

Human Capital-Intensive Firms and 4PLs: A Specific Partnership

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The aim of this paper is to analyse and frame the way in which the boundaries of human capital-intensive firms (HCIFs) are changing as a consequence of the growing importance of fourth-party logistics (4PLs). The specific relationship between these two types of modern firms is representative of the transformation of inter-firm coordination and sheds light on the resulting expansion of the boundaries of the firm. Based on the modern theory of the firm, we show that the traditional legal-contractual approaches are inadequate for investigating the strong and complex links between an HCIF and a 4PL contrary to the “new” economic-strategic approaches of the firm. The restrictive legal vision of the firm they support needs to be transcended by functional and productive recent analyses that we summarise in four propositions. Thus, the service supply chain relationship that we study is useful in laying the foundations of a broader framework on the boundaries of the firm.

Keywords: human capital-intensive firms (HCIFs), boundaries of the firm, fourth party logistics (4PLs), inter-firm relationships, service supply chain

JEL classification: L2, L9, R4

Received June 17, 2014, revised December 5, 2015, accepted February 15, 2016.

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1 Introduction

Since the 1990s, the industrial landscape has changed as the result of three combined trends: (i) a vast movement of vertical disintegration which has developed new forms of production (Brusoni *et al.*, 2001; Langlois, 2003), (ii) the growing importance of human capital-intensive firms whose productive activity is based on key skills and talents rather than physical capital (Fulghieri and Sevilir, 2009; Burton-Jones and Spender, 2011), and (iii) the recent boom in logistics service providers (LSPs), particularly the latest generation known as fourth-party logistics providers (4PLs) (Fulconis *et al.*, 2005, 2006; Filser and Paché, 2008).

First of all, vertical disintegration can be observed in the outsourcing of certain stages of the production and distribution process and the increasing use of subcontracting, partnerships and consultants. In this context of growing modularity, greater specialisation is required and the role of the firm and the division of labour are changing (Baldwin and Clark, 2000; Schilling, 2000). “The boundaries of the firms become increasingly blurred as firms seek to deal with the increased pace of market and technological developments. These developments have led firms to focus on core activities and to outsource non-core activities. Outsourcing and vertical disintegration, however, has increased firms’ dependency on inter-firm relations” (Thrane and Hald, 2006).

Secondly, human capital-intensive firms (HCIFs) are identified as small and large innovative modern firms operating in both knowledge-intensive service sectors and high-tech manufacturing industries whose results in terms of the growth of production and/or turnover are better than those of other types of firms (Amil *et al.*, 2007). They can be easily detected in the French and European statistical classification of economic activities.¹ They refer both to consulting firms, advertising agencies and large pharmaceutical or automobile companies, since their

¹Of particular concern are specialised and scientific activities like consultancy, engineering, research and development or even advertising (see 69.10 to 74.90 in the French classification of activities NAF rev. 2). Many strongly specialised industrial firms are also viewed as HCIFs because they have a high propensity to innovate. The chemical industry (20.11 to 20.60), pharmaceutical industry (21.10; 21.20), computer, electronic and optical products manufacturing (26.10 to 26.80), the car industry (29.10; 29.20; 29.31; 29.32) and even aircraft and spatial manufacturing (30.30) are over-representative of this type of firm.

activity is first of all based on the abilities, expertise and other know-how of the employed or independent workers which have a specific relationship with them and take part in the division of work (Foss, 2011). HCIFs are built on resources that are, by nature, intangible, inalienable and difficult to reproduce instantaneously. In other words, they are built on specific human capital which is defined as the skills, knowledge and competencies that produce value only within the firm in which it has been accumulated (Becker, 1964), and which is of limited use outside the relationship in which it has been developed (Williamson *et al.*, 1975; Klein *et al.*, 1978).

Thirdly, a 4PL can be viewed as a supply chain integrator² that assembles and manages the resources, capabilities, and technology of its organisation with those of complementary service providers to deliver a comprehensive supply chain solution (Bade and Mueller, 1999; Bumstead and Cannons, 2002). 4PL firms are non-asset-based in terms of specific physical assets (Win, 2008). Like HCIFs, they are modern firms based on very specific human capital. 4PLs develop more intense links with HCIFs than with other conventional business firms. Along the same lines, these links are stronger and more complex than those that connect HCIFs with other forms of LSPs: the dematerialized service provided by the 4PL is critical for its client. For example, compared to a 3PL, a pure 4PL is the only LSP to own neutrality. Thus, the 4PL has the freedom to propose independent solutions and enter into long-term outside partnership relationships.

