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Cooperation, Coopetition and Innovation

Nabyla Daidj

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Introduction

The beginning of the 1960s marked the emergence of "corporate strategy", through the first works of [CHA 62] which analyzed the evolution of large American enterprises and the works of [ANS 65] related to strategic and operational decisions. Three works are considered the first reference manuals to have contributed to the consolidation of strategic management as a discipline on its own: *Strategy and Structure* [CHA 62], *Corporate Strategy* [ANS 65] and *Business Policy: Text and Cases* [LEA 69]. Since the 1960s were influenced by those founding texts, the following decades made it possible for other authors to build upon this tradition and to progressively incorporate new concepts, theoretical developments and empirical applications.

As strategic management refers to the entire scope of actions and decisions made by an enterprise in a constantly changing context, the following three levels of analysis must be taken into consideration:

– *country*: macroeconomic conditions (broad environmental factors), including monetary and fiscal policy, the state of the global economy, unemployment levels, productivity, exchange rates, inflation rates, and so on. As economic conditions are in perpetual change, the economic measures preceding or following these movements equally have a direct or indirect, positive or negative impact on the competitiveness of firms;

– *market* (sector or industry): market structure (i.e. organizations producing the same products or services). Here, the market structure and the level of competition play a key role. There are several factors which may determine the market structure of a particular industry: buyers and sellers (number of actors, interactions between them, their bargaining power, etc.),

prices, production and selling processes, and product differentiation. Over the years, market structures may also evolve from monopoly to oligopoly (consider, as an example, the telecommunications market at a national level in European countries). The other two basic types of market structure include pure and perfect competition (a theoretical model considered from a neoclassical perspective) and monopsony;

– *company*: often known as "corporate", "business" and "operational" (or functional) strategies. The *corporate* level refers to the overall scope of an organization, its portfolio of businesses, the nature of its competitive advantage, its decision to enter a new market or to abandon a specific activity. These are often long-term decisions. The *business* strategy refers to the different means by which a firm competes against its rivals and thus achieves its aims at a specific market (or strategic domain of activity). An *operational* strategy is closely related to the resources and competencies of an organization, and the way in which these are used efficiently in doing business.

	Macroeconomics	**Industrial economy (mesoeconomics)**	**Strategic management**
Level of analysis	Country	Market – sector	Company
Scope	Government policies	Structure of industries and markets	Strategies of firms
Concepts	Comparative advantage Global performances Macroeconomic indicators (growth, employment, public finances, inflation, etc.) Growth and recession Globalization	Concentration (horizontal) Vertical integration Competition Entry and exit barriers The degree of market power Two-sided markets Technology race and innovation (patents) Performances	Competitive advantage *Corporate* and *business* strategies Organization and culture Resources and competencies Information system Internationalization Performances

Table I.1. *Different levels of analysis (adapted from [DAI 15b])*

Strategic management refers to the study of strategic behavior (cooperation, rivalry and coopetition) as well as the interactions between actors of a market in a hyper-competitive and globalized context. [MAR 90] underlined the paradoxical nature of strategy in these terms:

> "The closing/opening pair […] constitutes the basic category of politico-strategic thought and corporate actions […] Current strategic themes or practices confront a double dilemma: how to discern between the intermediate forms of competition, cooperation or partial alliances".

Among the many motivations for forging an alliance, we find access to resources (material or immaterial) and/or missing competencies (knowledge, know-how and skills), cost reduction, production rationalization (economies of scale, productivity gains, control over experience curves and learning effects), and increase in bargaining power with suppliers, and so on.

An important number of works and academic papers examine the subject of cooperation in association with innovation, and – to a lesser extent – coopetition. However, the purpose of this book is not to enlarge an existing list of academic works or textbooks. Borrowing from different bodies of theory such as industrial economy, international economy or strategic management, the aim of the present volume is to explore various approaches to analyzing the concept of cooperation. A review of the specialized literature will reveal the complexity of the cooperative phenomenon, not only in the way it originated many decades ago, but also integrating the coopetitive practices which came to light at the end of the 1990s and at the beginning of the 2000s.

Cooperation is a multidimensional phenomenon which can be studied from many different perspectives and thus requires the decompartmentalization of disciplines, particularly of economics, management and broader fields of knowledge. Our book intends to adopt this approach, inviting the reader to go beyond his/her expertise on a given subject or specific theoretical field.

The book has been divided into different chapters which can be studied separately (each chapter cross-referencing specific theoretical corpora), and can also be connected among themselves. Many readings are then possible.

Apart from R&D and innovation – which are often at the heart of corporate strategy and will naturally constitute the reading thread – we particularly encourage the reader to combine the reading of certain chapters. Such is the case for Chapters 2–4, which examine the theoretical determinants of alliances via the theories of the firm (property rights theory, transaction costs theory and agency theory) from a "classical" perspective. In Chapter 7, a venture in the theory of resources (RBV) and competencies will enlighten the potential connections between this theoretical field and the theories of the firm. While game theory does not constitute the core of this publication [DAI 07], we may find some of its teachings in Chapters 3, 5 and 6.

The rest of the book has been structured following this logic: coopetition constitutes the nucleus of Chapter 6, which acknowledges once again the connections between economics and management. It was certainly difficult to tackle the question of alliances without making reference to the international context in which these evolve. We will address that matter in Chapter 8. Chapters 1 and 9 directly refer to the different forms and modalities of cooperation, with special examples drawn from telecommunications satellites, e-health and video game consoles.

1

From Traditional Forms of Cooperation Toward New Collaborative Practices

1.1. Introduction

Understanding the phenomenon of cooperation mainly depends on how we define "agreement". The purpose of this chapter is to carry out an in-depth study of the concept of cooperation. The general characteristics of cooperation agreements (object, actors involved, products/services concerned and duration) are introduced in the first section of this chapter. The main forms of cooperation are analyzed in the second section, which will enable us to provide a general definition for agreements. This chapter concludes with a typology of agreements.

1.2. What is cooperation?

The tools used for defining cooperation are numerous and vary according to the authors. The definitions we will consider in this chapter can be articulated around four chief axes: the object of cooperation, the different actors involved, products/services and applications, and duration of agreements.

1.2.1. *The object of cooperation*

Our intention is not to analyze the different motivations that entice the companies to cooperate (risk-sharing, the pursuit of economies of scale and/or of economies of scope, sharing distinctive resources and/or

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fundamental competencies and so on) but to stress its main purpose and the means to achieve it. [TEE 92] provides an ample definition:

> "Agreements characterized by the commitment of two or more firms to reach a common goal, involving the pooling of resources and activities."

Cooperation would not be possible unless each part expected to get at least as much as it would have obtained had it remained independent; that is to say, unless there was a mutual gain. Each actor assesses benefits and costs, at least in a rudimentary way, but the result of cooperation is not always evident.

One of the main difficulties is the distribution of gains among the different members of the partnership. Cooperation should guarantee enough benefit appropriation not only at the moment when the agreement is passed, but also from start to finish [JAC 87]; otherwise, one of the partners could end up disadvantaged. *A posteriori*, it could be proved that cooperation led to the domination of one partner over the other. In fact, cooperation between firms produces an impact not only on the exterior of the coalition but also internally, on the partners themselves, because while being close collaborators in certain domains, the partners are simultaneously competing against each another in other fields. As it has been pointed out by Doz *et al.* (1986), cooperation is not a new concept, but arises as the extension of competition in a different shape. Furthermore, cooperation may reinforce the competing position of a firm to the detriment of a partner, who could end up in a situation of dependency or of lasting inferiority [DEW 88].

1.2.2. *The actors*

This book will particularly focus on the case of cooperation between firms. Cooperation between countries shall not be taken into consideration except in the cases where it has paved the way for alliances between firms. In fact, governments can play a key role in a complex board when the alliance concerns a relation between two, three or many players, generally firms. In fact, governments may favor certain agreements between firms or privilege a specific alliance to the detriment of a different agreement (see Chapter 8).

With regard to firms, these may be public or private [ROO 88]. Collaboration may refer to "complementary firms within the same economic group" [DUS 90] as well as competing or potentially rival firms working on the same economic branch. In fact, two firms may cooperate to develop a certain type of technology, while directly competing against each other for marketing purposes [DUS 88]. In general, agreements do not necessarily imply an international character, but can bind two firms of the same nationality.

Besides, these alliances may concern both small businesses and large, often multinational, industrial groups [DUS 90].

Two observations come to mind concerning the multinationalization of firms and of cooperation. [ROO 88] distinguishes between two types of cooperation: interfirm and intrafirm. Interfirm cooperation points to cooperation in the case of a multinational company[1] (MNE), between the parent company and a subsidiary firm holding more than 50% share. This percentage has been fixed arbitrarily, in the sense that there is no existing property threshold that could make it possible to distinguish between the subsidiaries under control from those that are not [ROO 88]. Other authors [BUC 88] have approached cooperation mainly from the perspective of company multinationalization and suggested that cooperation mainly concerns MNEs. Yet, numerous studies have proved the existence of cooperation phenomena without entailing multinationalization practices and vice versa.

1.2.3. *Products and services involved*

Cooperation relations between companies include both a material and an immaterial dimension [GAF 90], to the extent that when firms collaborate, they exchange tangible and intangible resources, knowledge, know-how, learning practices and so on, in order to provide goods or services. With regard to the products involved in cooperation agreements, these may refer to final products or intermediary ones (systems, sub-systems, components). Since the end of the 1990s, cooperation has focused less on the products themselves, but on the fine competencies associated to the value chain

1 Multinational enterprises (MNE) are also referred to as multinational or transnational firms (MNF) by the UNCTAD (United Nations Conference on Trade and Development). Chapter 8 is utterly dedicated to the alliances set in an international context.

(R&D, production, purchases, quality control tests, marketing, after-sales services, etc.) [JOF 86] referred to "intrafunctional exchange", whereas [DEM 89b] uses the term "competence exchange", as when a specific network exchanges information concerning patents.

1.2.4. *Agreement duration*

Some authors [FRI 81] have agreed upon the fact that cooperation relations are sustainable in time. However, very few of them have been precise as to the exact duration of collaboration:

> "A cooperation agreement may or may not entail financial remuneration. On certain occasions, the contracting parts may agree on exchanging information or other goods or services. But in both cases we are referring to cooperation agreements. According to this definition, the agreement has to be set for a long time: an isolated purchase of goods and services does not constitute a cooperation agreement, whereas the commitment to purchase all production factors to a unique supplier for the next ten years is a cooperation agreement" [MAR 83].

[ROO 88] provided the following definition:

> "In an international agreement, as in other types of long-term cooperation […], the long term does not refer to a specific time frame, but rather to a length of time that exceeds the necessary span for market transactions."

Other authors [ROB 06] equally employ the expression *"long term"* without going into the details of the duration. In view of this, it seems more sensible to reflect upon the agreement's fragility rather than its sustainability in time (see Chapters 2–4). In contrast to what happens with traditional joint ventures, [CHE 88] stressed that many alliances are restricted to the short term, even when the contributions of the different partners may be complementary and clearly differentiated. This is due to the fundamental ambiguity of alliances, in which two ambivalent aspects are present: cooperation and conflict, which could be due to different reasons: divergence of interests, technological looting and exacerbated rivalry between the partners. We will discuss the principles of coopetition in the following chapters (see Chapter 6).

This is similar to the idea developed by [GAR 89]:

> "Alliances often result from a delicate balance. Since it is a hybrid form between market and hierarchy, an alliance is torn between two forces, one pulling towards breakup (return to competition and market) and the other, pulling towards merger or acquisition (hierarchy internalization)."

This observation echoes the notions of success or failure of an alliance, which are often difficult to determine. *A priori*, duration could be interpreted as a sign of success. However, as [DOZ 86] pointed out, the success of an alliance is not systematically defined by either its duration or by a particularly efficient complementarity between the partners' contributions. This could indeed change from partner to partner. One of the participants may profit from a lasting alliance in order to improve its own performance to the detriment of the other firm. From this perspective, the duration of the agreement does not constitute a factor of success for all the partners involved. Likewise, the end of an alliance does not necessarily denote a sign of failure.

> "The survival, duration and stability of alliances are not conclusive synonyms of success. They could even be associated with poor performances. Conversely, a rupture, a short lifespan or the evolution of alliance modalities are not indisputable signs of failure, because they could be associated with excellent performances."

The explanatory factors that could account for the failure of an agreement are numerous and cannot always be clearly identified. Should we attribute the failure of an alliance to the inherent risk of the shared activity (this problem is particularly acute in the case of R&D) or to the difficulties associated with managerial and organizational hassles? According to [HAK 91], the only two factors that could help determine the success or failure of an alliance are technical difficulties and – for the firms involved in the alliance – an impossibility to adapt to an evolving technical and commercial environment and to adopt new strategic orientations.

1.3. The traditional forms of cooperation

Numerous definitions of cooperation have been proposed in the last few decades. However, since the beginning of the 2000s, new forms of cooperation have emerged, such as collaborative or open approaches and specifically *open-innovation* practices.

1.3.1. *"Traditional" cooperation at large*

In the majority of cases, a cooperation agreement bears a formal and official character. Nevertheless, not all alliances are apparent and observable [DUS 88]. Some of them may even have to remain secret. Although in its form a cooperation agreement has to be explicit, a written backup is not always compulsory for the agreement to exist. "Cooperation agreements can be verbally concluded" [MAR 83], but this is not frequently the case.

Not all alliances are conducive to a change in existing structures or to the creation of a particular judicial entity [LYN 90]. "Unstructured" alliances can take the shape of crossover agreements between suppliers: in this way, big companies make sure that they get an alternative source of supply in case they are deserted by their main supplier (*double sourcing*). These pacts are known as second-source agreements [CHE 88].

> "In this way, many manufacturers reach an agreement with a competitor in order to make them produce a required component, in exchange for the opposite operation. As a result, the same product can be found in the catalogue of both suppliers. With time, the repetition of crossover agreements engenders an alliance which is not perceived as an organizational change" [DUS 87].

[MOR 87] highlighted the "preservation of identity" as one of the four features of agreements, together with a regular and continuous transfer of resources, responsibility-sharing and indivisibility of projects. Agreements make up for only a small part of the activities of participants who can preserve their own identity and pursue other activities not included on the agreement.

1.3.2. *Exclusions from a restrictive typology*

Among the cooperation forms most frequently quoted by academic research, some seem to be placed at the very threshold of the notion of cooperation, while others cannot directly be included in the list of interfirm agreements.

1.3.2.1. *Licenses*

A license is an arrangement by which a company (A) gives permission to another company (B) to access a certain technology for a limited period of time which is determined in advance.

> "This technology can range from property rights, trademarks, patents, know-how (a non-patented secret technology) to a combination of different forms. In addition, the contract may provide the contract-holder with access to any improvement in the technology covered by the pact, as well as to additional technical assistance (some contracts cover only that element) and to staff training" [HUG 84].

Taking this into account, it is difficult to ascertain whether the license is analogous to the simple purchase or sale of a patent – which would clearly place the operation under the market rules – or whether it refers to a cooperation agreement, not to mention a direct investment. Including licenses under one category or another depends on the following criteria:

– the way in which the grantor will be remunerated (percentage sales, royalties, percentage of profits, etc.). According to [MIC 88], "if, for example, the license or expertise issuer is totally or partially rewarded by a percentage of the turnover or the net profits of his licensee, then the new investment can be considered as a direct investment. If, on the contrary, the license issuer is not interested in the performance of his licensee and receives a fixed fee, the operation can be considered as a simple commercial transaction";

– the nature of the patented technology. By definition, licenses refer to an already existing and efficient technology. In this case, licenses can be considered as pure and specific market transactions. As [MOW 88] pointed out in his characterization of international cooperation, the sale of technology via licenses is excluded from the definition.

However, if the license agreement entitles the beneficiary or license holder to access to all forms of technological improvement [KIL 83], technical assistance or staff training, such agreements could be assimilated to cooperation. On the contrary, cross-licensing is an integral part of the agreements.

1.3.2.2. *Mergers/Acquisitions*

From a legal point of view, a merger brings under "one and the same legal personality the patrimony of two or more companies" [JAC 89a]. To employ the terms coined by [MOR 76], "equal mergers" occur when companies of relatively equal size disappear in order to constitute a new, distinct entity. "Merger acquisitions" occur when one of the more powerful firms absorbs the others.

As [MAR 83] and [JOR 89] concluded, a merger does not constitute a form of cooperation and must be acknowledged from the agreement's perspective. Merger acquisitions should not be mistaken with the logic of alliances, even if these categories constitute concentration forms and means for external growth. External growth can be interpreted as a partial or total pooling of resources (material, human, financial) exploited by each party in order to develop an activity. It can manifest in two ways:

– by the irreversible transfer of assets between partners (in a context of partial contributions, withdrawals or mergers) and

– through financial investments between companies.

A merger is a particular case in which "collaboration" is total, identities are erased and there is no distinction among projects. In a certain way, mergers are like "marriages", not cooperation agreements. Many authors mistakenly assimilate mergers with the more traditional forms of cooperation, because some agreements may evolve toward mergers [OBR 89]. On the contrary, "a certain number of contractual relations between companies constitute control modalities in disguise" [DEL 91a]. At present, we are witnessing more and more "partial mergers", which are often designated as joint ventures (JV) or joint companies. As a result of the collaboration, partner companies can pool resources from different units or divisions.

> "A joint venture refers to a partial merger […] where – after leaving an existing industrial or commercial environment, necessary to real or potential competition - the partners effectively and irrevocably renounce every possibility of coming back separately to the previous market conditions" [JAC 89a].

Some authors [COL 92] considered this type of partial merger as the "most complex form of strategic partnership".

1.3.2.3. *Wholly owned subsidiaries and share holdings*

Purely financial shares and holding acquisitions (generally associated with takeovers) do not constitute strategic alliances.

By contrast, there is little consensus around the question of minority share holdings. These can be considered indifferently, either as international cooperation or as foreign direct investment (see Chapter 8). Minority share holdings have sometimes been referred to as *corporate venturing* [COL 92], when a large company takes minority interests in the capital of newly created unlisted companies with significant growth prospects. Through this mechanism, very small and medium-sized enterprises can access precious financial resources. On the contrary, large companies can take part in the development of new financial processes incurring in little risk, while making the most of fresh opportunities for applying new technologies and marketing the fruits of the collaboration.

