mitigated by the seaport (represented by the APA) through the creation of a Collective Intellectual Asset – the EMS: organizations' IIC increased through the development of new and better environmental procedures (in response to the annual auditing) and also through the development of new competencies as a result of collective training. Over time, the seaport's CIC (namely, its environmental reputation) increased as result of the development of a collective environmental consciousness.

Finally, the "IT system" illustration addresses the issue that although collaboration is crucial to develop IC through knowledge transfer, it is not always easy to attain. Although knowledge transfer is important to develop innovative capacities (Nieves and Osorio, 2013), the resistance of the Customs to adopt a new procedure – the electronic cargo manifest – can be seen as a resistance to change, which is a source of limiting an actor's capacity of absorbing knowledge (Nieves and Osorio, 2013). This illustration also leads to a conclusion similar to previous ones: the relationship between IIC and CIC is dynamic.

The results of the case study allowed to reflect upon IC at the meta-organizational level. A meta-organization's CIC appears as a function of both individual and collective IC dimensions: the three traditional IC dimensions (human, structural and relational) when referring to the individual organizations that form the meta-organization and two collective dimensions, which are labelled "Collective Structural Capital (CSC)" and "Collective Relational Capital (CRC)". Because the meta-organization is seen as an organization *per se*, both these concepts were adapted from the ones applied at a "micro" level. On the one hand, CSC includes systems, (inter-organizational) networks, culture and values, and elements of intellectual property, pertaining to the meta-organization. On the other hand CRC refers to the relationships between the meta-organization and its stakeholders. Although acknowledging the importance of the human capital in this context, the authors do not contemplate the existence of a "collective human capital". Instead, it is suggested that the human capital "belongs" to the very interdependent individual firms that compose the meta-organization's network.

In a meta-organization, collaboration (or non-collaboration) may occur at two different levels: between the meta-organization and is actors and also between the networks' actors. Although acknowledging that the meta-organization' CSC can encompass the relationships between the meta-organization and its members, this paper proposes that the meta-organization's CRC should be further divided into two dimensions: one regarding the relationships between the meta-organization and its external actors (e.g. the population) and the other between the meta-organization and its internal actors. The authors call them "Collective External Relational Capital" and "Collective Internal Relational Capital", respectively. An individual member's IIC is a function of its human, structural and relational capital, as well as the above collective dimensions. A framework, in which these dimensions and effects are articulated, is presented in Figure 2.

It was found that the above individual and collective dimensions are strongly interrelated, which means that members' investment in the individual dimensions of IC may have a positive (or negative) effect on the meta-organization's CIC. On the other hand, "collective" investments may also have different impacts on members' IIC. It was found that the creation or deterioration of IC by an individual member may lead to the development or the deterioration of the collective IC, and that the relationship between

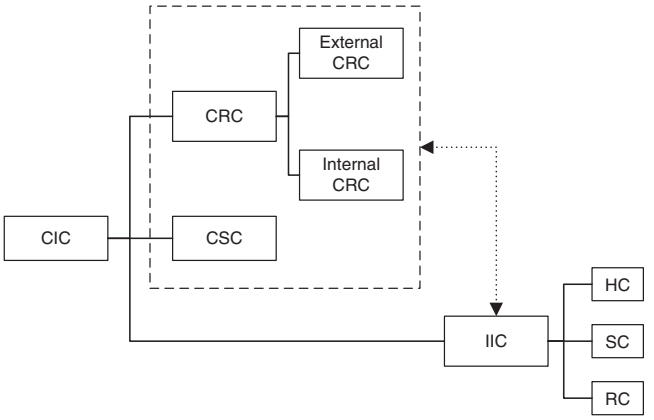


**Figure 2.**
IC creation and deterioration in a meta-organization

both levels may be less straightforward. First, the creation of IC by individual organizations may lead to the emergence of a CIL. Second, increases or decreases of CIC may have distinct impacts at the individual level. This reinforces the authors' claim that the concept of IL can also be seen from a "meso" or macro-level perspective.