HCIFs and 4PLs have developed a multifaceted partnership as far as outsourcing logistics is concerned. Logistics, which has become a key function in HCIFs' activity, is often now entrusted entirely to 4PLs. In other words, HCIFs coordinate these specialised outside partners who themselves manage the supply chain, i.e., the sequential flow of activities with interdependent components. However, the dependency³ relationship between HCIFs and 4PLs is rarely

²A 4PL is summed up as a "proactive facilitator supporting and encouraging the exploitation of a relationship between the core players in the supply chain" (Boughton, 2007, p. 28), which Cabdoi (2003) calls "a Superprovider" that is able to be a true partner, taking on a more strategic role whilst sharing the risk and rewards. Christopher and Towill (2001) analyze a 4PL as a "pipeline integrator".

³According to Levy Mangin *et al.* (2007), in considering a relationship between two parts A and B, the more that A takes into account B's objectives, the more that B depends on A. Consequently, dependency is a function of resources invested by A and these resources are necessary for B to achieve its objectives.

mentioned in the economic literature while it raises the central issue of the boundaries of the firm.

The aim of this paper is twofold: (1) to analyse the role of 4PLs in the changing boundaries of HCIFs, and (2) to suggest lines challenging the legal vision of the boundaries of the firm using a service supply chain relationship perspective. The article is organised as follows. The second section describes the evolution of logistics and especially the shift from LSPs to 4PLs in managing the supply chain. The third section shows how the relationships between HCIFs and 4PLs are so complex that they extend the coordination role of HCIFs and blur their boundaries. The fourth section explains how traditional approaches to the firm are inadequate for understanding these organisational changes. We show that “new” theories of the firm are advocated by suggesting a synthesis of their key elements coupled with some propositions. The last section concludes with the important results of the study, emphasizes its main limitations that should be relaxed and suggests further lines of research that could be explored to more deeply understand the partnership between HCIFs and 4PLs.

2 The Role of 4PLs in the Changing Boundaries of HCIFs

Three categories of LSPs can be distinguished according to the complexity of the services supplied (Delfmann *et al.*, 2002; Filser and Paché, 2008): the most traditional firms simply carry out physical operations of transport (they are called 2PL providers); valued-added service providers also manage operations of an industrial, commercial, administrative or information-based nature (3PL providers); and then there are the non-asset-based LSPs (4PL providers) (Wong and Karia, 2010). A 4PL is different from other LSPs in that it has few or no tangible assets (O’Reilly, 2011): it has no trucks, warehouses or other physical equipment. Besides, a 4PL pursues three main missions (see Table 1).

Thus, by turning to 4PLs, firms cut their costs and transfer some of the risk onto these partners, who become contractually liable for the quality supplied, the meeting of deadlines, etc. Through these activities of intermediation, 4PLs are therefore capable of making these partners interdependent around norms that they

generate and control. Consequently, the value created by 4PLs depends on their ability to quickly and frequently combine resources and skills, i.e., human and technological capital, both in-house and outside in their partnership with the HCIF-client. Clasquin is an illustrative example of a 4PL. It is a pure player defined as a firm responsible for designing, organising and coordinating the supply, information and regulation chain in order to allow a customer to transport goods from the point of departure to the point of arrival. Clasquin offers global logistics solutions “tailored” to the constraints related to the types of transported goods, the specificities of the geographical territories concerned, and the requirements of customers. Clasquin provides a total solution package with a single contact partner, the design of tailored solutions and the management of the entire overseas flow (from pickup to delivery), the optimization of costs and deliveries, and a real-time traceability. Under these conditions and this illustration, we show that the global supply chain management relationship is representative of the current trend towards vertical disintegration, particularly in HCIFs.