This is the logic of business ecosystems (see Chapter 6), which connect various players, such as large groups and start-ups.

1.3.2.4. *International subcontracting*

There is a very delicate boundary between international subcontracting and cooperation agreements because of the existence of many sorts of delocalization practices. It is possible to distinguish between commercial and industrial delocalization, and the latter can also be split into specialist subcontracting and capacity subcontracting. Specialist subcontracting corresponds to a firm that has its goods manufactured by a specialist in possession of special equipment or efficient know-how, because – due to its strategy – the firm cannot or simply does not wish to acquire the necessary

means for manufacturing an item. On the contrary, we are dealing with capacity subcontracting when – despite the fact of being in possession of the necessary equipment for producing a product – the contracting firm requires the assistance of another firm, be it occasionally (because of seasonal production overload or a technical incident), or in a more frequent manner (the firm desires to allocate its own productive capabilities to other ends) [QUE 87].

Should international subcontracting be considered an outsourcing or a cooperation form? Outsourcing can be found when a company decides to ask another firm to manufacture its goods. The contracting firm may require manufacturing special items, following precise specifications. In this case, the firm is outsourcing its production. However, this type of relation could also have a different character. The contractor may consider the subcontractor as a "true partner". In fact, the contractor may provide the subcontractor with a certain level of security by offering a long-term collaboration, not only a one-off intervention (which could be related to the existence of a lower price offered by competing firms in the market). Apart from this relation, cooperation may extend to other areas such as the conception of new goods and other production-related fields, including consultation for the choice of special equipment and quality control [MAR 90]. As we can observe, the partnership brings benefits to both firms and thus engenders "synergy" effects [BAR 82]. Following the classification adopted by [HOU 57], outsourcing can result in a temporary or permanent collaboration between the subcontractor and the hiring firm, with the common goal of achieving the production of a product. Without this synergy, the contractor would probably not have been able to produce the product. According to the author, it is not a question of hierarchical, but of "communal" relations between the prime contractor and the subcontractor. Accurately, the relation should be described as "partnership", which differs from outsourcing in that:

> "it lasts longer and it seeks to achieve a common goal (improving the quality or performances of a product or reducing costs) either in the medium or the long term, in conditions allowing for reciprocity in advantages" [BAN 89].

[COL 92] employed the expression "vertical supply alliance", a term that helps distinguish between the more classical relation of buyers-vendors and outsourcing. They consider that vertical supply alliances possess a set of singular traits.

> "For a start, compared to simple outsourcing, it is common for the buyer to rely closely on the research competencies of the vendor during the initial phase of product development. Secondly, close cooperation is generally necessary so that each partner can maximize sales to final users. Thirdly, these alliances involve long-term commercial collaboration. And lastly, the partnership has a measurable effect on the competitive position of one or both partners" [COL 92].

Now, should outsourcing be considered a vertical or horizontal type of alliance? According to their nature, agreements can be vertical, horizontal or "radial". In view of this typology, outsourcing has generally been included under the category of vertical agreements [GUI 83]. In fact, outsourcing relations constitute a traditional form of vertical alliances. These are often carried out for reducing transaction costs in relation to market operations (see Chapter 2). There is a vertical relationship if during the exchange, the subcontractor is in a situation of subordination or dependence toward the contractor, which results in "unequal exchange". Conversely, this relationship is a "horizontal" one if the subcontractor is not subordinated to the contractor (or if one of the firms or both are subordinated to a third party).

Broadly speaking, other cooperation agreements focus more on horizontal relations between (competing) firms in the same sector.

> "Real cooperation mostly appears in association with horizontal complementarities, in activities of the same type. It is more like a pooling of resources towards a common goal rather than a traditional division of tasks" [DEL 91a].

As we will see in Chapter 7, we can also associate resources with competencies. In horizontal relations, rivalry between firms predominates and does not completely disappear, not even in a cooperative frame. In fact, the question of opportunism and/or trust arises. This question will be analyzed from different theoretical perspectives in the following chapters.

> "Horizontal agreements are concluded between competing firms. Compared to vertical agreements, such alliances are far more difficult to settle and wrap up, and more complex to manage. The solution to opportunism problems (free-rider logics) frequently requires the choice of contractual forms involving financial commitments (exchange hostages) such as joint ventures" [GUG 91].

A third form of cooperation is often identified. “Radial” (or inter-sector) cooperation designates the agreements passed between firms belonging to different sectors of activity and which look forward to a certain complementarity over a specific project. This type of cooperation has also been referred to by the term “diagonal alliance” or “conglomerate merger”. It may also adopt the form of inter-organizational networks.

> “Technology development and the appearance of systemic products have recently encouraged the configuration of alliances between firms belonging to different branches […] Firms in the fields of microelectronics, biotechnologies and new materials are enthusiastic about cooperating among themselves, in order to access knowledge which is external to their background” [GUG 91].

1.3.2.5. *Cartels*

Cartels can also be considered as a form of cooperation because, while still retaining a certain level of autonomy and individuality, the actors (countries or enterprises) agree to collaborate during a certain period of time. In particular, the contents of the agreement may refer to the amount of goods to be produced (as well as how to split the market between partners) and the definition of a specific price policy (see Table 1.1)

The fact that cartels are no longer the privileged form of cooperation chosen by firms to develop partnerships can be explained by a number of reasons. Apart from shaping variables such as quantity and price, cartels have little impact on distribution and R&D. Cartelization is often found in the production of raw materials, energy, chemical or steel products. Nowadays, agreements between companies are particularly important in the sectors of information and communication technologies (ICT or IT), where R&D and innovation predominate.

	Non-equity	***Equity***
Exchange	Short and middle-term transactions	Portfolio diversification
Alliance	(Non-financial) middle- and long-term agreements	Joint venture (JV), consortium and cross-participants
Merger	Not applicable	Wholly owned subsidiary
Cartel	Agreement on prices and quantities	Agreement on prices and quantities

Table 1.1. *Typology of interfirm links according to [JOR 89]*

This digression about the nature and characteristics of cartels leads us to make an important difference – not only from a semantic point of view between alliance (cooperation) and collusion (*entente*): cartels should be interpreted as collusion between the parts. As [GAR 89] pointed out, compared to the entente:

> "The alliance does not focus on splitting the market and defining a price policy –which would bring it closer to a cartel- but is used for sharing assets (in the broad sense: production tools, distribution networks, skills, expertise) between partner firms."

Collusion is different in that it eliminates competition, whereas cooperation modifies the rules of the competitive game itself.

> "Cooperation is not an understanding, which would presuppose relatively stable rules of the game and a restraint of the competition arena (at least in its aggressive form). On the contrary, cooperation seeks stable rules of play in an uncertain universe, but does not exclude competition itself" [ARL 87].

A final observation can be made about the use of the term "collusion". An alliance can foster collusion and have significant repercussions on the dominant positions of firms [WAV 91]. While it is true that cooperation cannot systematically be compared with collusion, cartels can be assimilated to collusive behavior [JAC 89b]. As [DUS 91] explained:

> "according to certain authors, alliances are akin to collusive behavior, in that they eliminate competition between allies and reinforce their collective strength towards the economic environment (other competitors, suppliers, customers, governments, etc.). Thus, alliances enter the category of so called "relational" strategies and constitute an advanced form of *entente*. [For other authors], alliances should be considered as competitive maneuvers in a new form: rivalry between allies. From this perspective, alliances lead to the weakening of one ally to the detriment to the other."

Furthermore, "an implicit collusion – which most often occurs in the mimetic behavior of one firm toward the other – does not constitute an agreement" [DEL 91a].

It is nevertheless important to observe that an R&D cooperation program may eventually lead to collusive practices in the areas of production and marketing for the product resulting from the technological development. In fact:

> "As a result of the alliance, there is an increased possibility of collusion between co-operating companies who have learned to exchange R&D technological information and collaboration, and may thus be tempted to extend their agreement to prices, markets or production" [NIO 91].

However, empirical analyses tend to show that the risk is limited and that collaboration is not generally followed by collusive practices during the production or the marketing phases.

1.3.3. *Typology of agreements by stage of production*

We can delineate a typology in function of two criteria:

– nature of the agreement (R&D, conception, design, production, marketing, distribution, etc.). The relationship between the functional contents of the agreement and the contractual form it assumes is certainly relevant. For example, agreements of a different nature (R&D, production, marketing) may assume the same organizational and legal form (for instance, consortium or joint venture). The typology suggested here is for simplification purposes only. In fact, a classification of agreements devoted to a unique activity cannot be performed systematically, in a rigorous way, because the majority of agreements cover several activities along the value chain. This finding enabled [POR 86a] to draw a distinction between two types of alliances. The first one (type X) refers to firms which have asymmetrical positions in the aforementioned different activities, what drives them to exchange resources and competencies as well as to specialize in the field where they perform best. The second type of coalition (type Y) re-unites similarly performing firms that pool their resources for a joint action in a specific activity, with the aim of attaining economies of scale. By cutting on exceeding capabilities, they are thus able to transfer expertise and share risks;

– the contractual form that cooperation may assume: joint venture, consortium.

1.3.3.1. *R&D agreements*

R&D agreements refer to fundamental research agreements as well as applied research agreements, leading to the improvement of a product, a service, a procedure or an application, which can be marketed in the short or long terms. These agreements may take place in a variety of settings: research foundations, public laboratories, university research centers, enterprises, start-ups, incubators, accelerators and so on. Many of these projects are materialized by patent filing, the creation of special structures (in Chapter 3, see the section dedicated to open innovation), joint ventures (JV) or consortiums and so on.

Two (or more) firms constitute a JV when they engage themselves to create an enterprise. This contractual relation entails the pooling of resources from different partners with the aim of achieving technological, financial or commercial results and seeks to increase and share profits. A joint venture is one of the most ancient forms of cooperation, particularly in industrialized countries and in emerging economies. A JV does not necessarily entail an equal distribution of capital between partners. Rather, these firms reach an agreement on how to distribute the benefits and losses of the new entity.

Consortiums pursue the same goals as JVs, namely technological sharpening of products and services, from the first steps of R&D to the marketing phase. However, these forms of agreement differ in two aspects:

– on the one hand, while consortium re-unites a large number of firms, JVs are limited to a maximum of two or three partners;

–on the other hand, consortiums appear as a less restraining type of structure, in which the conditions for obtaining and sharing the benefits of cooperation are not as strict as for JVs.

> "Contrary to consortiums, which have certain flexibility, joint ventures make it necessary to decide how to split the profits (or the losses) and how to reinvest for the future. This implies that the management philosophies of both enterprises (or more) which constitute the JV are identical and compatible […]. A joint venture is accompanied by numerous legal contracts and forms capital participation [OHM 85].

> "The international consortium is the prime contractor of a production system in which the firms involved come from different national origins. In this sense, the consortium is more than a joint venture, a more stable form; it manages products over the long term and is provided with management autonomy, which is far bigger than that given to joint ventures. Nevertheless, consortium also differs from the multinational enterprise, which may result from the merger of two firms. As a result of the merger, the firms which gave origin to the multinational enterprise remain registered in its organizational chart, but are now a unique entity. This is not the case of consortium, which occupies only a part of the activities of the firms involved, and which can, by the same token, be dissolved by the partners at any moment. The creation strategy of a consortium is conceived for the long term, but is not irreversible; it can be modified or reoriented by the firms" [CLA 91].

With regard to the R&D consortiums, they are in some respects similar to JVs, especially when a consortium brings together two companies. According to [EVA 90], the main difference is that R&D consortiums involve direct competitors, in contrast to JVs (in most cases). This is because the consortium, conducting long-term R&D work, does not always arrive at a certain, definite result. On the contrary, an R&D consortium seems to be a more flexible form than a JV, with smaller sums invested and more partners.

R&D consortiums (a form that emerged at the beginning of the 1980s) as well as R&D JVs are developed considerably in the 1990s, even if their original intention was focused on production/manufacturing activities.

1.3.3.2. *Conception/design agreements*

Design is a very general and polysemic term that can simultaneously refer to a creative activity and a process related to the design of a product/service/application. In this category of cooperation, we may find the original design manufacturer (or ODM) agreements, which designate the conception of white-label products, which will bear the mark of another company once they are sold.

1.3.3.3. *Production agreements*

These are the agreements concluded between firms in the perspective of producing a good, a system or a component. Cooperation may assume several forms: joint ventures, consortiums, licenses and so on.

As far as consortiums are concerned, they are a form of cooperation that predominated between 2000 and 2010. It was the most popular form of agreement when it came to defending a standard. Such was the case of the battle between Sony and Toshiba, regarding DVD players, which resulted in the victory of the Blue Ray format in 2007, as defended by SONY and the consortium that the firm represented [DAI 10d]. More recently, in January 2017, in the field of connected cars, Ford, Toyota and PSA have joined forces to create a consortium around the SmartDeviceLink platform/technology (see Box 1.1). Currently, data access/control and smartphone applications are at stake.

The SmartDeviceLink consortium brings together several players in the automotive industry:

– Ford, Toyota, Mazda Motor, Fuji Heavy Industries (Subaru) and Suzuki Motor;

– Elektrobit, Luxoft and Xevo are also part of the consortium.

Their goal is to develop a SmartDeviceLink platform open to application developers seeking to improve the "customer/user experience" in terms of connectivity between smartphones and the automotive interface. This initiative was launched to countervail the action of Internet giants (Google, Apple), which have significant ambitions in this sector.

Other alliances were concluded in 2016–2017, focusing more specifically on frequencies and networks. In the face of the enormous data processing required by autonomous cars, 4G technology appears undersized. As a result, several car makers have come together to prepare for the move to 5G technology in cooperation with operators. This is particularly the case for PSA-Orange and Ericsson. The second major alliance involves Audi, BMW, Daimler, Ericsson, Huawei, Nokia and Qualcomm within the 5G Automotive Association.

Box 1.1. *Alliance intensification in the sector of connected vehicles*

In addition to R&D JVs, whose characteristics have been discussed earlier, there are production JVs. The typology suggested by [BUC 88] makes a distinction between two categories of JV, according to the position that each partner plays in relation to the common subsidiary: "symmetrical" JVs and "asymmetrical" JVs. We say that JVs are "symmetrical" when each partner is located either upstream or downstream of the joint subsidiary. JVs are "asymmetrical" when one partner is located upstream of the joint subsidiary and the other is downstream (multi-step JV). This type of configuration is often found in the case of technology transfers between countries.

Another mode of cooperation corresponds to what [THI 87] have called "mutual organization", where all the members are simultaneously prime contractors and subcontractors, thus constituting a real network:

> "Properly speaking, in this type of virtual cooperation, there are no formal agreements between partners. The repetitive nature or relations between a prime contractor and a subcontractor creates strong informal bonds which, in due time, acquire all the features of cooperation" [HTI 90].

As [CLA 91] stressed, mutual organization is not limited to production, but to the final marketing stage of a product, not necessarily having taken part during the production phase. Such was the case of EIG from the Airbus Industry for many years (see Box 1.2)

The "simple" supply operation when a company offers its customers readily available standard products chosen by catalogue does not constitute a form of cooperation. This bond is purely commercial. By contrast, subcontractor and "complex" supply agreements can be considered as cooperation. [BAR 82] defined the special supply as:

> "the type of relationship in which an "equipment supplier", for example, carries out a subset corresponding to the specific need of a car manufacturer, while he retains the industrial property of the object on which he affixed his mark and for which he is entirely liable in case of defect".

Since its founding in 1970, the EIG Airbus had achieved very positive results and positioned itself as leader in the aeronautics manufacturers market. The EIG (Economic Interest Group) was neither a generator nor a distributor of benefits: its aim was to allow its members to use all means of development and improvement for their own activities. It was and still is an organization whose planning and administration were very flexible, while it retained its legal personality and legal capacity [...]. For the manufacturers of high-unit-cost products (as in the aeronautics industry), one of the most seductive features of the EIG was liability: any incurring debts were joint and severe between the members of the group [...]. According to the structure of the EIG at Airbus, none of the partners enjoyed a privileged status, nor any of the entities dominated the others [COL 92].

At the beginning of the 1990s, the transformation of the Airbus EIG into a full-fledged company became the main objective of the consortium's leaders and partners. Despite the indisputable success of Airbus, the aim was justified, because some limitations of the EIG form called for a necessary mutation.

In July 2000, the EADS (European Aeronautic Defense and Space) was created as a result of the merger of three companies: Aerospatiale-Matra (France), Daimler-Chrysler Aerospace (DASA, Germany) and Construcciones Aeronáuticas (CASA, Spain), and the EADS headquarters were settled in Amsterdam. In 2001, following the consolidation of the European aeronautics industry, the consortium became an integrated company, which was divided as follows: 80% was to be owned by EADS – at that moment, the largest European group in the sector – and 20% by BAe, the second largest European group.

Since 2012, the Group has expanded its shareholder structure, changed its governance and made strategic changes, which now include its space and defense activities. In 2017, Airbus Group is still positioned as the European leader in aeronautics, space and defense. It is now present throughout the world and is considered, alongside the American Boeing, as one of the two leaders of civil aviation. Airbus Group is also the world leader in the production of helicopters (Airbus Helicopters) and the world's third largest space systems manufacturer (Airbus Defense & Space, particularly Astrium).

Box 1.2. *From EIG Airbus to Airbus Group (adapted from [DAI 15a])*

1.3.3.4. *Commercialization agreements*

Commercialization agreements refer to both agreements concluded in order to extend the distribution network and franchising agreements, better known as OEM (Original Equipment Manufacturer).

Franchising is an agreement whereby the owner of a registered trademark (or trade name) concedes a license to use the trademark in a given activity for the supply of goods and services, under specified conditions.

Under the same category, we may find agreements combining both the productive and marketing dimensions. These are essentially OEM agreements and can involve a wide range of relationships:

> "They range from providing standard products that the client company will distribute under its own brand, to the design and manufacture of tailor-made products which meet the specific standards required by the OEM. The balance of power between the partners and the level of cooperation varies greatly from one case to another" [COL 92].