## 6. Conclusions

This paper addresses an important gap in IC literature: the processes of IC creation and deterioration in meta-organizations and, specifically, the relationship between IC at a "micro" and "meso" levels of analysis. Its objective has been also to comprehend those relationships from a longitudinal perspective. A case study conducted in the Portuguese Seaport of Aveiro provided a set of illustrations depicting the interdependencies between a meta-organization and its members, which allowed to better comprehend the importance of assessing IC at both these levels. The paper suggests that in such settings two types of IC must be distinguished: the CIC pertaining to the meta-organization and the IIC of its members. It is also argued that the traditional models on which most "macro" and "meso" IC models are built from, do not fit in this type of setting which can be seen as an organization *per se*.

In a more dynamic stance, results suggest that relationships between IIC and CIC develop and evolve throughout time. There are situations whereby IC may be created or even deteriorated at both individual and collective levels of analysis in an interdependent way as time goes by. In the "strikes" illustration, for instance, evidence gathered suggest that individual organizations may try to increase their own IC at the expense of the collective, but it may well be the case that this results in an individual liability for those organizations. A *contrario*, there may be instances of organizations incurring in intellectual liabilities when they prioritize collective interests, but in the medium and long term the increase in CIC may translate into individual assets for the same organizations.

In general, this paper contributes to the literature by showing that although a meta-organization is composed by individual organizations, there are CIC dimensions that go beyond the individual ones. Hence, the IC of a meta-organization is different from the sum of the ICs of the individual organizations composing it. Also, although both IIC and CIC may be assessed separately, one has to be aware of the interrelationship between the "individual" and "collective" IC dimensions. These arguments are not entirely in line with those of Nielsen and Dane-Nielsen (2010), who suggest that the CIC is greater than

the sum of individual knowledge. This may be true in some situations. However, there may be cases in which increases of the IIC will not necessarily lead to an increase of the CIC. CIL may emerge from individual organizations' investment in their own IC. In such circumstances, the CIC may become smaller than the sum of IIC. Despite the validity of the interpretations provided in the context of the case study, generalization to other situations should only be conducted in a theoretically framed manner.

In this paper, a seaport is conceptualized as a meta-organization, which has a coordinator – usually in the form of a port authority – that strives to ensure the attainment of collective goals, but characterized by the lack of a formal authority towards several members (within a port, both private and public organizations coexist). From a managerial perspective this coordinator is likely to bear in mind the above relationships to perform its role with the objective of increasing CIC. Future literature should seek to develop even further the "managerial" implications, coordinator's view, of the problem of IC in a meta-organization. IIC and CIC can be created not only by direct investments in intangibles but also by cooperation or even competition between actors. Liabilities may even emerge as a consequence of different relationships between those actors. Therefore, future research could focus on the impact that different types of relationships may have upon the creation and deterioration of IC within this type of organization. Specifically, IC literature should address the impact that power balance/imbalance between organizations may have upon the CIC, namely, in the case of a meta-organization, where its coordinator may not be able to make use of a more "coercive" type of power. Thus, future research could be focused on the mechanisms network coordinators can use in order to create CIC – not only directly, but also indirectly, as a result of more or less collaborative (or even conflicting) relationships established throughout the network. Further research should also explore how investments in tangible assets may lead to both individual and collective IA and/or liabilities (e.g. the creation of a new terminal on a seaport). Finally, it would be important to replicate this study in similar contexts with similar characteristics, namely, the possibility of distinguish the whole's CIC from individual members' IIC and the coexistence of public and private actors possessing different levels of power.

## Notes

1. Diário Económico, 15 December 2011.
2. Ionline, 24 December 2011.
3. Dinheirovivo, 9 January 2012.
4. Jornal de Negócios, 2 October 2012.
5. Ionline, 10 January 2012.
6. Jornal de Negócios, 2 October 2012.

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