Table 1: 4PLs’ Main Missions

1 st mission	Be a logistics consultant providing an engineering service.
2 nd mission	Be a coordinator of the firm’s network of different partners (suppliers, distributors, customers, 2PL, 3PL, etc.). Thus, a 4PL is a “partial” or “complete” substitute for the firm.
3 rd mission	Be a creator of value, on the one hand, for their clients through their ability to select and coordinate a pool of resources from other factions (one or multiple 3PLs), and on the other hand, for themselves by combining the value to their own resources.

Very few works have studied the multifaceted partnership between HCIFs and 4PLs, despite their importance for the development of modern HCIFs.⁴ Nevertheless, it is possible to draw on a recent strand of the literature that attempts to bridge the gap between the economics of the firm and strategic research through an analysis of knowledge in organizations. Developed around the reflexions of a central author, Luis Garicano, the contributions are built on the task-based approach and focus on how to coordinate specialisation according to the complexity of the tasks to be

⁴The case of the Korean conglomerate Samsung is emblematic of this trend. The competitiveness of the conglomerate is based on its innovative capacity. In order to regularly develop new products (semiconductors, TV, mobile phones, etc.), Samsung invests approximately 5.5% of its global turnover in R&D each year. Moreover, it channels more than 38% of its total wage bill into its R&D units. The objective is to secure a return on specific programs to manage talent and promote internal mobility for key employees. Concerning cooperation, Samsung calls on Clasquin to globally manage its supply chain.

performed in a firm (Dessein *et al.*, 2010; Garicano, 2000; Fuchs and Garicano, 2010; Garicano and Hubbard, 2003; 2005; 2007; 2009; Garicano and Rossi-Hansberg, 2004; 2006a; 2006b; 2012; Garicano and Santos, 2004, Garicano and Wu, 2012).

Within this framework, the firm is analysed according to its capacity to organise the acquisition and pooling of knowledge when the problems to be solved are complex and costly. The role of the firm is to associate activities with the workers who have a relative advantage in performing them. This analysis reveals an important industrial fact: in many sectors, an increase in the variety of bodies of knowledge is needed to cope with the multiplicity and partial unpredictability of activities. It therefore accounts for the adjustments that must be made in response to changes in the division of labour. The specialisation of individuals is measured by the establishment of increasing returns to human capital in team problem-solving (Garicano, 2000; Garicano and Wu, 2012). It obliges the firm to call upon experts (in-house or external) to accomplish those tasks that remain unaddressed (because the incumbent employees' human capital is concentrated solely in one type of activity).

It is then easy to understand why a HCIF turns so much to service providers, such as 4PLs. A HCIF develops numerous and/or complex activities that increase the degree of specialisation of the individuals performing them. A HCIF calls on the services of recommended outside experts when their employees do not possess the necessary skills for solving a particular problem of an exceptional nature. In this way, the extension in specialisation and thus in the division of tasks can be done either within each firm or between different firms (Garicano and Hubbard, 2003). When the human capital of experts is indispensable to the solution of a problem, the specialisation occurs within the firm; otherwise it occurs between different specialised firms. Garicano and Santos (2004) show that the use of experts depends on the *ex ante* or *ex post* nature of the activity. When the activity takes place during the realisation of a transaction, in other words *ex post*, as is the case of the supply of traditional and value-added logistics services (as defined above), the specialisation takes place between different firms through the intermediary of a market transaction. Even if it is incomplete, the contract describes the majority of existing problems and solutions. On the other hand, when the activity takes place before the transaction, in

other words *ex ante*, as is the case of the supply of dematerialized logistics services - including 4PLs -, the specialisation occurs within the firm, with the help of experts who intervene over the course of the process. The complexity of the task and therefore the contractual incompleteness are such that the incentives of the firm's employees are preserved and the use of experts is efficient. More precisely, it is in the employees' interest to specialise in the experts' human capital, because their gains will be higher compared to the situation where they remain specialised in one particular area (Garicano and Santos, 2004). Since the expertise essential for performing the tasks is not present within the firm, their incomes are not threatened; they are therefore not opposed to the transfer of specific problems to be dealt with by the appropriate experts. The firm then uses partnership contracts to entrust to experts those activities that it is not capable of performing.