In general, the OEM refers to an agreement by which a company (A) supplies a company (B) with intermediate goods (subsystems, components, etc.), which the latter incorporates into a final product and markets with the name of its own brand. The OEM is considered a cooperation agreement in that a true collaboration may exist between supplier and customer. As [GIQ 86] stressed, "the OEM customer may be invited to participate in market research and prototype product evaluation, while the OEM supplier can provide a kind of 'pre-sales' service to the OEM customer, bringing support for the integration of subsystems into systems".

The author refines his analysis by introducing a distinction between the cost saving oriented OEM (the customer can manufacture a product, but at a higher production cost than the supplier) and the *specialist* OEM, an agreement the customer appeals to in case it he is unable to manufacture the product. Depending on the context, the customer will be totally dependent on his supplier, or conversely, cooperation between the two protagonists will be possible. Finally, according to [TUR 85], the OEM may be interpreted as either a vertical (marketing) or a horizontal (range-sharing) agreement.

1.4. New collaborative practices or the emergence of new innovation forms

1.4.1. *Multiplication of "co-…" practices*

Approaches like co-conception, co-design, co-creation and co-production all emerged in the early 2000s and have grown without interruption ever since. They have been adopted by many companies from various sectors. In varying degrees, they all imply a collaborative, collective and interdisciplinary dimension. Instead of relying upon a "technology push" philosophy, which prevailed for a long time, they confide in a "market pull" outlook, which seeks to integrate market needs with the expectations of final users.

Co-conception and co-design specifically acknowledge the context in which the goods are consumed so as to collect information and thus be able to improve and enhance customers' experience. These collaborative practices transform the relations between the company and its customers, because the latter are now involved in the design of new products, services, applications and information systems before or during the development stage. These different actors become "co-producers" of value [PRA 04, VAR 04]:

> "Co-creation establishes a relation of mutual dependence between the actors of innovation and the innovative firm. On the one hand, organizations are not in a position to fully control the activity of developers because these do not work under any type of subjection bond. On the other hand, developers and users have the power to influence the choices made and the options taken during the development phase. There is therefore a relationship of mutual dependence between organizations and co-creators" [ETS 09].

In its narrow sense, co-production is defined by [MAG 15] as follows:

> "Co-production refers to the last moment of the customer's participation in the creation of a product/service. The design of the product/service takes place upstream. The task performed by the consumer will make it possible to effectively produce the offer. This dimension of co-creation is subject to many controversies about what can be assimilated to co-creation and what cannot. Co-production is widespread in the service sector."

1.4.2. *Platforms*

The practices described above are, in most cases, based on a platform approach. This concept refers to several different cases that will be presented and analyzed in Chapter 6. [GAW 14] distinguished three main categories of platforms: internal platforms (product modularity), logistics platforms and technological (or industrial) platforms. The latter are digital platforms and are often observed in software development.

All platforms integrate a collaborative dimension in different forms, at the time that they renew cooperative strategies and relational practices, which extend beyond social networks.

1.5. Conclusion

As we have seen in this chapter, cooperation may take a variety of forms. "Traditional" modalities are complemented by new practices that involve not only several actors (start-ups, large groups) but also individuals who are increasingly contributing to the creation of value, which, in some cases, extends to the very definition of new offers.

These collaborative logics are increasingly questioning the nature of the links between many actors, of a heterogeneous nature, which can alternate between cooperative, competitive or even coopetitive conducts. It is this complexity that has led to many academic debates around different theoretical corpuses, which will be explored in the following chapters of this book.

2

Cooperation and Transaction Costs Theory

2.1. Introduction

The "new" theories of the firm, which cover transaction costs, the theory of the agency (Chapter 3) and property rights theory (Chapter 4), all challenge the neo-classical paradigm of the firm according to which an "abstract" producer combines the factors of production in the most favorable way. In the 1970s and the 1980s, when this restrictive outlook no longer adapted to the complex reality of the firms, new theoretical approaches emerged, which placed firms at the heart of the analysis and incorporated other parameters such as uncertainty, information asymmetry, limited rationality and opportunism.

These thoughts around the notions of transaction, contract and coordination costs, with the ultimate aim of increasing performances, have been largely analyzed by many authors in the field of strategic management in order to better assess the phenomenon of cooperation. In this sense, alliances have emerged as an intermediate form between the market and the hierarchy, in that they reduce transaction costs while preventing an increase in organizational (or bureaucratic) costs.

2.2. The logics of transaction costs

According to the theory developed by [COA 37], resources can be allocated in two ways: either via the market or via the firm. The originality of this analysis lies in that the author acknowledges the existence of

Cooperation, Coopetition and Innovation, First Edition. Nabyla Daidj.

operating costs in the market. The system that relies on market-specific prices engenders transaction costs, which justify the existence of firms, which are then responsible for minimizing the same costs. Building on previous works, [WIL 75] intended to ascertain the origin and the nature of transaction costs, he observed that an optimal structure (either market or hierarchy) can be determined by combining asset specificity costs, the degree of uncertainty of the transaction and the total number of transactions performed.

2.2.1. *Coase and the market costs*

Robertson was the first author to try to explain the reasons for the birth of a firm. His question was formulated in the following terms: why these islands of conscious power emerge in the ocean of unconscious cooperation "like lumps of butter coagulating in a pail of buttermilk"? As organized entities, firms represent a true paradox for market theory [JOF 87]. Coase later tried to provide answers to this interrogation, going against the neo-classical tradition (even if he used the concept of substitution at the margin), which denied the specificity of the firm, reducing it to an abstract entity, to a "simple function of production". [COA 37] explained: "Since there is apparently a trend in economic theory towards starting analysis with the individual firm and not with the industry, it is all the more necessary not only that a clear definition of the word 'firm' should be given but that its difference from a firm in the 'real world', if it exists, should be made clear." The firm can then be interpreted as an alternative mechanism to market, presenting advantages and disadvantages in resource allocation. In this way, Coase intended to reveal the specificity of the firm in economic action by establishing a difference between price and hierarchy coordination.

The firm can be defined as the place where resource allocation through pricing mechanisms is no longer valid. "The main reason why it is profitable to establish a firm would seem to be that there is a cost of using the price mechanism" [COA 37]. Until the writings of Coase, numerous authors had focused their attention on the role of prices as system coordinators. However, economic analysts had completely ignored other possible means of coordination, in particular those taking place within the firms themselves (hierarchical coordination). Let us make a difference between two types of costs:

–*Market-related costs.* Firms buy goods and services on the market. The pricing system is the main variable for orienting production, and

coordination is done by exchange. However, there is a cost for using this system. The workings of the market are not free. Why? First because there is a cost associated with information research. It is "the most evident cost of organizing production" via the pricing system, which requires the determination of an adequate price. This type of cost can be reduced but not eliminated, thanks to the assistance of specialists who sell this type of information [COA 37]. Information costs may be related to market research studies for detecting needs and their evolution, as well as shopping and consuming habits of future buyers. Then, there is the second cost, associated with negotiating and concluding separate contracts for each transaction taking place in the market;

– *Internal organizational costs.* A way in which a firm may reduce market costs is by internalizing transactions. The firm exists because it enables certain economic transactions between its different members at a lower cost that exclusive market mechanisms do not permit [OUC 80]. Under these conditions, *a priori,* we should witness a continuous and unlimited expansion of the productive system until manufacturing is only assured by a single firm. However, this is not what usually happens and the reason is that the organization itself has costs. The existence of organizational costs sets a limit to the capacity of firms to completely replace the market. The bigger a firm becomes, the more its "coordinating" function is confronted to decreasing returns (information poorly identified by the entrepreneur). In this sense, the more a firm internalizes, the lower its internalization benefits.

> "A firm becomes larger as additional transactions (which could be exchange transactions coordinated through the price mechanism) are organized by the entrepreneur and becomes smaller as he abandons the organization of such transactions" [COA 37].

2.2.2. *Developing the theory of transaction costs: Williamson*

These first explorations were further developed by Williamson [WIL 85], who defined a transaction as "a transfer across a 'technologically separate interface'".

> "A transaction entails a cost: first, it is necessary to find a contact for the transaction, and then an agreement has to be reached, and its terms, respected" [THI 87].

Williamson's contribution was to account for all the factors that affect transaction costs, bearing in mind that these can be defined in various ways. Briefly, transaction costs can be considered as a set of costs specifically related to the management of the "face-to-face between two economic agents, either individual or collective" [JOF 87]. In more general terms, transaction costs can be defined as the "operating costs of the economic system" as Arrow (ARR 69) phrased it, and specifically, it is "what it costs to resort to the market to allocate resources and to transfer ownership rights" [MEN 90]. They are, in fact, "market utilization costs" [MOR 91] and [WIL 85] stresses that these are not to be confused with production costs.

Williamson continued to build upon Coase's problematic, which in fact connected two dimensions: transaction costs and the decision concerning a "pertinent" or "adequate" price, together with the unforeseeable character of the contract's negotiation and conclusion. Nevertheless, he deepened his analysis by identifying the different actors at the origin of transaction costs in a market setting. He particularly made a distinction between human factors (bounded rationality, opportunism and information-processing capacities) and the factors related to the firm's environment (namely uncertainty and small numbers.)

2.2.2.1. *Composition of transaction costs and behavioral assumptions of agents*

2.2.2.1.1. Limited rationality

In neo-classical theory, the economic agent is considered as a rational being seeking to maximize his/her well-being. Among these agents, firms intend to maximize their profit. Indeed, this rationality (maximization of benefits under certain conditions) – at the level of either the individual or the firm – is a complete abstraction. In fact, even if agents are supposed to make rational decisions, their aptitude to do so is seriously limited. The concept of bounded rationality was updated by Simon (1957), who referred to "the capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behavior in the real world — or even for a reasonable approximation to such objective rationality" [SIM 57].

The complexity of current operations and uncertainty are so acute that individuals cannot perform truly rigorous calculations. They simply do not

have all the information that would be necessary for making decisions. Moreover, even if they had all the information, they would not be able to store or process it.

2.2.2.1.2. Opportunism

The second category of factors at the core of transaction costs is linked to opportunistic behavior. This type of behavior involves the agents acting in their own interest, to the detriment of that of partners, and seek to achieve supplementary gains or take ownership of a part of the surplus that would have otherwise been destined to other partners (hold-up behavior). The opportunist seeks individual interest through cunning [WIL 81]. This result can be explained by a gap in information, which may have led to different appraisals of the situation or the non-respect of engagements. The feeble number of protagonists equally enhances the opportunist's behavior. [WIL 75] further distinguished between the "small numbers *ex ante*" and the "small numbers *ex post*".

> "Transaction costs appear when -starting at a largely competitive situation- the execution of the contract itself transforms the commercial relation into a dependency bond between the parts, because these progressively acquire specific experiences or are invited to make specific investments linked to the contract's execution. When the moment comes to renew the contract, the parties will have more difficulties in changing partners and will find themselves, in a certain measure, locked in the bilateral exchanges" [GAR 91].

This eventually leads partners to a situation similar to that of "bilateral monopoly" [WIL 75]. Opportunism entails a degree of "moral hazard" or "moral peril" [WIL 81] over the different partners of a transaction (or cooperation) in the measure that personal aims can be pursued to the detriment of collective interest. Here, we may also refer to information opacity, which amply results from uncertainty, opportunism and limited rationality [WIL 75]. Information flows are not necessarily known to all of the agents; those who are not involved in the transaction will not be able to acquire this piece of information, which has a supplementary cost. Williamson made a difference between *ex ante* opacity (which exists at the beginning of negotiations) and *ex post* opacity (which develops during the execution period of the contract). He later made a distinction between *ex ante* and *ex post* transaction costs.

2.2.2.2. *The features of transactions*

Apart from analyzing its costs, Williamson also described the appearance of a transaction. Inspired by Coase, Williamson reminded us that transactions reunite three features:

– specificity, a fundamental aspect;

– uncertainty degree;

– frequency with which the transaction takes place.

2.2.2.2.1. Specificity of assets

This refers to the existence of a "specific" investment inherent to the transaction, which entails a cost (this is related to the notion of *sunk costs*). The concept of asset specificity can be interpreted in terms of complementarity and re-deployment. The assets are specific when they are complementary. In this way, their cooperation engenders a quasi-rent regarding their use without cooperation [BRO 89]. These assets cannot be easily re-deployed because they are specialized.

> "Specificity is the attribute of resources which determines that their productive value is much higher within a particular process –for which they are being the object of the transaction- than in any other type of activity" [GAF 90a].

2.2.2.2.2. Uncertainty

The second most important attribute of a transaction is uncertainty in relation to the environment where it shall take place. In fact, "the different states of nature" cannot be known with certainty or precision, nor even be imagined, because the ability of agents to conceive plans is dramatically reduced and their rationality is limited. There is a distinction between risk and uncertainty [KNI 21]. Risk can be assessed in terms of probability and can be measured. In contrast to this, uncertainty cannot be measured through a probability distribution because of its random character.

2.2.2.2.3. The frequency of transactions

The more a transaction takes place, the more the agents have an interest to organize it in the long term. In fact, in a situation where the three factors are combined, it is important to save the resources involved in the transaction. As we have previously mentioned, these factors are asset specificity, uncertainty and frequency of transactions.

Williamson summarized his ideas in a diagram representing the direct relations between limited rationality, uncertainty and complexity, as well as opportunism and the small numbers. Opacity can generate situations leading to small numbers. The advantages of internalization according to [WIL 75] can be summed up in five major points:

– when market relations become too complex and contracts become unenforceable, the organization facilitates sequential and adaptive decision-making;

– in the face of small numbers, internalization makes it possible to decrease the bias toward opportunistic behavior;

– it favors the reduction of uncertainty;

– internal organization combats information opacity and reduces the propensity toward strategic behavior;

– a generally more satisfying environment is obtained.

2.3. Alliance, market and hierarchy

Coase was not interested in the intermediate forms of organization, equally known as "quasi-internalization", "quasi-integration" or cooperation. It was other authors, namely Williamson, who provided an explanation for the existence of these intermediate forms. On the basis of transaction costs, two tendencies can be drawn concerning the triptych "alliance, market and hierarchy". The first trend considers alliances as an intermediate form between market and hierarchy [HEN 88, HEN 89, HEN 90b, IMA 84]. The second approach privileges alliances as an alternative form to market transactions and hierarchy [RIC 72, CIB 91]. This distinction basically unveils the difficulty of defining the notions of market and hierarchy with accuracy.

2.3.1. *The alliance, an intermediate form between market and hierarchy*

Williamson built on the works of Coase and Chandler. [CHA 88] was particularly interested in the dynamics of competition and cooperation in the US railway industry between the 1870s and the 1890s. He studied and identified the beginnings of active cooperation between private firms in the sector, a totally unprecedented phenomenon at that time.

Williamson conceived the possibility of a "hybrid mode of organization", a distinct set of intermediate situations combining market mechanisms with administrative procedures. In this perspective, Williamson was followed by other authors.

Still, [WIL 81] grew beyond the classic dichotomy market/hierarchy. He mainly focused on the most effective *governance structure*: the market, the company and the "mixed" forms, including *franchising*. It is interesting to observe that Williamson long denied the fact that these forms could even exist, before having to admit that they were, in fact, widespread.

> "Whereas I was earlier of the view that transactions of the middle kind were very difficult to organize and hence were unstable, on which account the bimodal distribution was more accurately descriptive (Williamson, 1975), I am now persuaded that transactions in the middle range are much more common" [WIL 85].

Alliances reduce transaction costs without having to bear an increase in organizational costs. They limit market utilization costs because they are generally focused on the long term. They equally make it possible to reduce information imperfection, to soften opportunistic behavior and reduce aversion to risk and uncertainty.

In a situation where there is a conjunction of the three factors (asset specificity, uncertainty and transaction frequency), it is important to save the resources involved in the transactions. The higher the level of uncertainty surrounding a transaction, the more expensive it will be to resort to contracts to coordinate the successive stages of production, and the stronger the incentive to internalize. Williamson considered that each type of transaction can be associated with a type of management structure (see Table 2.1), thus resulting in four different situations:

– The first case is that of the market. This type of coordination is more effective in the case where an investment is unspecific or where transactions are not recurring. It propitiates "classical contracts", aimed at standardizing products. It is more a question of sales rather than contracts. Opportunism risks are limited thanks to the existence of substitutability between partners and the virtual absence of "small numbers";

– The second case is that of three-sided structure. Transactions are subjected to a relatively high degree of specificity, what leads to a "small number" context, risking opportunism. The choice of an integrated structure

is not justified (non-recurring transaction). A third party (arbiter) is in charge of solving possible conflicts and evaluating performances;

– The third case is that of an internalized structure which becomes imperative when the asset is very specific and utilization frequency is very high. Indeed, such a situation leads to a major risk of opportunism;

– The fourth case particularly strikes our attention in the measure that it resonates with inter-firm cooperation. It refers to bilateral contracts in which the autonomy of each party is respected and every partner has a trustworthy commitment toward another. Resorting to such formulas is appealing when relatively specific assets are the object of frequent transactions. This negotiation formula costs less than internalization [GLA 92].

Type of investment **Frequency**	**Unspecific**	**Moderately specific**	**Idiosyncrasy**
Weak	Market structure (classical contract)	Three-sided structure (with arbitration) (neo-classical contract)	
Strong		Two-sided structure (personalized contract)	Internalized structure

Table 2.1. *Management structures and typology [WIL 86]*

Several agreements have been analyzed thanks to the theoretical framework suggested by Williamson (see Table 2.2). This is particularly true of the joint venture (JV), a privileged agreement in international economic relations (see Chapter 8).

Kogut studied the reasons behind the creation of a JV [KOG 88a, KOG 88b]. He considered that this can be explained with the help of three theoretical approaches: "transaction analysis", the study of strategic behavior (see Chapter 5) and finally, organizational learning. Kogut explained the extent to which the JV differs from other organizational forms, and more precisely, under what conditions a JV will be preferred to a contract. Two elements are involved in this choice: on the one hand, there is the question of sharing the assets' ownership and control and, on the other hand, there is the question of how to manage joint resources. It is the combination of two factors, namely a high degree of asset specificity and the uncertainty over the definition and control of performances that lead to the creation of a JV rather than signing a contract. To illustrate this point, Kogut identified two categories of JV.