By focusing on the Clasquin case, we observe that this 4PL is approached in order to manage air and sea transport, for its know-how as an economic approved operator in the customs, its air approvals (international air transport association), its multi-sites authorization, and its international network (of 33 offices on 4 continents). Based on this network, Clasquin can develop a real time interface all over the world to collect information on the follow-up of the goods. While the efficient IT tool it provides to its clients does not form the manufacturing core of these HCIFs, they are decisive for developing their activities.

In this context, 4PLs incorporate key inalienable resources – both human capital and a meta-technology (Garicano and Rossi-Hansberg, 2012) – essential to HCIFs. So, when experts are 4PLs, the situation is rather different and delicate because 4PLs, as non-asset-based firms, build their value creation on the capitalisation of the knowledge acquired while accomplishing their different missions. For that reason, it is not in their interests to share all their knowledge in order to retain some valuable resources. Consequently, as the HCIFs try to capture the increasing returns on 4PLs' specialised human capital, those that call on their services have to cope with an additional informational risk.

HCIFs have emerged to achieve the intensive use of the knowledge that is acquired to perform specific tasks and to integrate the dispersed knowledge that is embodied in different individuals (Garicano and Wu, 2012). HCIFs manage the specialisation of tasks and the coordination of a sequence of productive

complementarities between different experts (Gereffi *et al.*, 2005). In these circumstances, HCIFs govern the value chain by recovering the main advantages of modularity, namely, external capacities related to the accumulation of skills and experience by all those participating in the productive activity (Baldwin and Clark, 2000). Based on the Clasquin case study, we advance that the key resources of 4PLs are their team members. In this perspective, promoting individual and collective performance becomes a corporate necessity. Work experiences are valued by a steady policy of internal promotion: each employee performs his job in all its dimensions, and develops his skills and expertise. Clasquin practices a high-level international management with 30% of the supervisory staff having more than 10 years' service. From this analysis and evidence, we think that the division of labour within a network of specialised agents (key employees and 4PLs) underpins the question of the boundaries of the firm.

3 The Economic Boundaries of the Firm

The partnership between HCIFs and 4PLs is a revealing manifestation of the shifting boundaries of the firm. To grow or even to survive, firms, and in particular HCIFs, need to continuously adapt their knowledge and capabilities based on a balance between internal and external learning (Santos, 2003; Garicano and Hubbard, 2005; Fuchs and Garicano, 2010). Nevertheless, traditional contractual theories, which develop a legal vision of the firm, are ineffective in explaining this phenomenon.

The transaction cost theory (Williamson, 1975; 1985) and the new theory of property rights (Grossman and Hart, 1986; Hart and Moore, 1990) are both focused on understanding the costs and benefits of vertical integration when all the productive partners are economically dependent on the firm. These theories advance the planned coordination of agents within the legal boundaries of the firm as the only way to prevent hold-up threats. In this framework, vertical integration corresponds to the internalisation of all the residual rights of control over non-human assets (Klein *et al.*, 1978); reciprocally, vertical disintegration is embodied in the separate ownership of those assets. From this contractualist perspective, the partnership between a HCIF and a 4PL corresponds to a slack relational contracting

(Williamson, 1985): it can be viewed as an inter-firm relationship that is close to a market one.

Partners are legally independent so that the HCIF, as the ordering party, can gain the upper hand through the precious resources that it contributes to the production process. Otherwise, the 4PL also has an influence on the HCIF, which can be seen, for example, in strong contractual commitments (investments in software creation, establishing teams at customers' sites, etc.), average contract duration of three to five years, and a rent-sharing system based on optimisation and remuneration of the supplied services. Likewise, the 4PL regularly proposes more specialised innovative solutions that could not be implemented by the HCIF, except at a very high cost. In sum, both the HCIF and the 4PL need the specific resources controlled by the other partner because they are complementary within the productive process. This bilateral dependency relationship constitutes an essential source of value-added organisational innovation. For example, as a major 4PL, Clasquin has succeeded in earning the trust of large industrial actors (both small and medium-sized enterprises and big world groups) thanks to its reactivity and the quality and very strong added-value of its service logistics provision. Clasquin has developed important strategic growth opportunities – including the expertise and commitment of its teams and the power of its information system – which contribute to customer loyalty. Finally, without rejecting the legal relations affecting its nature and role in countries where the rule of law predominates (the application of laws, use of courts), we believe, like Hodgson and Knudsen (2007), that the relationship between HCIFs and external partners, in particular 4PLs, cannot be described solely in legal terms.