Themes	Authors
Cooperation and resource allocation system	Imai and Itami [IMA 84]
Joint venture (JV) agreement	Kogut [KOG 88a, KOG 88b]
JV and company multi-nationalization	Hennart [HEN 88, HEN 09] Beamish and Banks [BEA 87] Svejnar and Smith [SVE 82, SVE 84]
Mutual organization	Thietart and Kœnig [THI 87]
Alliance, clan, network, market and hierarchy	Richardson [RIC 72] Ouchi [OUC 80] Jarillo [JAR 88] Ciborra [CIB 91]
Vertical integration (empirical works: aerospace, automotive industries)	Masten [MAS 84] Walker, Weber [WAL 84] Walker, Poppo [WAL 91] Monteverde, Teece [MON 82]
Licenses	Teece [TEE 81]
Costs associated to different organizational forms	Williamson [WIL 91]

Table 2.2. *Transaction costs theory: a conceptual framework of different organizational forms*

The first category represents a vertical investment for a firm and a horizontal investment for the partner. In this case, the JV replaces a simple supply contract. The alliance is the result of an advantage in terms of production costs for the supplier, associated with the risks run by one of the firms (or both) involved in the agreement. There are different types of risks: market-related information possessed by the firm placed downstream, the use of new technologies and the quality of the supplier's services. The JV makes it possible to solve these problems by stabilizing the agreement on how to share the costs and benefits. As Williamson cleverly observed, the agreement is stabilized through "mutual hostage exchange" via a shared commitment of financial or real assets, as well as incentive mechanisms.

In the case of contracts where there is no financial participation, cooperative behavior may be adopted, but this requires more stringent conditions than a JV. In order to prevent opportunism, the contract must clearly stipulate all the rules of conduct and obligations. In a JV, initial commitments and profit-sharing rules are specified, parallel to the introduction of administrative procedures for monitoring and evaluation.

The second type of JV refers to a horizontal investment made by both firms. Companies combine their efforts in one (or several) fields of activity along the value chain. This case appears to correspond to the alliance of type Y, defined by Porter (see Chapter 1). The characteristic of this more complex JV is that it employs assets that are likely to devalue: technological advantage, reputation and image related to a trademark. In fact, it is the initial complementarity between the partners' assets that motivates joint cooperation (see Richardson) and which can encourage innovation in the first place. It may also give rise to a transaction risk problem for the externalities related to imitation and technology (see Chapter 4). This type of behavior would then push the other contracting party to reduce the amounts of goods produced or to increase their prices. A JV solves these problems through the creation of a homogeneous asset management structure controlled by both firms through ownership and rights control.

Ultimately, resorting to a JV is recommended when uncertainty about the outcome is high and when the assets of one firm (or both) are specific, because this strategy avoids having to face the high cost of fully acquiring a firm.

2.3.2. *The alliance, an alternative form to market and to hierarchy*

Some authors have tried to expose the need to reduce divide between those transactions made within the firm and those made on the market, thus permitting a better apprehension of the phenomenon of cooperation. In contrast to previous works, they considered that the alliance is an alternative form, different from the market and hierarchy.

2.3.2.1. *Alliance, clan, market and hierarchy*

[CIB 91] developed a typology in which alliances, far from being hybrid arrangements, constitute a completely new form, independent of that of markets, hierarchies and clans. [CIB 91] took up the concept of clan, developed by [OUC 80], based on reciprocity, the legitimacy of authority and the belief in common values.

Control mechanism	Normative conditions	Informative conditions
Market	Reciprocity	Price
Bureaucracy	Reciprocity Legitimacy of authority	Regulations
Clan	Reciprocity – Legitimacy of authority Common values and beliefs	Traditions

Table 2.3. *Different organizational forms [OUC 80]*

In this typology, agents have a limited capacity to influence the market and mainly depend on local information. Hierarchy possesses a greater capacity to process information, but has limited learning capacities, a certain inertial bureaucracy. On the contrary, the cohesion within a clan or a group is strong because its members share values, implicit traditions and common aims, all of which practically erase the possibility of opportunistic behavior. Also, clans rely on a dense but flexible communication network. This is their greatest asset.

The alliance simultaneously shares the features of the market and the clan. While it has a weaker capacity to manage information than a clan, it favors flexibility, trust and learning more than markets do. As an organizational form, the alliance can establish itself more rapidly than a clan or a hierarchy, thus revealing a higher dynamic efficacy. In some ways, it represents a decentralized form of organization, combining high levels of autonomy, certain market elements and limited opportunism.

[JAR 88] equally completed the analysis of [OUC 80] by adding a fourth category to the three forms, which have recently been mentioned (market, clan and bureaucracy). This is the strategic network that enables a large company to maintain dense and regular relationships with other companies. Contractual relations that are often knit within networks may, in certain cases, be assimilated to full-fledged alliances. The question of inter-organizational networks will be studied in Chapters 5 and 6.

	Relational practice	
	Zero-sum game	**Non-zero-sum game**
Hierarchy	Classical market	Strategic network
Legal form	Bureaucracy	Clan

Table 2.4. *Four organizational modes of economic activity [JAR 88]*

2.3.2.2. *Richardson's approach*

Richardson first defined cooperation as a coordination mechanism. From his viewpoint, as indicated by [DUL 94]: "co-operation represents the *output* of the agreement: the agreement aims to produce the cooperation process itself, the partners work together and coordinate their activities with distant objectives in view."

Contrary to this, when cooperation is considered as an input, it "dissolves in its own materialization, because each of the partners separately exploits the pool of assets constituted by the agreement" [DEL 91a].

[RIC 72] considered the broad variety of inter-firm cooperation forms:

> "What confronts us is a continuum passing from transactions, such as those on organized commodity markets, where the co-operative element is minimal, through intermediate areas in which there are linkages of traditional connection and goodwill, and finally to those complex and inter-locking clusters, groups and alliances which represent co-operation fully and formally developed. And just as the presence of co-operation is a matter of degree, so also is the sovereignty that any nominally independent firm is able to exercise on a *de facto* basis, for the substance of autonomy may often have been given up to a customer or a licensor." [RIC 72]

On the basis of this observation, he developed the idea that cooperation is not a form of intermediary organization between the firm and the market, but an alternative form to market transactions, which constitutes a different viewpoint from the perspective of transaction costs. As stated in [RAV 90]: "Richardson aims to formally set up the role of inter-firm cooperation as a relevant phenomenon in the study of industrial activities coordination."

This approach sets the author apart from the majority of inter-firm cooperation analysts, who have generally assimilated the concept of cooperation to a hybrid form of organization, which combines the advantages of hierarchy to those of the market [IMA 84, AOK 88].

> "The dichotomy between firm and market, between directed and spontaneous coordination, is misleading; it ignores the institutional fact of inter-firm cooperation and assumes away the distinct method of co-ordination that this can provide" [RIC 72].

From the viewpoint of [RIC 72], the theories of the firm do not explain the principle of labor division between firms and markets, or the multiplicity of alliances models. This is due to a partial perception of the firm, which limits it to a productive function, neglecting other essential elements such as organization, knowledge, experience and skills.

Basic assumptions made by [RIC 72] are closely related to the concepts of similarity and complementarity. The notion of industry is introduced as accompanying a very large number of activities, which may represent different phases of a production process (R&D, production, sales, etc.). These activities should be carried out within organizations on the basis of appropriate competencies. The author considers that the activities of a firm have a strong tendency to be similar and that complementary activities must be coordinated from quantitative and qualitative viewpoints. While activities described as similar are those that require an exercise of identical abilities (same knowledge, same experience, same qualifications), complementary activities are those that correspond to the different phases of the same production process.

The coordination of economic activities finally comes down to an analysis of the complementarity of the different forms of organization at hand:

– *direction*: the activities are subject to a unique control and integrated in a coherent plan;

– *cooperation*: two or more independent organizations agree on how to harmonize their plans beforehand;

– *market transactions,* in the context of "spontaneous coordination".

There is a labor division between management and other forms of cooperation in economic activities. The nature of the division depends on the complementarity and similarity of tasks. When the activities are similar and complementary, they are coordinated by the organization (hierarchy). When activities are closely complementary but dissimilar, they need to be coordinated *ex ante* through the implementation of cooperation agreements between firms. Finally, when activities do not require any kind of qualitative coordination, they are the responsibility of the market.

In sum, the contribution of [RIC 72] can be applied to operations in which a vertical type of cooperation takes place, but it suffers from certain limitations for strategic alliances.

In more recent works, [RIC 03] revisited the arguments of his 1972 article and once again stressed the importance of the thorny question of cooperation, which still remains to be addressed.

2.4. Limitations of the contribution of transaction costs theory to the analysis of strategic alliances

Two series of critical observations can be made in relation to the theory of transaction costs. The first one is linked to the very concepts of this analysis and, more particularly, to the notion of transaction costs. The second one has to do with the fact that this theory cannot account to explain the "Why" and the "How" of cooperation practices. By itself, the theory of transaction costs can barely explain the choice of one organizational mode over another [GUG 91]. It may well justify the contractual or internalized efficacy of organizations, but does not account for their prime motives [DEL 91a].

2.4.1. *Issues associated with transaction costs*

It is advisable to undermine the commonly held view that contractual agreements make it possible to avoid both transaction costs and organizational costs [DEL 89].

2.4.1.1. *Persistence of transaction costs in the context of alliances*

Alliances do not systematically eliminate transaction costs, particularly those associated with opportunism, even if this behavior is largely mitigated in the context of more formal cooperation modes than joint ventures. However, even in this case, [HEN 88, BEA 87] highlighted that the incentives for opportunism do not completely disappear. In fact, each partner could eventually find it more rewarding to maximize his/her own gain to the expense of the agreement. The efficacy of a JV finally depends on the type of aims pursued by the agreement partners.

This is also the case for mutual organization, which is formed in such a way that the partners behave in the interests of all.

On the contrary, while licensing agreements help avoid certain costs related to the creation or acquisition of a production unit, they nevertheless generate transaction costs. Several difficulties related to transactions were identified by [TEE 81] and summarized in three terms: identification (recognition), disclosure (communication) and organization in collective work.

To be specific, different types of costs can be identified. Firstly, there are costs linked to searching negotiation partners and problems related to contract execution and control. It is necessary to carry out the negotiations, establish (draft) the contract and verify that the terms of the contract have been respected. Nevertheless, the transfer of knowledge and technological or managerial expertise are private pieces of information, demanding a degree of reserve concerning the divulgation of the contents. Hence, there is a "fundamental paradox" of information, as was pointed out by [ARR 71]. The talent of the salesperson comes down to "partially" disclose his know-how before a contract is signed in order to reduce the buyer's uncertainty, who would courageously accept the risk of such a transaction.

There are also costs associated with the risk of dissipation of transferred technological advantage: this risk grows bigger when the appropriation regime is weak (insufficient legal protection), and opportunistic behavior on behalf of one of the partners cannot be taken for granted (see Chapter 4).

Finally, there are the costs attributable to the risk of loss in the final quality of the product. [HOR 87] particularly insisted on this point: "the existing reputation of a product engenders a consequence: every license agreement encourages the license holder to keep up with the reputation of the product and thus gives him a motive for internalizing transactions."

2.4.1.2. *Underestimation of other costs*

This theory largely underestimates the various types of costs associated with different organizational modes. We may wonder up to what extent transaction costs are more significant than other types of costs, such as transportation, production or distribution costs.

Business surveys such as the one carried out by [MAR 83] concluded that the reduction in transaction costs is not a driving force in business agreement strategies. In their research, these two authors were expecting to find that the aim of cooperation was to reduce not only the transaction costs of specific contracts but also other legal or otherwise identifiable costs. For this, they interviewed various business executives across all sectors to determine whether transaction costs were significant in their decision for entering into alliances. In all cases, the executives argued that the avoidance of transaction costs was not a fundamental gauge in their decision-making scheme.

Another interesting study carried out by [WAL 84] showed that when confronted with the choice *"to make or to buy",* the executives of an American automotive firm made their decision focusing exclusively on production costs and ignoring transaction costs. Both authors confirmed the influence of transaction costs on the decision of whether to manufacture components or to purchase them through the effects of competition on the supplier market, as well as the uncertainty factor surrounding desired volumes and technology. The author's hypothesis was that in addition to transaction costs, decisions were predictable under the light of a buyer's previous productive experience, as well as by comparing production costs between the buyer and the supplier. The results revealed the pre-eminence of production costs involved in the decision, which could also be explained by the complexity of the components.

2.4.1.3. *Partial analysis of strategic alliances*

Williamson did not establish an alliance typology. However, he associated a particular management structure to each type of transaction (Table 2.1). Among the different types of contracts he identified, he particularly focused on the "framework contract", which implies a long-standing relationship between the partners. This contract symbolizes outsourcing relations. From this perspective, an alliance is reduced to a simple form of vertical integration. It would then seem that the theory of transaction costs:

> "is most fertile when analyzing and modeling the relations between actors at the different stages of the economic sector *(filière économique)* that is to say, essentially, during vertical integration [...]. The approaches derived from the theory of transaction costs, including the *scale/link* problematic, do not clearly distinguish between the alliances of competing firms from the whole range of inter-firm cooperation" [DUS 91].

Since the beginning of the 1990s, alliances have mostly taken place between rival firms. The reduction of transaction costs does not systematically constitute the major reason for forging strategic alliances.

Besides, the theory of transaction costs neglects the sectoral dimension and leads to difficulties in interpreting strategic alliances, particularly in high-tech sectors. As noted in [RAI 88], because of the uncertainty associated with R&D and the specific investments that this industry requires, such an activity cannot be separated from production. On the contrary, this situation calls for integration into the company. Yet,

> "Cutting down on transaction costs is simply not enough for explaining why an alliance should take place in a very innovative sector. Reasoning in terms of transaction costs should always entail the use of internalization under these conditions. However, practice has shown the opposite: it is mainly in the high-tech sectors where the alliances take place. Firms invest enormous financial resources and undertake strategic investments" [CIB 91, p. 55].

2.5. Conclusion

The theory of transaction costs has given rise to numerous works in the field of not only economics but also strategic management. In particular, a closer understanding of hybrid forms of organization (cooperation agreements, *joint ventures, franchising*, etc.) has been made possible thanks to this conceptual framework. Two broad categories of agreements must be distinguished. Transaction costs have a certain degree of explanatory power over well-defined cooperative structures [CIB 91] such as the formation of joint ventures. However, these explanatory factors are insufficient to account for more flexible forms of cooperation and of the lesser defined factors such as strategic alliances.

3

Cooperation, *Open Innovation* and Property Rights

3.1. Introduction

The theory of property rights developed by [ALC 65] and [DEM 67] aims to explore the relationships between property and contracts. Property rights are fundamental rules that constitute the basis for production, exchange and distribution [DAV 71].

The theory of property rights is at the heart of the agency theory (see Chapter 4), but it is often difficult to clearly distinguish between both theories. This is because the contractual conception of the firm predominates in both analyses. On the other hand, the agency theory largely alludes to property rights because their structure plays a fundamental role in both individual decisions and contracts.

In this chapter, the stress is placed on intellectual property, and patents in particular (section 3.2). Section 3.3 introduces the main teachings of the property rights theory. Cooperative behavior is analyzed, in terms of both "traditional" inter-firm alliances (section 3.4) and *open innovation* practices, which have refreshed the debate on intellectual property (section 3.5).

Inter-firm alliances are frequently found in very innovating sectors, chiefly in a context of digital transformation. Emerging technologies in the market are not systematically and totally protected by property rights. These can no longer be adequate, either because they are too old or because they are difficult to establish and are therefore insufficiently precise; this encourages innovating

Cooperation, Coopetition and Innovation, First Edition. Nabyla Daidj.

firms to internalize asset transaction either within their own structures [DEM 88] or through alliances with other firms.

It is also advisable to highlight the importance of intellectual property in the current global innovation ecosystem, which is often described as increasingly open and collaborative. While the patents' battle is fierce between large enterprises (Samsung, Apple, etc.), *open innovation* practices continue to develop, which leads us to reconsider the property rights issue.

3.2. The patents contest

Firms are creating more and more knowledge in numerous sectors, which elicits numerous property rights-related questions. This section is especially dedicated to patents, which are undoubtedly the most important form of intellectual property for firms. It is not surprising that patents are considered as intangible assets.

3.2.1. *Overall view: the notable growth of patents*

The World Intellectual Property Organization (WIPO) has defined different categories of intellectual property in these terms:

3.2.1.1. *Patents*

A patent is an exclusive right granted over an invention. Broadly, the patent confers on its holder the right to decide whether – and how – an invention may be used by third parties. In return, the patentee discloses specific technical information to the general public by publishing invention-related information on the corresponding patent document. Thanks to this mechanism, patents help determine the date, place and author of an invention. At the same time, the PCT[1] (Patent Cooperation Treaty) system provides users with the possibility of applying for patent protection of an invention in several countries, through the filing of a single international application.

1 "This facilitates the acquisition of patents rights in numerous legal jurisdictions at the same time. It simplifies the multinational filing procedure by deferring the need to file a separate application in each jurisdiction where protection is sought. However, the decision whether or not to grant a patent remains the prerogative of national or regional patent offices, and the rights conferred by the patent are exclusively limited to the jurisdiction of the administration which issued the document. There are currently 148 Member States under the PCT system." [OMP 14].

3.2.1.2. *Copyrights*

Copyrights is a legal term referring to the rights that creators enjoy over literary and artistic works. Work protected by copyrights range from books, musical pieces, paintings, sculptures and films, to software, databases, advertising creations, maps and technical design.

3.2.1.3. *Industrial designs*

Depending on the national regulation considered and the type of industrial designs, these can be protected under industrial design law as a "registered design" or under patent law as "design patents". Industrial designs may also be protected as works of art under copyright law (WIPO 2014). In certain countries, industrial design protection and copyrights are cumulative. In other countries, they are mutually exclusive, meaning that from the moment the patent holder has chosen a type of protection, he/she is not entitled to claim another one.

3.2.1.4. *Trademark*

This is a sign that distinguishes the products or services of a company from those of other companies. Trademarks are protected intellectual property rights. At a national or regional level, protection of a trademark may be obtained by registration, by filing an application for registration with the national or regional trademark office and by paying the required fees. At an international level, there are two possibilities: filing an application for registration with the trademark office of each country where protection is sought, or using the Madrid system of WIPO. The Madrid system is a complete solution for the registration and management of brands worldwide. By filing a single application in one language and paying a single set of fees, we can ensure the protection of a trademark in the territories covered by 114 members.

Investment category	Patent	Author's rights	Industrial design / sketch	Trademark
R&D	X		X	
Software	X	X	X	
Design	X	X	X	X
Creative work		X		X
Publicity		X		X

Table 3.1. *Different forms of intellectual property (adapted from [GIL 08], quoted by WIPO, 2012)*

According to the most recent statistics of the WIPO (2016), all forms of intellectual property are rapidly increasing (Table 3.2).

	2014	2015	Growth (%)
Patent applications	2,680,900	2,888,800	7.8
Applications for trademark registration	7,426,900	8,445,300	13.7
Applications for registration of industrial designs	1,137,500	1,144,800	0.6

Table 3.2. *Increasing importance of intellectual property (WIPO, 2016)*

Nonetheless, patents still remain one of the most widely used technological indicators. The strong and continuous growth of international applications for registered patents is a phenomenon that dates back to the 1990s and has been observed not only in several European countries, but also in the United States and Japan. In 2015, China played a major role in the record increase of patent applications worldwide, totaling 2.9 million. According to WIPO figures (2016):

> "In total, innovators filed some 2.9 million patent applications worldwide in 2015, up 7.8% from 2014, higher than the 4.5% growth rate in 2014. Resident filings, where innovators filed for protection in their home economy, accounted for around two-thirds of the 2015 total.
>
> China's patent office received 1,101,864 filings in 2015, making it the first office to receive more than a million applications in a single year – including both filings from residents in China as well as from overseas innovators seeking patent protection inside China. This totaled almost as many applications as the next three offices combined: the U.S. (589,410), Japan (318,721) and the Republic of Korea (213,694)."

As shown in Table 3.3, the distribution per company reflects the general trends already observed at a national level:

Ranking 2013	Name of the applicant	2013 PCT Applications	2012/2013 Variation
1	Panasonic Corporation (Japan)	2 881	–109
2	ZTE Corporation (China)	2 309	–1 597
3	Huawei Technologies (China)	2 094	293
4	Qualcomm Incorporated (United States)	2 036	731
5	Intel Corporation (United States)	1 852	1 212
6	Sharp Kabushiki Kaisha (Japan)	1 840	–161
7	Robert Bosh Corporation (Germany)	1 786	11
8	Toyota Jidosha Kabushiki Kaisha (Japan)	1 696	43
9	Telefonaktiebolage Lm Ericsson (Sweden)	1 647	268
10	Koninklijke Philips Electronics (the Netherlands)	1 423	193

Table 3.3. *Main applicants for 2013 (WIPO, 2014)*

3.2.2. *Patents and innovation: the theoretical economic debate*

Several researchers have concentrated on the close links between innovation and patents. With regard to patents, the main focus of the debate is whether patents are rather an obstacle or an incentive for innovation. "In the simplest case, when a patent corresponds to a single product and knowledge is not cumulative[2], it is clear that patents will encourage innovation" [HAL 09]. In the 1980s, the theoretical literature on patents suggested that patents could lead to a large number of innovations [WRI 83, REI 89]. As stated by Blind *et al.*:

2 There are many categories of knowledge. We generally oppose (coded) *explicit knowledge* to *tacit knowledge*. Cumulative knowledge builds upon previously stored expertise.

> "Several authors (Jaffe and Lerner, 2004; Shapiro, 2003) have warned against the innovation-hindering effect of patents. Several explanations for this phenomenon have been provided by the specialized literature, although none can account for the whole story (Jaffe, 1999). First, it is argued that the R&D process became more efficient or more differentiated thanks to a deeper division of labor, leading to a higher number of inventions, and therefore of patents per unit in terms of R&D expenditure (Janz *et al.*, 2001). Second, patent applications were extended to promising and expanding new fields of technology (Kortum and Lerner, 1999), like biotechnology (for example Thumm, 2003) and software (e.g. Blind *et al.*, 2005). Third, patent strategies changed and became more complex and comprehensive, leading to an expansion of patent applications (Blind *et al.*, 2004)" (p. 428).

Patents have become truly strategic weapons, which contribute to strengthening the firms' market positioning as well as their competitive advantages (see Chapter 5). It is no longer a matter of protecting an invention and/or generating revenues (royalties) with a defensive approach. Motivations are now multiple and can be more offensive. [PEE 06] stressed the importance of preserving market share and/or a temporary monopoly in a specific market through the use of a *sleeping patent* strategy.

> "Patent filing is systematically encouraged even if it is not planned to industrialize the invention (simply because the company does not want to cannibalize its sales made with old products). This may be partly due to the desire of protecting the results of R&D in order to hamper the technological progress of competitors (strategic reason) or because the company is expecting to issue later licenses – and thus value the current patent via the "technology market". In this case, we would dealing with a so-called dormant patent, neither exploited directly by the licensee nor indirectly by another firm in the eventuality of a license contract" [LEB 10].

This strategy has also become a means of communication in markets as a signal for competitors. The use of patents makes it possible to enforce negotiation means (partnerships, competitors), to acquire knowledge and/or technology [HAL 01], to make economic intelligence, to discourage the entry of new competitors or to carry out financial and fiscal valuation

operations [UEL 10]. Because of the importance of patents, litigation risks intensify and innovation issues play an important role in making a legally valid decision.

Patent documents contain substantial sources of information regarding inventions, which cannot easily be acquired and are in fact an important complement to traditional sources of information. Since the late 2000s, there have been significant patent battles in the sector of Information and Communication Technology (ICT/IT). These intellectual property (IP) disputes of ICT companies have been closely linked to not only the counterfeit of patents and of underlying technological inventions but also the design of mobile products (mainly smartphones and tablets), as shown Figure 3.1.

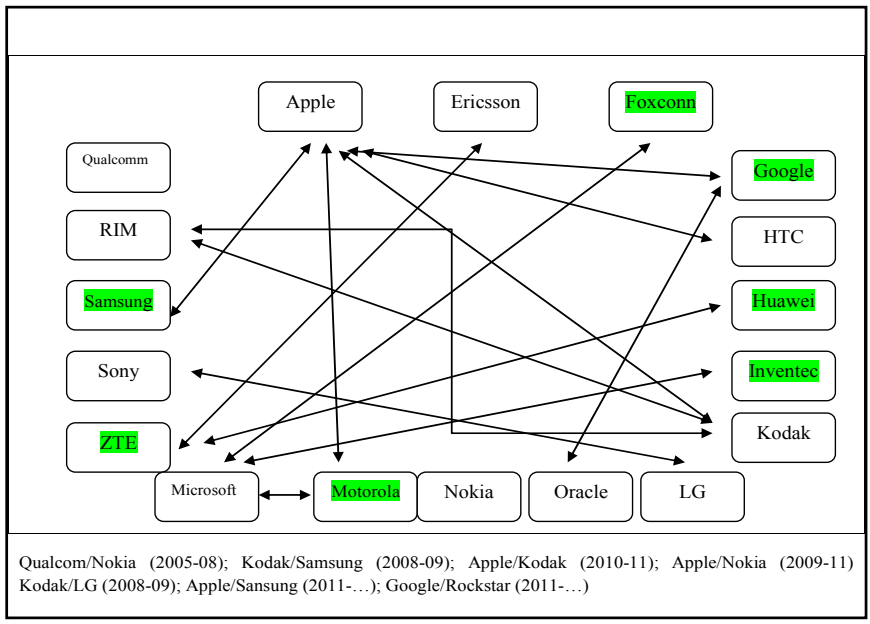

Figure 3.1. *Patents: a strategic weapon (adapted from [REU 12], quoted by WIPO (2012) and updated by the author)*

3.3. Property rights and firms

The contribution of Armen Alchian and Harold Demsetz devoted to "the theory of the firm" published in 1972 in the American Economic Review is today considered a "classic". Alchian and Demsetz started their reflections by observing that individuals and firms are determined by property rights.

Recognition of the complex nature of the firm led the authors to reject the vision of microeconomic theory, in which the firm is considered as a "black box" and the organization seen through "holistic" lenses.

3.3.1. *Definition and fundamental features of property rights*

Property rights enable individuals to know what to reasonably expect from their relations with other individuals [DEM 67].

> "Property rights do not regulate relations between men and things, but rule relations between men, who also happen to have a relation to the use of things" [PEJ 69].

These rights share two characteristics: exclusivity and transferability. There are three aspects to the exclusivity of ownership rights for the holder: the right to enjoyment (*usus*), the right to dispose of it freely (*abusus*) and the right to receive an income derived from it (*fructus*).

> "Private property is a particular type of legal regime in which the property rights which govern the relations of men regarding the use of things constitute subjective, individual, exclusive and freely transferable rights" [LEP 85].

The social recognition of these rights invites individuals to freely transfer them: "in the context of contracts clearly defining the conditions of transfer, as well as the nature of the compensation" [PIC 92].

Consequently, there is private ownership of resources – and in particular ownership right – from the moment that the object is the exclusive property of a person who has the power (if he/she wishes and in the context of an exchange) to temporarily or permanently assign its use to a third party.

3.3.2. *A contractual conception of the firm*

The analysis of the firm performed by Alchian and Demsetz is based on a framework that heavily relies on very precise behavioral hypothesis about individuals, particularly the concept of *homo œconomicus,* according to

which economic agents maximize their utility function via the search for their individual interest. It would then be individual behavior that could account for the firm's behavior.

Traditionally, the firm has been characterized by the hierarchal nature of relations (grounded in founding principles like authority and discipline) at the heart of the organization, as opposed to transactions, which correspond to – *a priori* – freely negotiated contracts. [ALC 88] explained that the firm is like a nexus of contracts. In their analysis, they focused on the fact that contracts are strictly linked to the function of production: a relationship between a central agent "employer/entrepreneur" and an employee. These contracts define the conditions under which the employer will have access to the resources made available through it. Nevertheless, even if these contracts try to anticipate any problems that may arise, they cannot foresee everything.

Coase's questions around the delimitation of boundaries between the market and the firm, mentioned in Chapter 2, can be found again in the works of [ALC 72]. In response to Coase and in contrast to Williamson, [ALC 72] placed a strong emphasis on technology in order to account for the existence of firms. What traces the boundaries between firms is technological inseparability. On the basis of this idea, they introduced into their analysis the notion of "joint production". They considered that the need for an organization stems from the technological advantage that can be derived from working in production teams.

[ALC 72] offered a model of the entrepreneurial firm as an example of "team production". The process of production performed in a team generates gains at the level of labor division that are higher than those resulting from the sum of individual production processes: "the output is yielded by a team, by definition, and it is not a sum of separable outputs of each of its members" [ALC 72].

However, in the case of joint production, it is difficult to determine the marginal productivity of the individual factors of production. This mode of collective production can induce "cheating" (*shirking*) behavior on the part of individuals who seek their interest more than anything. Therefore, it becomes essential to assign a supervisory function to a "controller" who will be responsible for assessing the personal contributions of the various agents of the production team:

> "The contractual structure is thus introduced as the means through which team production can be efficiently organized. In particular, this arrangement reinforces the ability to detect cheater behavior among members of the production team (detection costs are reduced) and, through a contract review, discipline by the central agent becomes more efficient" [ALC 88].

As it has been explained by [JOF 87] and conceived by Alchian and Demsetz, the key to the solution for the problem of firm control and its efficiency lies in the dissociation of the "controller's" wage and the salary of the organization's members. This central agent then becomes a "residual creditor", meaning that he/she receives a (residual) income once all the costs have been covered. It is for his function as a manager or a coordinator of the whole of the company's activities that the controller is paid for. As [LEP 85] pointed out, we can consider that: "It is not in the ownership of capital that the right to profit is grounded, but in the entrepreneurial function associated with it."

According to [DEM 88], the central agent is simultaneously the employer and the owner of the firm. Nonetheless, the managing functions and the ownership of the company do rarely get confused. Shareholders delegate to a portion of their authority to the managers, but there cannot be open divergences of interest between shareholders and managers because they all maximize their utility, be it on the firm's internal or external markets.

Alchian and Demsetz rejected the idea that authority relations within the firm differ from those existing in the market. Furthermore, they esteemed that the difference between the firm and the market is not based on authority. Within the organization, there is no need to resort to authoritative control, and questions around power and constraint disappear; there is no contract asymmetry and renegotiations with the central agent take place regularly.

Other authors, including Coase, disputed this argument because it neglects an essential aspect of product organization within the firm. In fact, authority is a factor that distinguishes the contracts within the firm from those that are established on the markets.

> "At this stage, it is important to note the character of the contract into which a factor enters that is employed within a firm. The contract is one whereby the factor, for a certain remuneration (which may be fixed or fluctuating), agrees to obey the directions of an entrepreneur within certain limits. The essence of the contract is that it should only state the limits to the powers of the entrepreneur. Within these limits, he can therefore direct the other factors of production" [COA 88].

In fact, for the theory of property rights as well as for the theory of the agency (see Chapter 4), incentive mechanisms replace the systems of supervision and repression. In the measure that there exists an optimal distribution of the right of ownership within the organization, opportunism can be curtailed and cooperation encouraged.

3.4. Property rights, technological externalities and inter-firm alliances

A fundamental relationship can be established between property rights, technological externalities and the way in which these externalities are internalized. Quoting the definition of [LEP 85]: "what economists call an "externality" [is] a market failure that makes the economy less efficient and costs us all something (of unborn value)."

Alliances appear as a form of externality internalization. The absence of total appropriability is at the origin of technological externalities [SIL 91]. As [FOR 92] observed: "we tend to unanimously attribute the characteristic of public good externality (for instance, non-rivalry) to the *output* of innovation activity."

The non-rivalry property is related to the fact that the use of a good is not exclusively reserved to an agent, but can be extended to others.

3.4.1. *Property rights imperfections and externalities*

3.4.1.1. *The concept of technology and innovation*

The "traditional" theory of technology is based on the writings of [ARR 62]. It assimilates technology to the production of knowledge, as if it were a merchandise with three fundamental characteristics: indivisibility, uncertainty and weak appropriability, pretty much in the same way that

informational goods are assimilated to uncertainty: "which makes technology [...] a commodity which can neither be divided nor appropriated. For this reason, there is no incentive to allocate resources to R&D, because the real value of its output (for example, information) cannot be determined by the market forces" [GAF 92].

Information can be seen as the result of long and complex processes of accumulation and appropriation of technology [CHE 86]:

> "In particular, weak appropriability means that there is a divorce between the costs of research and the revenues derived from the exploitation of research results, because it is always possible for a firm who did not provide research efforts, to take advantage of the research results produced by others at a very low cost" [GAF 89].

The imperfection of appropriation engenders a consequence: on the one hand, it requires the implementation of organizational coordination to remediate market failure mechanisms [BEH 85, COH 92] and, on the other hand, it leads to the need for reinforcing legal regulations that safeguard property rights.

3.4.1.2. *Appropriability of innovation and externalities*

According to [DEM 88]:

> "The first function of property rights is to serve as a guide that encourages a greater internalization of externalities [...]. Changes in knowledge result from changes in production functions and individual aspirations. New techniques, new ways of producing the same goods or conceiving new ones engender beneficial or perverse effects that society is simply not used to [...]. In fact, the emergence of new property rights occurs in response to people's desires to adapt to new cost-benefit opportunities."

Now, innovation is a type of production, which, in certain cases, makes it difficult to assign property rights to the value it creates, and this also provokes the emergence of problems related to externalities.

> "As it is widely recognized, an optimal allocation of resources cannot be achieved through a market system if they are confronted with technological externalities. There are goods for which no market can be created" [ARR 84].

Delving into the works of [GRI 79, GRI 92 and GRI 95] and [MOH 91 and MOH 96], we may find that there are two categories of externalities related to technology. First, there are the productivity spillovers, innovations that provide benefits to not only the industry concerned but also downstream industries. The second category of externalities is related to the innovative industry (these externalities are also referred to as "R&D *spillovers*" or "carry-over effects"). They are rooted in the informational nature of innovation and its degree of appropriability.

[TEE 86b] described an appropriability regime of assets created by alliance. He distinguished between "codified" and easily transmissible knowledge (highly appropriable) from tacit knowledge, which is difficult to transmit and which leads to a regime of strong appropriability. This can even be reinforced if the innovation benefits from protection (patent).

Now let us consider the case where innovation efforts performed by a firm may benefit to other firms, and this at a negligible cost. These externalities lead to opportunistic behavior on the part of firms in the measure that R&D efforts made by other firms are profitable to them. We can then observe certain "passivity" from the part of firms that do not engage in a race for innovation. [HAL 04a, HAL 04b].

3.4.2. *Alliances and internalization of technological externalities*

The externalities approach favored the development of many models in which R&D cooperation is seen as a form of externality internalization. In particular, these are the models of [SUZ 92] and [BEA 88], which examine the impact of cooperation on the level of R&D expenses and the incentives for a firm to innovate.

3.4.2.1. *Cooperative and non-cooperative R&D, with externalities*

[DAS 88, DAS 90] studied the impact of cooperation on R&D efforts from a symmetric two-phase duopoly model (a "precompetitive" R&D phase and a production phase). During the first phase, companies choose a level of investment in R&D that will affect the criteria for the next phase in which prices and quantities will be determined.

This model allows them to compare cooperation with competition in R&D, and to be faced with several concepts of equilibrium: a situation of total cooperation, of partial cooperation, of non-cooperation and of *welfare* (defined as the scenario which results from adding consumer surplus to producer surplus). Consequently, the firms must choose between three options:

– to cooperate during the two phases (R&D and production);

– to cooperate only for R&D activities;

– not to cooperate at all (neither during R&D nor during the production phase).

Expenditure levels on R&D ($x1 = x2 = x$) and production (Q = $q1$+$q2$) are calculated for each of the equilibrium scenarios described above. Thus, R&D expenses (x**, x'', x*, x') and production costs (x**, x'', x*) correspond to *welfare* situations, non-cooperation and partial cooperation.

Firms have a production function with externalities. The presence of positive externalities (as measured by the ß parameter) is considered in terms of a decrease in the rival firm's production costs.