We advance the view that “new” approaches to the firm provide useful avenues for appreciating the profound structural reorganisations resulting from the growing influence of 4PLs. Similar to recent works, notably those on critical resource theory (Rajan and Zingales, 1998; 2001), we argue that the vision of the legal boundaries of the firm must be transcended by rethinking its two founding principles. Firstly, the traditional incomplete contracts approach provides a partial if not erroneous treatment of human capital. It supposes that human capital is only valuable when it is combined with a firm-specific physical asset. In this sense, control over non-human assets leads to control over human assets (Klein, 1988; Hart, 1989). Yet,

because it is inalienable and hard to reproduce instantaneously, no agent (neither a HCIF nor a 4PL from our point of view) can promise his residual rights of control on his human capital to others through an incomplete contract for a long period of time (Grossman and Hart, 1986; Hart and Moore, 1990). Thus, contracts on the management of human capital do not give rise to the same residual rights of control as contracts on physical capital: they give inalienable (not alienable) residual rights of control which do not refer to ownership and thus do not change the structure of the firm (Gibbons, 2005). In parallel, the traditional incomplete contracts approach rules out the possibility that a worker expropriates a part of the organisational rents. The status and central role of 4PL-experts are thus neglected, while 4PLs have a human capital that is indispensable to the HCIFs' competitiveness. Secondly, the traditional incomplete contracts approach frames a static analysis of the boundaries of the firm, in that it does not consider the temporal horizon of a service supply chain relationship. It also neglects the informal dimension of contractual arrangements, the importance of which is sustained by the prospect of future transactions based on results observed *ex post*. Yet, specific human capital includes critical resources that influence rent-sharing and value creation. Under these conditions, 4PLs, which really control resources that are decisive to the HCIFs' production process, affect both the instantaneous value allocation and continuous process of value creation in the partnership.

In line with critical resource theory, we view the firm as "a web of specific investments built around a critical resource" (Zingales, 2000). The primitive role of the firm is to manage the specialisation and accumulation of critical resources. We argue that this coordination function cannot be achieved through the centralisation of property rights. Rather, the decentralisation of access rights in relation to critical resources guarantees long-term cooperation between the partners who benefit from these rights of use (Rajan and Zingales, 1998). Access is defined as "the ability to use, or work with, a critical resource" (Zingales, 2000, p. 388): it gives residual rights of control on alienable or inalienable assets, which are dedicated to the firm. Thus, regulating access to these critical resources generates synergies between partners so that they adjust their investments so as not to jeopardise the jointly created value, and even to enhance their own value (Blair and Stout, 1999; Rajan and Zingales, 2001). Therefore, the regulation of access rights is a more flexible

mode of coordinating specialisation than the allocation of property rights: complementarities arise from a team production where each partner is decisive because of the specific human capital investments it makes and/or the specific physical capital it offers. Moreover, the regulation of access rights intervenes upstream of the legal contract specifying the terms and conditions of transactions, when the firm determines the pattern of the division of tasks (Cézanne, 2008). As a result, it is not immutably fixed but evolves according to the changing productive needs of the firm.

In these circumstances, if the structure of property rights over non-human assets defines the legal boundaries of the firm, the structure of access rights to human (and non-human) assets establishes its economic boundaries. These are determined by the limits of specialisation of the firm and its need to maximise the gains deriving from the efficient division of labour (Rajan and Zingales, 2001; Baker *et al.*, 2002). They are extended when the firm seeks access to indirect skills in addition to direct skills in the context of its productive activity (Kay, 2000; Brusoni, 2005). Consequently, the economic boundaries of the firm evolve (Brusoni *et al.*, 2001; Araujo *et al.*, 2003), and are outlined as the result of the changing division of labour (Garicano, 2000; Santos and Eisenhardt, 2005; 2009; Paché and Santos, 2010). Firms require conscious efforts of coordination at the level of knowledge and thus at the level of productive technology, even beyond their legal perimeter (Brusoni and Prencipe, 2001).