D'Aspremont and Jacquemin considered a duopoly with an opposite demand function: D−1 (Q), where Q = $q1$ + $q2$ is the produced amount. Each firm faces a Ci (qi, xi, xj) cost of production, which is a function of their own qi production, of the expenses for the xi research undertaken and the xj research expenses of the rival. In this scheme, D−1 and C functions are supposedly linear:

$$D-1 = a - bQ \text{ with } a, b > 0$$

$$Ci\ (qi, xi, xj) = [A - xi - ßxj]\ qi\ i = 1, 2\ i \neq j$$

where:

$$0 < A < a$$

$$0 < ß < 1$$

$$xi + ßxj < A$$

$$Q < a/b$$

According to the value of ß parameter, results differ:

– in the presence of important externalities (on their model ß > 0,5) over R&D profits, we obtain: x**> x''> x'> x* and Q**> Q'> Q*> Q'';

– firms which cooperate during the R&D phase, but not during the production phase, run into higher R&D expenses than non-cooperative firms in both phases and, on the contrary, reach a higher level of production (the closest to "socially optimal" level);

– in the presence of weak externalities (i.e. in the context of ß < 0,4 model), firms which cooperate neither at the R&D nor during the production phase spend more on R&D and produce higher amounts than the firms that cooperate. The *second best* balance for R&D is obtained thanks to non-cooperative behavior during both phases. Then, we get:

x**> x*> x''> x'

and:

Q**> Q*> Q'> Q''

These results were generalized by [SUZ 89, SUZ 92], and the conditions of stability for the solutions were studied in depth. For instance, [HEN 90a] confirmed the explorations of Jacquemin and d'Aspremont in the case of strong externalities. Furthermore, [SUZ 89, SUZ 92] proved that the introduction of externalities in the context of the non-cooperative model tends to favor stability. However, in the case of the cooperative model, when the level of externalities is higher, the equilibrium ceases to exist.

As we can infer, the value of ß parameter plays an essential role. According to Jacquemin and d'Aspremont, numerous factors may influence the value of ß. First, there is the nature of research. *A priori*, the results of pre-competitive, generic research are less easily appropriable and lead to more externalities than those regarding specifically applied development activities.

Moreover, the nature of the contract and the degree of perfection in information also affect the rate of externalities. On the one hand, these externalities are higher for the different partners of a cooperative agreement than for firms that do not cooperate with one another. On the other hand,

within the cooperative group itself, ß can vary according to the type of organizational arrangement, where ß = 1 corresponds to perfect communication and information use, as in the case of integrated research laboratories.

Ultimately, regardless of whether there is a patent or not, positive externalities make it impossible to fully protect the innovative firm. Cooperative behavior is privileged by the firms wishing to internalize these externalities.

3.4.2.2. *Multi-firm model generalization*

[SUZ 92] also looked into the question of cooperative and non-cooperative R&D with externalities, but this time from an oligopolistic point of view. The author compared the effects of cooperative R&D against non-cooperative R&D, particularly focusing on cooperative R&D at a pre-competitive stage, at the moment when firms become rivals in the market. Furthermore, [SUZ 92] intended to draw normative conclusions for economic policies.

In the presence of sufficiently large externalities, neither the non-cooperative equilibrium nor the cooperative equilibrium makes it possible to reach levels of *second best* in R&D. In the absence of externalities, however, while the level of cooperative R&D remains socially insufficient, the non-cooperative level should surpass the first and *second best* R&D levels.

Suzumura's analysis is conducted in the context of an oligopolistic competition model. During the first stage, firms decide to reduce the cost of R&D either cooperatively or non-cooperatively, whereas in the second stage, they engage in competition on the basis of the amounts of the product market.

The author considers that the soundness of the results offered by Jacquemin and d'Aspremont can be questioned; he intends to resume their conclusions and generalize them. As we have previously observed, Jacquemin and d'Aspremont concluded that cooperative R&D agreements between otherwise rival firms should increase the level of R&D expenditure related to the totally uncooperative case. Thus, it should be remembered that R&D externalities are large enough and that cooperative R&D does not reach the socially *first best* level.

Suzumura reminded us that [DAS 88] presented their results as if they were astounding on the basis that cooperation should reduce excessive duplication of R&D efforts in the face of significant externalities. However, he pointed out that the motivation for R&D of a single firm depends on the appropriability of R&D profits. In such a case, the presence of significant R&D externalities should drastically reduce incentives to reduce costs, with the result that voluntary R&D undertaken by a firm tends to be socially weak. From this point of view, an applicable agreement on cooperative R&D efforts seems to encourage more commitments. The result of this net effect of R&D cooperation can be explained by the relative strength of these antagonistic effects.

The objective of Suzumura is to prove not only that the second effect dominates over the first one in the duopoly example, with a linear inverse demand function and a linear marginal cost function, as described by [DAS 88, DAS 90], but also, in a wider category of oligopolistic industries, what allows them to generalize the scope of their results.

In the model, firms are engaged in two-phase competition. During the first phase, they make an irreversible commitment to R&D. In the second phase, the strategic variable is the level of production.

Suzumura then examined two types of equilibrium. The first one is non-cooperative for the phases. Under these conditions, the balance of the second stage is the Cournot–Nash equilibrium, leading to perfect equilibrium in subsets for the overall game. The second equilibrium integrates both cooperative and non-cooperative dimensions: firms are supposed to coordinate their R&D during the first stage in order to maximize their joint profits and to become rivals in the second stage. As we will see, the results are summarized in Tables 3.4 and 3.5.

	R&D	
	Non-cooperative equilibrium	**Cooperative Equilibrium**
Collective surplus	Insufficient	Insufficient
Producer's joint profits	Insufficient	Insufficient

Table 3.4. *R&D levels in the case of significant externalities (according to [SUZ 92])*

	R&D	
	Non-cooperative equilibrium	**Cooperative Equilibrium**
Collective surplus	Excessive	Insufficient
Producer's joint profits	Excessive	Insufficient

Table 3.5. *R&D levels in the case of weak externalities (according to [SUZ 92])*

Suzumura reached a number of conclusions concerning the merits (or not) of technological policies. For a start, if we compare the first and second lines in each of the tables, it appears that the conclusions are identical for the two types of welfare. In Table 3.4, the comparison of the first and second columns shows that, in the presence of large externalities, the equilibrium levels of non-cooperative R&D and of cooperative R&D are socially insufficient.

Thus, a technological policy that facilitates an additional investment in R&D marginally improves welfare (regardless of whether the firms cooperate or not). In Table 3.5, the first and second columns show that in the absence of externalities, the level of equilibrium of non-cooperative R&D turns out to be excessive, whereas the level of equilibrium of cooperative R&D is insufficient. Then, if firms cooperate, technology policy should encourage investment in R&D.

Suzumura recommended taking into consideration different elements for a deeper analysis of cooperative R&D:

– First, R&D undertaken by firms outside the industry should influence the marginal cost of a firm. Such effects of inter-industry externalities should be taken into account with the effects of intra-industry externalities, in order to obtain a balanced assessment of the effects of R&D externalities;

– Second, one of the functions of cooperative R&D is precisely to generate synergy effects by bringing complementary resources together, such as information research and experience, teams of researchers and technological expertise. From this point of view, Suzumura disagreed with the idea that R&D externalities in terms of average variable cost function should remain the same whether firms cooperate or not. For a deeper analysis, the function of externalities should probably be endogenized;

– Third, the potential benefits of cooperative R&D are often linked to an increase in the speed of invention and innovation, in particular by fairly distributing risks. An element of uncertainty should be introduced in the analysis.

All this work on technological externalities conceives cooperation as a particular modality of internalization: the R&D alliance is integrated into a continuum of secrecy, patent and temporal asymmetry. Therefore, what criteria make it possible to choose the alliance in R&D as a mode of appropriation instead of secrecy, patent or temporal asymmetry? Apart from the contribution of [KAT 90] on patent arbitration (*ex post* cooperation) and the R&D alliance (*ex ante* cooperation), the theory of externalities does not provide an answer and does not propose a typology, helping us to clearly classify the different modalities for internalizing technological externalities.

3.5. Property rights and *open innovation*

Open innovation and traditional innovation are seen as complementary practices. However, open innovation refers to rather thorny problems of intellectual property.

3.5.1. *Open-innovation* strategies

Open innovation is a concept created by Chesbrough (see Chapter 1), which leads companies to use all the available internal and external knowledge and know-how to accelerate innovation. It involves engaging a large number of actors in a process of collective intelligence, be it at the interior of the business ecosystem (see Chapter 6) or outside the "network", as explained by [CHE 03]:

> "Open innovation means that valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well. This approach places external ideas and external paths to market on the same level of importance as that reserved for internal ideas and paths to market during the closed innovation era".

Chesbrough also pointed out that open innovation is a clear strategy opposed to vertical integration (when an enterprise extends its downstream and/or upstream activity from an original activity to the progressive acquisition of one or more suppliers). Beyond the reduction of transaction costs relative to every market operation, the main objectives are: cost control (better control of suppliers that are in fact "internalized"), better quality control, access to "sensitive" components or technologies, a guarantee for market opportunities and an increase in market power, thanks in particular to size effects and rising barriers to entry.

> "The open innovation paradigm can be understood as the antithesis of the traditional vertical integration model where internal research and development activities lead to internally developed products that are then distributed by the firm […] open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas…" [CHE 06].

Chesbrough compared the closed and open innovation paradigms with respect to a number of dimensions (summarized in Table 3.6). Open innovation is a mode of innovation based on cooperation, knowledge- and expertise-sharing and serendipity[3].

> "The traditional paradigm that companies used to manage industrial R&D is indeed over in most industries. But that does not mean that internal R&D itself has become obsolete. What we need is a new logic of innovation to replace the logic of the earlier period […]. The new logic will exploit this diffusion of knowledge, rather than ignore it. The new logic turns the old assumptions on their head […]. Instead of managing intellectual property (IP) as a way to exclude anyone else from using your technology, you manage IP to advance your own business model and to profit from your rivals' use. Your own R&D strategy should benefit from external startup companies' abilities to initiate multiple organizational experiments to commercialize technologies" [CHE 03].

3 *Serendipity* refers to inventions made by individuals (inventors) who have learnt "how to profit from unforeseen circumstances and who have categorically refused to be dominated by chance" [BOU 11].

	Open-innovation principles	Closed-innovation principles
Resources and competencies	Encourage external partners (other major groups from other sectors, *start-ups* and SMEs, public and private research laboratories, independent experts and developers, universities, its customers and suppliers) to collaborate. A sole company cannot hold all the resources and competencies by itself.	An in-house and relatively autonomous team is a necessary and sufficient condition
R&D	R&D carried out in collaboration with partners makes it possible to create value. Collective intelligence is an asset.	In-house R&D helps develop a sustainable competitive advantage
First mover advantages	It is the *business model* which can provide such a significant advantage	Innovation gives the advantage by being the first on the market
Intellectual property	It is necessary to carry out intellectual property transactions (purchases / sales)	Intellectual property rights control is a condition for success

Table 3.6. *Open- and closed-innovation principles*

3.5.2. *Intellectual property challenges in open-innovation practices*

The relationship between intellectual property and *open innovation* has generated much debate and papers (Chesbrough [CHE 03a, CHE 03b, CHE 03c], Hogan [HOG 05], Laursen and Salter [LAU 06], Van de Vrande, de Jong, Vanhaverbeke and de Rochemont [VAN 08, VRA 09]). The title "Intellectual Property and Open Innovation: The Enemy Brothers?" from an article published in 2011 [JEA 11] sums up the paradox that seems to emerge when the two concepts are combined. As it was pointed out by [HAL 10], these concepts seem irreconcilable:

> "That is, open innovation implies a willingness to allow knowledge produced within the firm to spill over to others (possibly in with the expectation of receiving knowledge spillovers from others in return) whereas IPR protections enable a firm to exclude others from using that knowledge."

Intellectual property issues relating to *open innovation* arise in fact by integrating mainly two dimensions: the degree of openness and the *outside-in* and/or *inside-out* character of *open innovation* (there are indeed different alternatives referring to these collaborations).

3.5.2.1. *Degree of openness*

This notion of openness reflects the complexity of the phenomenon of open innovation. *Open innovation* should not be interpreted as unrestrained access without obligations or control. There are several degrees of openness in open innovation. In one extreme form, accessibility is total and access is completely unrestricted. In this case, open innovation is accompanied by a promise of a public good:

> "Our notion of openness is defined as the pooling of knowledge for innovative purposes where the contributors have access to the inputs of others and cannot exert exclusive rights over the resultant innovation. In its purest form, the value created through an open process would approach that of a public good" [CHE 07].

As pointed out by Pénin [PEN 13], these characteristics are mainly found in the practices of *open access*, *open data* or in *open source* software, but are not part of *open innovation*. In most cases, open innovation can be accompanied by strong protection.

> "In the end, for Chesbrough, contracts and intellectual property rights are always present in open innovation approaches, which are most often facilitated by strong patents or the possibility of formal contracts. A company whose technology is protected by strong patents will be better predisposed to agree to collaborate or to provide licenses, because betrayal and technological looting risks are reduced; conversely, if the company is not protected, collaboration is risky, considering that the partner can always take possession of the company's manufacturing secrets free of charge" [PEN 13].

3.5.2.2. Outside-in *and* inside-out

The term *outside-in* involves internalizing external skills so as to develop innovation in one's business.

For a company, the notion of *inside-out* is associated with knowledge-sharing and outsourcing. This practice enhances the company's external intellectual property by creating structures detached from the main firm (subsidiaries or *joint ventures*), while still having access to resources (patents) and existing competencies at the heart of the "parent company", and particularly its R&D activities.

As explained by [BIN 15], *open innovation* is one model among others that requires tailor-made answers in terms of intellectual property:

> "How does Intellectual Property Law understand the *open innovation* model?" The *open innovation* model is above all rhetoric. It is more a synthesis of practices than a revolution in creative methods. There is no conflict between intellectual property and open innovation. The idea is that – in order to innovate - the company must mobilize a plurality of models and skills. It cannot be satisfied with a single model. There is a real difficulty in organizing work. We do not innovate uniquely in an open or closed environment, either alone or collectively. It is necessary to simultaneously mobilize internal innovation, external acquisition, collaborative research, *open innovation*, the open model, the closed model. Success depends on the articulation of all these models; it is difficult because they are often presented as antinomic when in truth, they are complementary."

3.6. Conclusion

As we have seen in this chapter, cooperative practices in the field of innovation can adopt many forms today, which make the issue of property rights particularly difficult. Even while remaining a "strategic weapon" for companies, patents are no longer the one and only form of protection.

Open innovation, with its collaborative and collective dimension, represents a real challenge in terms of intellectual property, and the question of sharing versus systematic protection still remains unanswered.

4

Agency Theory and Strategic Alliances

4.1. Introduction

As we have analyzed in Chapter 3, the concept of agency relies on a contractual approach of organizations and is closely associated with the theory of property rights, in the sense that their structure plays a key role in both individual decisions and the contractual relations of a market economy.

So far, agency theory scholars have sought to determine how the different organizational forms contribute to minimize contract costs within organizations. These theorists focus on the firm and illustrate how contracts may generate cooperation between asymmetric partners. They particularly insist on the importance of incentive mechanisms.

In the past, the agency theory used to focus on a company's internal relations; however, as [DEM 89b] pointed out, it would be interesting to consider whether this conceptual framework can be extended to the interpretation of other contractual growth forms and, more precisely, to inter-firm alliances. We will explore this question in this chapter.

4.2. Cooperation and conflict in agency theory

Agency theory acknowledges the separation between owners and managers within a company and reveals a possible form of relationship binding a principal to an agent. This type of relationship is known as an "agency relationship", a "mandate relationship" (or a "sponsorship relationship"). In case of appearance of differences between the interests of principals and agents, such a relationship would give rise to agency costs. In

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this way, the agency's theory can account for the simultaneous interplay of conflicting and cooperative interests between the different protagonists of an organization.

4.2.1. *Contract and firm*

4.2.1.1. *Agency relations and agency theory*

It was the contribution of [SPE 71] and [ROS 73] that led to the development of agency theory. In agency theory there are generally two tendencies[1]. The "positive" approach is based on the works of Jensen and Meckling [JEN 76]. The second, approach "normative" [BRO 93] is commonly known as the "principal-agent theory". It originated in the theoretical developments of [SPE 71] and [ROS 73]. The agency theorists [ROS 73, JEN 76, FAM 80, PRA 85] analyzed the issue of risk-sharing between individuals or groups [ARR 71] through integration of the agency relationship. This situation occurs when the contracting parties have different (or even antagonistic) aims, which leads the appearance of collective forms of labor division and re-configuration. The agency theory aims to determine the various organizational forms that will minimize contract costs within an organization. First and foremost, it is interested in the firm and shows how contracts can create cooperation between asymmetric partners, emphasizing the importance of incentive mechanisms.

[JEN 76] understood the firm as a "nexus of contracts", and examined the ideas of property rights theorists Alchian and Demsetz [ALC 72], who stated that contractual clauses define the internal structure of property rights [LEP 85]. Alchian and Demsetz provided a contractual view of the firm (as well as of any organization), asserting that all the relationships that structure a firm can be considered as agency relationships. They even regard the firm as a particular type of "contract", somehow denying the notion of organization itself.

Agency theory broadly refers to property rights because their structure plays a key role in both individual decisions and contracts. Jensen and Meckling pointed out that they expect to analyze "the behavioral consequences of property rights as specified in contracts" [JEN 76, p. 31]. According to [ALC 72], individuals and firms are determined by property

1 This distinction is challenged by some authors, such as [RAV 85].

rights. The decision to acknowledge the complex nature of the firm enables them to reject, on the one hand, the limited scope of microeconomic theory, which assimilates the firm to a "black box" and, on the other hand, the "holistic" paradigm of the organization. Rights share two features: exclusivity and transferability. The analysis of the firm carried out by [ALC 72] fell within a framework based on very specific behavioral assumptions about individuals, particularly on the concept of *homo œconomicus*, which states that economic agents maximize their utility function while they pursue their individual interest. It is individual behavior that makes it possible to explain the actions of the firm. While transactions correspond to freely negotiated contracts (*a priori*), the firm has been traditionally defined by the hierarchical nature of its relationships (based on authority and discipline).

Agency theorists have broadened the basis of property rights theory (which had so far only retained employer–employee contracts) by considering all the bilateral contracts established between the firm and its environment:

> "The relationship of agency is one of the oldest and most common codified modes of social interaction. We say that an agency relationship has arisen between two (or more) parties when one, designated as the agent, acts for, on behalf of, or as representative of the other, designated the principal, in a particular domain of decisions. Examples of agency are universal." [ROS 73].