Finally, access (rather than ownership) can be viewed as a privileged modality of coordination by providing a set of equivalent but differentiated mechanisms of specialisation. More precisely, whatever the legal space in which transactions take place (intra- or inter-firm), they are always coordinated by the firm by means of integrated or disintegrated instruments of specialisation. As far as the partnership between HCIFs and 4PLs is concerned, HCIFs coordinate key human capital in the division of labour through the specialisation of incumbent employees (HCIFs use integrated instruments) and through the specialisation of outside experts, specifically 4PLs (HCIFs use disintegrated instruments). We can interpret the Samsung-Clasquin relationship in the light of this framework. On the one hand, Samsung coordinates the key productive stages through integrated instruments of specialisation: its employees are specialized in designing, developing or even distributing new

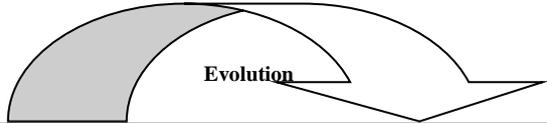
products and services. On the other hand, Samsung manages the specialisation of its service of organisation of transport through disintegrated instruments, in particular sustainable contacts with favoured competent partners, like Clasquin. Thus, the role of Samsung is to develop durable and valuable composite mechanisms to guarantee the co-specialisation of all its key workers. As a result, we see vertical integration and disintegration as distinct methods of allocating access rights to synergic and complementary resources; they are analysed as instruments for coordinating the division of labour. This original conception of vertical integration and disintegration does not challenge the distinction between employment relations and partnership relations: the labour contract and corporate contract retain their specificity with regard to the legal clauses that characterise them mainly in terms of employment law. Synthesizing the distinctive features of the analytical visions of the firm helps advance a proposal for portraying the HCIF-4PL partnership which can be discussed.

4 Synthesis, Propositions and Discussion

This study aims at modelling the successful partnership between 4PLs and HCIFs, which are two kinds of firms built on specific human resources. While this specific partnership corresponds to a disintegrated relationship which is both widespread and unique, no specific work has been developed in regard to it. On the one hand, it is a relevant manifestation of the industrial restructuring that has been in progress for nearly 25 years and, on the other hand, it focuses on “new firms” whose productive and innovative activity is essentially based on the intangible synergic and decisive resources incorporated by the members of each partner. Our analysis is all the more significant in that we highlight and discuss the HCIF-4PL partnership by changing the analytical lens from a traditional legal-contractual vision of the firm supported by logistics management to new economic-strategic visions of the firm based on organizational and functional considerations. This analytical transition (not opposition) can be explained by providing a comparative overview of the key elements of the two groups of approaches (see Table 2). This synthesis forms the basis for advancing a proposal portraying the evolving relationship between HCIFs and 4PLs. Setting up a partnership with a 4PL requires questioning the distinctive advantages and limits of the relation for HCIFs in terms of 1) the stock of specific

human capital and expertise, 2) opportunities in solving complex tasks, 3) power and its economic nature, and 4) extending the boundaries of the firm.

Table 2: The HCIF-4PL Partnership: Comparison between Traditional and New Visions



Key analytical elements	Traditional legal-contractual approach Logistics management	New economic-strategic approaches Organisational economics
Nature and objective of the partnership between HCIFs and 4PLs	Outsourcing contract to minimize transaction costs of HCIFs and to optimize the 4PLs' value creation.	Complementarities relationship to solve complex problems and create value both for HCIFs and 4PLs.
Unit of analysis	The reduction of transaction costs explains the disintegrated market exchange between HCIFs and 4PLs.	Expertise acquisition within an extended division of work explains the integrated relationship between HCIFs and 4PLs.
Production teams	The productive teams of the two organizations are totally separated and do not work together.	The HCIFs' productive teams are mixed, i.e., made up of in-house experts and external 4PLs-experts.
HCIFs' role	Legal role: preventing hold-up threats from 4PLs by ensuring incentives alignment.	Organizational role: managing the specialization of complementary resources along a sequence of productive activities.
Boundaries of HCIFs	Legal boundaries based on the centralised structure of property rights on physical assets.	Economic boundaries based on the decentralisation of access rights on critical (non human and human) resources.
Power relationship	Unilateral dependency relationship dominated by HCIFs that possess the legal power.	Bilateral (mutual) dependency relationship where each part has a balanced functional-economic power.
Forms of coordination	Spontaneous transactions between HCIFs and 4PLs coordinated by the market price system.	Planned acquisition of synergic human assets coordinated by HCIFs.