There are numerous examples of this: the case of the manager and the owner; the employee and the employer; the lender and his debtor and the service provider and the client. This relationship can be explained because the agent possesses particular expertise or information. This definition may be enriched by that of [JEN 76], who considers the agency relationship as "a contract in which one or more persons use the services of another person to perform any task on their behalf, which naturally implies the delegation of decision-making power to the agent".

4.2.1.2. *Moral hazard and adverse selection*

An agency relationship involves an agency cost which originates in the non-fulfillment of the contracts [KLE 83] established between the actors of the organization. It is impossible to fully predict all the possible contingencies that could take place, as well as to write an optimal contract, unless an extremely costly procedure is used [GRO 86].

This uncertainty, closely linked to information asymmetry, manifests in two ways [LEV 88]. On the one hand, uncertainty leads to the phenomenon of "adverse selection", described by Akerlof [AKE 70]. Certain characteristics of the transaction are known to one party and cannot be discovered by the other partner without a cost. Below is the famous example of used cars, or "lemons", introduced by Akerlof [AKE 70].

> "The example of used cars captures the essence of the problem […]. Suppose (for the sake of clarity rather than reality) that there are just four kinds of cars. There are new cars and used cars. There are good cars and bad cars (which in America are known as "lemons"). A new car may be a good car or a lemon, and of course the same is true of used cars.
>
> The individuals in this market buy a new automobile without knowing whether the car they buy will be good or a lemon. But they do know that with probability q it is a good car, and with probability $(1 - q)$ it is a lemon; by assumption, q is the proportion of good cars produced and $(1 - q)$ is the proportion of lemons.
>
> After owning a specific car for a length of time, the car owner can form a good idea of the quality of this machine; for example, the owner assigns a new probability to the event that his car is a lemon. This estimate is more accurate than the original estimate. An asymmetry in available information has developed: now the sellers have more knowledge about the quality of a car than the buyers. But good and bad cars must still be sold at the same price- since it is impossible for a buyer to tell the difference between a good car and a bad car. It is apparent that a used car cannot have the same valuation as a new car - if it did have the same valuation, it would clearly be advantageous to trade a lemon at the price of new car, and buy another new car, at a higher probability q of being good and a lower probability of being bad. Thus the owner of a good machine must be locked in. Not only is it true that he cannot receive the true value of his car, but he cannot even obtain the expected value of a new car" [AKE 70].

This situation of information asymmetry about the quality of the product creates generalized distrust, insofar as the characteristics of all the goods exchanged (or likely to be exchanged) are not known by all the actors in the same way. Not even the price can properly play its signal role. The way to remedy adverse selection is to appeal to a procedure that makes it possible to obtain information about the intrinsic quality of a product or service [CAH 93].

The problems of adverse selection result from "the pre-existing distribution of information" [BRO 93]. However, the contract itself may be the source of informational asymmetries. Uncertainty refers to a problem of moral hazard, the origin of which may be twofold. First, the moral hazard reflects the principal's inability to observe accurately and without cost all the efforts undertaken by the agent [HOL 79]. In a second case:

> "The uninformed agent can observe the action but cannot verify whether it is appropriate, because he cannot observe the circumstances in which the action takes place ... When there is moral hazard, the problem is to succeed in encouraging the agent who has private information to make an optimal decision for the uninformed individual" [CAH 93].

Some of these actions, which are not observable, can hamper the smooth running of the agreement and thus affect the final result. If these actions were intentional, we would be confronting opportunistic behavior.

Moral hazard is closely linked to the notion of agent rationality [BAR 86]. The "principal–agent" models do not incorporate the limited rationality aspect of transaction cost theory. The theory of the agency postulates a broader rationality than the one developed in Williamson´s analysis. This is what leads Levinthal to describe the principal–agent approach as:

> "The neoclassical response to questions raised several years ago by March and Simon concerning the behavior of an organization of agents pursuing their personal interest with contradictory goals in a world of incomplete information" [LEV 88].

Simon developed the concept of limited rationality and established a difference between substantive (or substantial) rationality and procedural rationality [SIM 78]. Substantive rationality corresponds to "rationality" as it is conceived in the neo-classical framework: economic agents make a choice that maximizes their utility from a set of possible alternatives. On the contrary, procedural rationality pushes agents to seek situations that will allow them to attain a certain level of satisfaction in their aspirations.

> "In the past, economics largely ignored the process that a rational man uses in making resource allocation decisions. This was possibly an acceptable strategy for explaining rational decision in static, relatively simple problem situations where it might be assumed that additional computational time or power could not change the outcome. The strategy does not work, however, when we are seeking to explain the decision maker's behavior in complex, dynamic circumstances that involve a great deal of uncertainty, and that make severe demands upon his attention. As economics acquires aspirations to explain behavior under these typical conditions of modern organizational and public life, it will have to devote major energy to building a theory of procedural rationality to complement existing theories of substantive rationality. Some elements of such a theory can be borrowed from the neighboring disciplines of operations research, artificial intelligence, and cognitive psychology; but an enormous job remains to be done to extend this work and to apply it to specifically economic problems" [SIM 78].

The agents are therefore sufficiently rational as to take advantage of any "empty spaces" [MAM 92] left through incomplete contracts. As each agent is able to rationally anticipate the same behavior in the other, he/she seeks to protect himself/herself against these opportunistic attitudes, incurring into a cost known as an agency cost. Jensen and Meckling distinguished between three sorts of agency costs in the principal–agent relationship:

– the monitoring costs borne by the principal in an attempt to limit the opportunistic behavior of the agent and to ensure that the decisions made by the agent comply with his own objectives;

– bonding costs (non-pecuniary as well as pecuniary), which are the expenses that the agent is prepared to incur so as to build trust and to convince the principal that he/she is working in an optimal way;

– residual (or opportunity) costs related to the "loss of utility" suffered by the principal in the event of divergence of interest between the principal and the agent. The existence of opportunity costs stems from the following logic: it is in the interest of the protagonists to reduce as much as possible the loss of value that would result from the opportunistic behavior of an agent, and it would also be productive for them to bring their respective utility functions closer together. If the principal adopted a permanent and total control strategy, the marginal cost of his/her action would quickly exceed the marginal income that the supervision would provide him/her. In that case, abandoning control defines the very nature of the residual costs.

Agency costs can be reduced through the establishment of either monitoring/control procedures or incentive systems. These two measures are considered as alternatives. Incentives may totally or partially substitute surveillance and repression systems:

> "Property rights economy and agency economy ignore the permanence of the confrontational character of cooperation, and the subsequent need for creating control and direction systems" [BRO 89].

In agency theory, the principal must find an incentive mechanism [EIS 89a]. An incentive mechanism is formulated as a "set of procedures intended to induce agents to disclose their preferences or information and to accept the consequences of their own activities" [MEN 90].

According to Holmström [HOL 79], this mechanism may correspond to a monetary compensation that will encourage the agent to adopt the best possible behavior. He considered the fact that in the case of team production, the role of the principal is not limited to monitoring the efforts made by the agents. The implementation of an incentive mechanism may solve the free-rider problem.

4.2.2. *Agency theory and cooperation agreements*

On the basis of the general problem and the fundamental assumptions of agency theory as outlined above, it is now necessary to study the question of the "why" and the "how" of cooperation agreements. On the basis of Jensen and Meckling's broadening of the notion of agency relationship to any form

of contract between the firm and its environment (suppliers, customers and creditors), in this section, we will study cooperation links between firms by exploring three categories of contractual relations: subcontracting, selective distribution and franchising.

4.2.2.1. *Risk-sharing and arbitration between reassurance and incentives: the outsourcing contract*

A subcontracting relationship can be interpreted in light of the results of agency theory. It can be defined as a contract by which a firm (an agent) makes a commitment to supply a principal with productions that are exclusively reserved to him/her and that meet precise specifications:

> "In the subcontract, the object is specified *ex ante* [...], but nothing guarantees a perfect execution of the transaction *ex post*. At the time of the initial pact, the principal only purchases "potentiality", and not a product. No explicit mechanism can guarantee *ex ante* that this potentiality will meet the expectation of the sponsor. Only time will validate, or invalidate, the initial contract" [BAU 92].

One of the outsourcing contracts is the "framework contract", concluded for a period equal to or longer than 1 year. In some cases, this type of contract may be similar to cooperation. In fact, it differs from the punctual contract, representative of "classical" subcontracting, which is periodically renewed in the case of recurring relations (repetitive control). The formula for the framework contract avoids having to regularly renegotiate the initial order and thus incur additional costs. It also saves transaction costs, especially costs associated with contract drafting [WIL 85].

Outsourcing is a principal–agent relationship whose moral hazard is linked to hidden action and information. From the moment that the prime contractor does not produce (or no longer produces) the good in question, he/she has difficulties assessing (or at least, without error) as well as controling the efforts provided by the subcontractor. [CAH 93] pointed out that models with hidden action reveal that the final result depends on two important elements: the effort provided by the agent and an "unforeseen risk", which can be determined by "nature" (e.g. weather conditions). We then join Laffont's definition of moral hazard as the "combination of non-observability of action and unforeseen risk over the product that makes it difficult to interpret it in terms of action" [LAF 87].

In addition, the subcontractor possesses specific knowledge which the principal no longer has in relation to the costs of production. Thus, the subcontractor can eventually cheat on production costs. A solution for this would be for the contractor to multiply tenders in order to reduce this information asymmetry.

In general, the subcontracting relationship is accompanied by a higher risk aversion for the subcontractor than for the main firm. It is normally considered that the principal does not have risk aversion in the measure that he/she has diversified assets, which enables him/her to hedge against risks. Moreover, in the case where the principal suffers from risk aversion, the main results will not change radically [SHA 79]. Several cases may arise.

In a symmetrical information situation, the principal may suggest a first-class contract that totally insures the agent. This situation is relatively infrequent.

In an asymmetrical information situation, in general the principal can no longer totally insure the agent. Risk-sharing between the lead firm and the suppliers should then be considered. This possibility was studied by Aoki in 1988 in a model borrowed from [KAW 87]. The subcontract model developed by [AOK 88] is written as follows:

$$p = b + \alpha\,(c - b)$$

The important variable is that of risk-sharing: α. Extreme cases are those where $\alpha = 0$ (the risk is totally borne by the supplier) and $\alpha = 1$ (the principal bears the full risk). If $0 < \alpha < 1$, then the risks are shared by the two protagonists. The unit price of the supplied good is represented by p, whereas b is the price initially set by the contractors, or target price. The initial fixing of this price raises the question of the disclosure of costs of the subcontractor, which reveals a situation of information asymmetry. With regard to the re-negotiation, this should be based on the increase of a subcontractor's production costs and, on the other hand, on the reduction of costs provoked by an increase in the duration of the collaboration [BAU 91]. In this model, the principal offers insurance to the subcontractor on the price of the supply. In return, the supplier must ensure the regularity and quality of the products supplied.

> "The keystone of this system lies in the possibility of sanctioning the failing supplier and rewarding the deserving supplier, in function of their respective reputation: there is a struggle to classify suppliers [...] The impact of the phenomenon of reputation is considerable" [BOU 94].

In the event that the subcontractor makes innovations, he will have to transfer the benefits of these efforts to the main firm. Under these conditions, his motivation to innovate could be reduced. There is a compromise between risk insurance and incentives [GAF 90].

Agency theory also makes it possible to justify the efficiency of selective or franchise distribution contracts. These are hybrid forms of organization [BRI 97, NOR 88, CAR 91, REY 91] for which the questions of moral hazard, free-riding and the appropriation of quasi-rents arise naturally. Competition in these practices is based on not only price but also intangible assets, such as branding. In the field of distribution:

> "Loss leader pricing or free-riding practices are typical examples of the implementation of opportunistic behavior. In the first case, the very image of the manufacturer's brand may be affected. In the second, the commercial strategy is disorganized. Free-riders represent a category of distributors who live at the expense of their colleagues who locally agree to comply with the manufacturer´s instructions and organize, for example, advertising campaigns to provide information, free demos or maintenance. Benefiting from the favorable external effects thus created, free-riders (who refuse to do the same) can then sell the products at lower prices: consumers will gather information from the former and buy from the latter. Distributors who are loyal to the policy desired by the manufacturer will tend to suspend their offers of additional services due to customer loss" [GLA 92].

Under these conditions, regular checks to discourage free-riding practices are essential. However, the establishment of monitoring mechanisms proves to be very expensive when the number of agents is high. The solution to this problem usually involves limiting the number of authorized distributors. Ultimately, as has been explained by [LEP 89], with selective distribution by an authorized dealer system the temptation of the free-rider is practically reduced to nothing.

4.2.2.2. *Arbitration between different organizational forms*

The association of agency theory with the theory of transaction costs (see Chapter 2) allows us to provide explanations concerning the compromise that a firm must reach when confronted against certain organizational choices, such as choosing between a merger and an alliance. Mergers and acquisitions (M&A) and alliances are different means of development available to businesses. It is interesting to show how the arbitration between these two types of transactions is done through the combination of agency theory and transaction costs, plus the theory of transition costs introduced by Ciborra. High transaction costs lead a firm to either favor full integration through a merger or establish an agreement with other companies.

Arbitration between integration and alliance is a function of the degree of transaction specificity (idiosyncrasy) and of the frequency of relations (Williamson). In some cases, a merger may be more profitable than cooperation and is justified according to this framework whenever the asset is very specific and the frequency of trade is high:

> "In situations characterized by information asymmetries, the existence of specific assets and human resources, for which markets are very imperfect or non-existent, merging may be aimed at absorbing a competitor who holds information, reputation capital, a brand image, a distribution network or management that could improve the dynamics of the acquiring firm. In contrast, the use of market relations to obtain these benefits may take too long, become too costly or impossible" [JAC 89a].

In these situations, the company has an interest in merging. This is the case for integrations made through skill acquisition of suppliers or subcontractors, or thanks to the benefits that customers can offer. According to [HEN 90b], an alliance in the form of a *joint venture* will be preferred to an acquisition as a means of obtaining assets only when a double condition is met: when the assets in question are "public goods" and when the targeted assets cannot be separated from the undesired ones.

Transition costs introduced by Ciborra [CIB 91] refer to organizational learning. They are defined as the costs that companies need to bear when they have to re-structure so as to develop new strategies. In this case, according to the Ciborra, the choice of an alliance to the detriment of a merger takes place in a situation where transaction costs and transition costs

are high (Table 4.1). However, it may be considered that a merger may be preferred to an alliance even in a situation where transition costs are high. Indeed, a merger is often accompanied by a re-organization of the activities of the firms concerned. However, this important re-structuring, which ranges from the composition of the board of directors to the assortment of goods offered, requires significant financial resources and can be assimilated to transition costs.

Transaction costs	Low			Market
	High	**Transition costs**	Low	Merger
			High	Alliance

Table 4.1. *Transaction costs and transition costs [CIB 91]*

Finally, agency theory also allows us to shed some light on the choice between alliance and merger. Initially, agency theory focuses on analyzing agency costs within an organization. As Muldur cleverly suggested, the enthusiasm of managers for external growth (takeovers through M&A) is explained by an increase in agency costs, linked to conflicts of interest between the company's managers and shareholders, which are particularly intense at the stage of strategic redeployment:

> "Instead of distributing the available cash flow to shareholders, managers prefer to use it to acquire new businesses. They thus increase their power and the chances of promoting their own employees. But if they allocate these cash surpluses to unprofitable projects, this can provoke an increase in agency costs and, consequently, a reduction in business efficiency. This theory (the agency theory) tends to show that while it is true that M&As may bring about conflicts of interest between shareholders and managers, at the same time, they may be the response to the problem" [MUL 88].

The relationship between two companies involves specific costs, that is, agency costs. In the event of high agency costs, it seems that the merger will be preferred. However, it is possible to imagine that in such a situation the signature of an agreement would invite a stable and lasting collaboration, ensuring the partnership's continuity. This will require a retribution/punishment mechanism to engage the different protagonists and potentially solve arising conflicts.

The existence of agency problems due to the development of a form of property that separates ownership from management functions is reflected in the theses of Galbraith on the emergence of technostructure in the 1960s. In large enterprises, power is legally in the hands of the owners of the public limited company, but the reality of power belongs to those who make decisions behind the scenes. This is the reason why the notion of management replaced that of entrepreneur. Those who constitute the brain of the company (or "technostructure") bring specialized knowledge, specific skills and experience to decision-making groups. In this analysis, the object of scarcity is no longer capital, but sophisticated knowledge. As organized intelligence is the new object of scarcity, this would legitimize the exercise of power through knowledge and thus explain the origins of technostructure.

4.2.2.3. *Toward a synthesis of the theories of the firm*

The Mahoney [MAH 92] approach is interesting in that it studies arbitration between different organizational forms from three theoretical axes: property rights theory, transaction cost theory and agency theory, which helps us to make a synthesis of Chapters 2, 3 and 4. Mahoney began by recalling important theoretical concepts, specifically, transaction costs and agency costs, from which he derived a practical analytical grid.

As discussed in Chapter 2, the theory of transaction costs emphasizes the notion of asset specificity. Agency theory focuses on the asymmetry of information (between the principal and the agent) due to team production, which leads to a problem of product inseparability [ALC 72]. Alchian and Demsetz explain the nature of the firm highlighting the impossibility of ensuring a remuneration that depends on the marginal productivity of each individual factor. A second important variable in agency theory concerns the knowledge of the transformation process or task programmability [EIS 85, OUC 79]. Low-task programmability reduces the effectiveness of monitoring efforts.

According to Mahoney, if we meet three criteria (asset specificity, task separability and task programmability), a firm could be confronted with eight situations:

	Low programmability		**High programmability**	
Factors	Low asset specificity	High asset specificity	Low asset specificity	High asset specificity
Low non-separability	Spot market	Long-term contract	Spot market	Joint venture
High non-separability	Relational contract (strategic alliance)	Clan (hierarchy)	Inside contract	Hierarchy (vertical ownership)

– *task programmability*: securing of effort is a weak measure with which to effectively assign rewards;

– *high non-separability*: securing of product is an insufficient measure with which to assign rewards;

– *high specificity*: specific firm investment is high (human, physical, geographic assets);

– *spot market*: the pricing system works naturally;

– *long-term contract*: principal and agent obligations are clearly specified;

– *inside contract* (*manager as monitor*): hybrid arrangement between the contract and the hierarchy;

– *joint venture*: agreement between two firms by which a separate entity is created;

– *hierarchy*: capital ownership control;

– *clan*: organization based on a vital feeling of human solidarity.