Four propositions

Proposition 1. *Setting up a partnership with a 4PL greatly increases the HCIF's stock of specific human capital and hence its specific expertise.*

A HCIF increases its stock of specific human capital by managing the specialisation of experts that perform along an extended division of labour. By combining its own specific human capital and the complementary immaterial assets granted by a 4PL, the HCIF creates more value for the two partners. The synergies between the critical human capital of the HCIF and the 4PL favour co-specialisation which consists of working together (condition of strong complementarity) within a specific relationship (condition of low mobility) (Teece, 1986). It also supports the optimisation of value creation since the value created by the combination of critical resources is greater than the sum of the values created by the two resources taken separately (Milgrom and Roberts, 1990). Based on this perspective, the HCIF calls on mixed production teams – made up of their employees-experts and 4PL-experts – to be competitive. In sum, we can say that the 4PL's specific human capital can be a solution to complex problems that the HCIF is no longer able to solve alone. Naturally, a medium-term win-win agreement has to be concluded between the HCIF and the 4PL. This contract would ensure the sustainability and mutual enrichment of the partnership while resolving residual misunderstandings and tensions between in-house and external workers. The more comprehensive the agreement is, the less likely potential conflicts are to occur or develop.

Proposition 2. *Setting up a partnership with a 4PL develops the HCIF's opportunities to easily solve its complex tasks.*

As logistics activities have become more and more complex, HCIFs need support in large part to better coordinate their operations, to handle quantitative fluctuations and even to improve the quality of the supplied services. Yet, 4PLs incorporate inalienable resources (human capital, technology...) that are critical to performing these productive activities. The partnership between a HCIF and a 4PL is organized as a planned acquisition of synergic human assets, which are dedicated to the functioning and competitiveness of the HCIF. The HCIF manages complex tasks with the help of employees-experts and 4PL-experts. The HCIF and the 4PL are legally independent, but necessarily economically dependent: each part needs the

other part, firstly to have access to the critical resources it controls, and secondly to collectively create more value in the long term. Value creation can take the form of different distinguishing indicators like knowledge, innovations, etc.

Proposition 3. Setting up a partnership with a 4PL changes the nature of the power wielded by the HCIF.

The power relationship between a HCIF and a 4PL is dominated by the HCIF because it legally owns the alienable residual rights of control. However, as soon as the 4PL is functionally decisive for the HCIF, a mutual dependency relationship develops (rather than a unilateral legal dependency relationship). On the one hand, the HCIF, which is the coordinator, can exploit the power it holds as owner of the non-human assets and employer of key human assets and, on the other hand, the 4PL controls resources fundamental for the productive activity of the HCIF. The power relationship between the HCIF and the 4PL must be viewed in economic terms; it represents a balance of real power between the two partners. Because each one is conscious of the fact that it depends on the synergic critical resources provided by the other, the ultimate role of the HCIF is to coordinate the specialisation of all the experts according to the complexity of the tasks to be performed. The specialisation occurs within the HCIF, and with the help of employees-experts and 4PL-experts, because the HCIF functionally depends on mixed teams of experts, the division of labour is extended. However, it should not be overlooked that the embedded relationship between the HCIF and the 4PL entails a number of costs notably in reference to the coordination, the implicit contract, the inalienable nature of human capital, and the open access to human capital. As the positive effects of the partnership exceed its costs, HCIFs are encouraged to outsource their global supply chain management to 4PLs.

Proposition 4. Setting up a partnership with a 4PL extends the boundaries of the HCIF.

In the HCIF-4PL partnership, the major role of the HCIF consists of defining and coordinating expert teams. As for the 4PL, it searches to make specific investments and to accumulate knowledge and competencies so that it makes itself indispensable to the HCIF and enhances its outside value. From this perspective, the

regulation of access rights in relation to critical resources is a privileged method to promote specific investments in human capital. In the service supply chain relationship, it consists of fragmenting inalienable rights of control on complementary expert skills within an enlarged production team. Via the regulation of access, the boundaries of the HCIF should be defined as economic ones and evolve according to the coordinated specialized partners. The economic boundaries of the HCIF are extended according to the area of expertise required. Thus, they depend both on the sphere of organizational influence and on the set of key resources that the organization should control. However, it is legitimate to question the sustainability of the economic boundaries of the firm. For instance, in situations where the partnership becomes a costly solution, the HCIF can decide to re-internalize the services provided by 4PLs. Yet, this vertical integration requires long-term investments and the mobility of in-house workers, which are not necessarily profitable. This alternative solution is thus especially risky. HCIFs often prefer renegotiating their arrangements or even changing their 4PL partner.

5 Conclusion and Research Perspectives

This paper has studied the specific and multifaceted partnership between HCIFs and 4PLs and its consequences in terms of understanding and analysing the boundaries of the firm. We have argued that traditional legal-contractual visions of the firm supported by logistics management need to be transcended by “new” economic-strategic approaches that are based on functional-productive arguments. In fact, by defining the firm as a unified structure of legal property rights, the earlier approaches cannot take into account the growing importance of both specific human capital and logistics for the competitiveness of firms and in particular HCIFs. As a result, we have shown that the firm can be seen as a dismembered structure of access rights to critical resources. From this perspective, the economic boundaries of the firm evolve according to the specialised activities it coordinates. This new understanding of the role and boundaries of the firm calls for a fundamental re-thinking of inter-industry coordination.

By focusing only on the HCIF-4PL partnership, we have studied a unique form of disintegrated relations. Therefore, to be generalized, our model requires

conditions which are suited to the form of cooperation to be described. The continuum of interfirm relationships represents the industrial organization (Richardson, 1972) and has to be described in each distinctive sector. From this perspective, the proposals contained in the model should take into account all potential intra- and inter-sectorial cooperation (franchise agreements, industrial subcontracting, strategic alliances), regardless of the characteristics of the partner firms.

Our paper has also presented a critical survey of the modern theory of the firm and has also advanced, based on four proposals in line with critical resource theory and an organizational knowledge-based approach, a model of the economic boundaries of the firm. While it is supported by some representative examples and illustrations, our analysis could be enhanced by extensive empirical evidence. In other words, the validity and the robustness of our model should be tested.

From these limits, several research perspectives can be advanced. First, in-depth theoretical considerations could be developed in order to generalize our model to all types of firms that are contractually and economically dependent. In this context, an integrative approach could be required. In fact, a neo-institutional analysis can be combined with new approaches to the firm to provide a new global framework. It would be useful to build a fully satisfactory theory of the firm that considers both rent-sharing and value creation issues. Secondly, the model could be tested based on empirical evidence (case-studies, econometric works, and so on). Qualitative and/or quantitative analyses could be performed to provide evidence of (1) the positive influence of relational contracting on the accumulation of human capital, (2) the level of expertise required to solve complex problems, (3) the assessment of economic power and of functional dependency, and (4) the economic boundaries of the firm.

The complex but increasingly widespread partnerships between HCIFs and 4PLs also bring us to examine at least two other future directions for research, especially in the sense of the emergence of a logistics industry. Firstly, measuring the impact of global outsourcing on the performance of HCIFs is quite difficult to do in relation to 4PLs. In this way, future developments could concern themselves with the measurement of value co-creation between 4PLs and HCIFs. Being mainly of an informational nature, this value co-creation can generate tensions. The 4PL creates

value for the HCIF thanks to the technical, technological and organisational complementarities it provides through its expertise. It also creates value for itself while accomplishing its missions, because the capitalisation of information and know-how enriches its databases.

Secondly, it would be interesting to estimate the real advantage of outsourcing logistics functions. Outsourcing is a source of corporate flexibility so that firms, in particular HCIFs, are able to quickly react to situations characterized both by emergency and uncertainty. However, at the same time, HCIFs lose their control on outsourced activities because they are constrained by medium-term win-win contracts. Therefore, they are dependent on 4PLs and have difficulty protecting their specific competencies and know-how. Nevertheless, as flexibility needs stability to boost corporate performance, it seems that the contractual context described above is positive for the ordering firm. Stability requires three essential elements: good supply chain management, attentive supervision of interfirm contracts, and the transfer of employees within logistics services under the control of 4PLs.

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