Table 4.2. *Different organizational forms (according to [MAH 99])*

4.3. Agency theory, an analytical frame

This section questions the relevance of extending (or not) the framework of the agency theory to all the strategic alliances- that is, to those characterized by a certain equality between the two partners [MUC 92], but which are at the same time the point of achievement for specific objectives of the firm. Power conflicts over who controls the alliance will then arise between the two partners, which will be more difficult to solve than in the case of vertical agreements. Incentive schemes will be implemented with varying degrees of efficiency [REV 90]. We believe that strategic alliances are actually "principal" relations characterized by a double moral hazard.

4.3.1. *An analytical frame for strategic alliances?*

[REV 90] recalled that the theory of the agency rests on the difficulties of converging the interests of the principal and those of the agent and, more generally, of two entities. He focuses on the incentive system that needs to be established between the two parties in order to address this issue. This system, it seems to us, is found in the framework of strategic alliances, which totally or partially substitutes supervision and repression mechanisms usually implemented in vertical agreements.

The monitoring and sanctioning system obliges the contracting parties to respect their promises. An incentive mechanism aims to make the agreement as effective as possible, which requires disclosure of the participants' capabilities and their real objectives:

> "If we analyze the strategic alliance in organizational terms (for example, with the agency theory), we will see that the problem of oversight and opportunism control is more complex than in the context of hierarchy. Alliances as bilateral exchange (as opposed to multilateral market exchange and the hierarchical exchange of internalization) can be formulated in terms of bargaining and bargaining power. In terms of negotiations, interdependence modalities between the two protagonists are often paramount" [MUC 92].

For [REV 90], the firm is a nexus of internal and external contracts. The author insists on the need to distinguish these two categories. However, the contractual conception of the organization stemming from agency theory, to which Reve refers, shows that there is no longer a clear distinction between the two types of transactions. The question of identifying the characteristics that make it possible to define the firm seems outdated and the organization should now be considered as a nexus of contracts. According to Reve, the two categories of contracts can be defined as follows: internal contracts are determined by core competencies and organizational incentives, whereas external contracts depend on complementary skills and inter-organizational incentives.

Thus, the firm can be defined in two ways. It is primarily a function of core competencies, organizational incentives, complementary skills and inter-organizational incentives. It is determined by not only strategic alliances but also a "strategic core", its own material assets (physical assets and investments) and intangible assets (linked to cultural, organizational or routine phenomena). These notions arise also in another theoretical corpus (RBV or resource-based view), which will be explored in Chapter 7.

The concept of complementarity developed by Richardson (see Chapter 3) allowed him to define organizational strategies [RIC 72]. In the analyses of both Richardson and Reve, the alliance is based on a combination of different skills, and this complementarity is more qualitative than quantitative. In fact, this concept allows Reve to distinguish the bilateral structure from the internalized structure and he can thus redefine the effective boundaries of the firm in these terms:

> "Basically, only core competencies that relate to strong asset specificity should be internalized. Complementary skills, linked to medium-sized asset specificity, can be achieved in more efficient conditions through strategic alliances and should be carried out on a bilateral basis, whereas all assets that are weak may be subjected to market contracts. In the latter case there would be no need to establish a specific mode of organization" [REV 90].

In a second step, Reve focused on the differences between internal and external contracts by focusing on the most fundamental of them, namely the nature of incentives.

> "If we focus on external contracts, the range of available 'incentives' is much more limited than for internal contracts. The traditional hierarchical structure cannot be used if there is no authority relationship between the contracting parties. Then the agency problem of alliances is much more complex than the agency problem of organization" [REV 90].

Basically, according to Reve, there are two approaches to agency problems concerning alliances. For the first economic approach, the actors involved in the operation choose a cooperative solution in order to increase joint profits. Transactions must be guaranteed and relationships remain impersonal and unstable. Bilateral exchange is formulated as a bargaining problem. In bargaining, the dependency model between the parties is often

the determining factor and the different power bases available are activated by both parties. This does not mean that the parties cannot reach cooperation agreements, but they seek the best solution to the game, exploiting their gambling position completely. The dependency model involves an unbalanced type of power, which exploits the use of authority and incentives already existing in the organization. The other approach is behavioral and attaches interest to the relationships between parties. Exchange can also be seen as a bargaining situation, but a longer-term view is adopted. Links are forged; trust and solidarity develop between the parties. These contractual relationships are characterized by relational criteria such as the role of integrity, trust, safeguarding relationships and conflict resolution. Transactions can be undertaken in confidence, and long-term contracts can be concluded. Value-sharing tends to develop inter-organizational incentives, and there is an idea of equitable distribution of the relational quasi-rent [AOK 88].

4.3.2. *Strategic alliances: relations between "principals"?*

Jensen and Meckling considered that agency costs emerge in any situation requiring collaboration between different stakeholders:

> "Agency costs arise in any situation involving cooperative effort […] by two or more people even though there is no clear-cut principal-agent relationship" [JEN 76].

This assertion is more than relevant, as pointed out by Charreaux:

> "It extends the concept of an agency relationship to any form of cooperation, without necessarily having a principal and an agent, which substantially broadens the theory's scope. It also avoids the problem of identifying the principal and the agent [...]. The terms agency relationship and agency theory therefore appear to be oversimplified and it would be preferable to speak either of a contractual relationship and contract theory or of cooperation and cooperation theory" [CHA 87].

It seems that a problem with agency theory appears within the framework of strategic alliances. Joint production is carried out in this case by two (or more) agents of the same status (principals or agents). Mutual organization can be interpreted in this light in the measure that we are dealing with a long-term relationship, in which every firm is at the same time the principal

(or sponsor) and an agent in the same organization [THI 87]. In other words, all the members of the organization are both prime contractors and subcontractors, thus constituting a real network. Mutual organization is not necessarily productive. It can assume responsibility for the sale of the final product but not produce it itself, which is one of the features of consortiums (see Chapter 1).

For strategic alliances, the agency problem must be framed in terms of a "double moral hazard". This expression was originally developed by Macho-Stadler and Pérez-Castrillo in the early 1990s to deepen the role of delegation in an agency relationship. According to these two authors, the problem of "double moral hazard" arises when "just as much as the agent, the principal contributes to the relationship but this contribution is unverifiable" [MAC 91].

This idea seems quite interesting to us in order to better understand the issue of strategic alliances. Within a strategic alliance, it is reasonable to postulate that information is far from perfect and equitably shared. Furthermore, the objectives and motivations of each partner may be divergent. This can have important consequences on the behavior of different agents. It will then be very difficult for them to judge the degree of optimality of the various actions undertaken within the context of this cooperation. In this case, the moral hazard will be shared by all the protagonists, and no longer exclusively by the principal.

More generally, in a principal–agent structure, where the behavior of each participant is not verifiable, some authors, such as Macho-Stadler and Pérez-Castrillo, highlighted the interest a principal has in hiring a "supervisor":

> "In a principal-agent relationship where the principal cannot perform supervisory or production tasks without his incurring a moral hazard problem, delegation is beneficial because it favors a separation between the principal's objectives as "residual claimant" and offers incentives in the direction of his own efforts. If he delegates the supervisory task to a second productive agent, the incentives can be provided by an adequate contract that acknowledges the existence of a moral hazard problem" [MAC 92].

Can we envision the possibility of delegating the supervisory role to a third party in a similar way as in the framework of strategic alliances? It seems difficult to introduce a third participant for solving information problems and for preventing any form of opportunism. How is it possible, then, to guarantee control over the various actions of the different partners? How to favor agreement stability? The implementation of organizational and technological drills and learning can provide a partial solution for the coordination problems that alliances inadvertently engender.

The theory of the agency has sparked two research axes that have been widely developed by different authors from not only economic sciences but also strategic management:

– on the basis of [JEN 76]'s idea to extend the notion of agency relationship to any form of contract between the firm and its environment (suppliers, customers and creditors), several categories of contractual relations (subcontracting, selective distribution and franchising) can be interpreted. Agency theory makes it possible to justify the efficiency of the hybrid organizational forms, for which questions naturally arise relating to moral hazard, free-riding and the appropriation of quasi-rents. Competition in these practices is fierce regarding not only prices but also intangible assets such as trademarks;

– governance reports. Agency theory analyzed the separation between owners and managers[2] within a company, thus highlighting a possible form of relationship binding a principal and an agent. This relationship is known as agency relationship, mandate relationship or sponsorship relationship. Such a relationship gives rise to agency costs in the event of divergent interests. As explained in [RUM 91]:

> "The corporate control perspective provides a valuable framework for strategic management. By recognizing the existence of "bad" management, identifying remedial instruments, and emphasizing the importance of proper incentive arrangements, it takes a more normative stand than most other subfields of economics".

2 The existence of agency problems, due to the emergence of this new property form that separates ownership and management functions, can be found in the thesis developed by Galbraith (1967) on the origins of technostructure (see section 4.2.2.2. Arbitration between different organizational forms).

Fama and Jensen [FAM 83] distinguished four decision-making stages within an organization:

– initiation: generation of proposals for resource utilization and structuring of contracts;

– ratification: choice of the decision initiatives to be implemented;

– implementation: execution of ratified decisions;

– monitoring: measurement of the performance of decision agents and implementation of rewards.

Depending on their nature, these missions are carried out by either the management or the shareholders. The idea is to find a "mixed strategy" that balances supervision levels and incentives. Governance reports have generated numerous research works.

Themes	Authors
Risk-sharing and incentives in subcontracting relations	Gaffard [GAF 90]; Cahuc [CAH 93]; Aoki [AOK 88]; Kawasaki and Mc Millan [KAW 87]; Florens and Naffrichoux [FLO 92]
Moral hazard, selective distribution contracts and franchising	Brickley, Dark [BRI 87]; Norton [NOR 88]; Carney, Gedajlovic [CAR 91]; Rey [REY 91]; Glais [GLA 92]; Mathewson and Winter [MAT 85]
Arbitration between different organizational forms (alliances, mergers)	Ciborra [CIB 91]; Thietart; Hennart [HEN 90b]; Muldur [MUL 87]; Mahoney [MAH 92]
Strategic alliances	Reve [REV 90]; Charreaux [CHA 87]; Macho-Stadler and Pérez-Castrillo [MAC 91a, MAC 92a]

Table 4.3. *Agency theory and contractual relations*

4.4. Conclusion

Agency theory is an integral part of the theories of the firm. Originally developed as part of the economics of organizations, it is now widely used in strategic management. It was mainly mobilized in the 1990s for a better understanding of inter-firm alliances, although it did not awaken the same enthusiasm as the theory of transaction costs, which gave rise to a great deal of theoretical work and empirical analysis. Nonetheless, its explanatory power varies according to the forms of cooperation studied.

5

Strategic Alliances in R&D and Market Power

5.1. Introduction

This chapter is devoted to the articulation between (entry and exit) barriers and strategic alliances. The presence of strategic barriers may lead some firms to forge an alliance as a means of circumventing them. Similarly, established firms can strategically resort to R&D in order to hinder the arrival of potential entrants.

Entry barriers are also closely associated with the concept of product lifecycle. The second section of this chapter will be dedicated to the technological extensions of the product cycle as well as the different strategies that firms implement. As we will see, strategic alliances tend to be more common at certain phases of the technological lifecycle.

In the third section, we will shed light on the issue of the technological race, and specifically look into the cases in which a company uses innovation as a rivalry instrument, with defensive and offensive purposes. We will understand rivalry or race as a situation in which the fact of arriving first becomes essential and the firms get rewarded on the basis of their rank and not their performance [HAL 92]. In this framework, the model of technological rivalry suggested in the literature [GIL 82] will invite us to

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explore a particularly interesting outlook on how strategic technological barriers and the technological race are articulated. Finally, through the contribution of [VIC 85b], we will focus on the possibility of forging alliances at specific stages of the technological race.

5.2. Entry barriers and strategic commitment

There are numerous models referring to strategic barriers. Certain research papers have stressed the connections existing between industrial structure, concentration and technological barriers [SCH 84, MAN 84]. Other studies have insisted on the specific form of engagement that makes it possible for firms to acquire and maintain a dominant position. Many authors ([SPE 77, SPE 79, FUD 83a, FUD83b]) have recognized the importance of capacity investment and, in a more general way, praised the role of capital. Finally, [GIL 82] concentrated on the preeminence of technological innovation and more precisely, on the role of patents (see section 5.4).

5.2.1. *Barriers and game theory*

Questions regarding the issue of interdependence between oligopolistic enterprises and barriers to entry can be analyzed via the theory of games. We will begin our exploration with an analysis of the more traditional models.

5.2.1.1. *The weakness of traditional models analyzing barriers to entry*

These models are derived from the postulate of Sylos-Labini, which can be summarized as follows: if the barriers to entry are not strong enough, an established firm may be led to set a “limit price”. The firm then decides to apply a selling price which is higher than the marginal cost of production, but lower than the marginal cost of potential entrants.

At first sight, this presentation may seem attractive, but at a closer look it remains unsatisfactory in order to understand the problem. Criticism has focused on the credibility of threats and on the real commitments of the firm. “Modern” theories regarding strategic barriers have complemented the former analysis by arguing, not only “the theme of retaliation threats, but fundamentally, the credibility of such threats”. By this means, the concept of credible threats or engagement was introduced [GAF 90a].

Current research devoted to strategic entry barriers is mostly grounded in game theory. This theory focuses on the representation of strategies of the actors involved. In game theory models, potential entrants engage in a "complex game of strategic relations" with the established firms [JAC 85]. Game theory makes it possible to model the decisions and actions of each firm, that is to say, the actions of potential entrants as well as those of established firms. It also measures the equilibrium (or equilibria) and the conditions for achieving balance. The aim of game theory is to determine which will be the optimal strategy for each player. From this viewpoint, the definitions of "perfect equilibrium" or "equilibrium for each subset" can be reached.

5.2.1.2. *Formalization of the basic model*

Within the theoretical framework of entry barriers, established firms are conceived either as mere enterprises or as a "perfect" cartel, which is almost a monopoly. From this perspective, the model has the following two players: the established firm and the firm seeking to penetrate the market. For the sake of the argument, we will assume that the firm (or the leading group comprising n firms) uses a fixed irreversible expenditure policy, which has a dissuasive effect on potential entrants. These expenses, as stated by Jacquemin [JAC 85], may correspond to investment in publicity, R&D costs or any other capital outflow, such as the capital cost for entrants, for example, which tends to increase. In the model we will discuss below, the strategic variable available to players refers to R&D expenditure.

In the words of [JAC 85], it is a "model of strategic rivalry based on the assumption of an initial asymmetry. In situations where it is advantageous to take the initiative (where there is struggle for who strikes first) and where information is perfect, the established firms are favored by an asymmetry before entry: they are supposed to take the initiative and are capable of making prior and irrevocable commitments which actually match reliable threats."

Moreover, the model reveals how an established firm in the market may profit from a time advantage, corresponding to the fact that it has accumulated a sufficient amount of "capital" (in the broadest sense) before the entry of other firms and what will automatically discourage their entry [TIR 85]. This analysis can be found in several authors' work. For example:

> "The strategic advantage that Bain implicitly considers is the one held by established firms, that is to say, the first ones who have made a commitment. This is the same type of advantage to which Stigler refers, namely, an advantage associated with time. It appears that there can be no other strategic advantage than the one implying that the firms involved will not have access to the same cost function. In accordance with Stigler's intuition, the asymmetry is essentially temporal. We can confirm the preeminent role of sunk costs (fixed but also variable costs), which are associated with either physical assets or due to intangible assets, such as for example, customer loyalty" [GAF 90].

Let us assume the case of two firms in a context of certainty, with a finite horizon. One is already established in the market, while the other is trying to access the same market. Two situations may arise:

– *only "innocent" behavior is allowed*, that is to say, the established firm does not seek to affect the expectations of potential competitors. In this case, the firm remains passive and we confront a two-stage sequential non-cooperative game. The first step concerns the decision of the potential entrant to stay out of the market (or not). If he stays outside the market, the established firm may benefit from monopoly profit. If the entry effectively takes place, the next step will be for the firm to choose either economic war (with a corresponding profit for each firm) or market share (with a duopoly profit for both players). At this point, we can assume that the duopoly is a profitable option (less profitable than monopoly), but always bearing in mind that a price war could be devastating for both firms. The determination of the optimal strategies for each player, the determination of "equilibrium", is obtained through inductive reasoning[1], going back from step number 2 to step number 1.

The pair of "entry war" strategies for the established firm and "staying out of the market" for potential entrants represents a Nash equilibrium situation in which none of the players is willing to change their strategy given the strategy chosen by the other participant. But it is evident that war is neither a

1 "Reasoning by backward induction is the general method in the case of finite horizon games. The procedure eliminates dominant decisions (where there is an available decision conferring a higher gain, regardless of future events), chops down the game into subsets, and solves the subsets backwards, reading from the end of the game tree until a resolution of the game without subsets is reached" [JAC 85].

reliable threat, nor would it be the optimal response for the established firm in case of entry. Bearing this in mind and given the context, the entrant is naturally not discouraged. As it has been pointed out by [RAI 88], this answer is contradictory to the very idea of Nash's equilibrium and "it is the existence of a potential commitment that makes it possible to solve the difficulty". In fact, this result is linked to the introduction of a new concept, that of perfect equilibrium, which can be defined as the equilibrium which "excludes possible actions corresponding to unreliable threats, given the strategies of the others. These threats are the actions of the players whose implementation would not be carried out if these players had the opportunity to execute them, because such a performance would clearly go against their own interests" [JAC 85];

– *only "strategic" behavior is possible*, that is to say, when a reliable threat strategy can be deployed and is thus realized by a commitment of the firm installed, to prepare the war, in expenses that will constitute costs. These costs may be related to the installation of production capacity or to advertising expenses. In this case, the sunk cost is linked to R&D expenses which will then become the strategic means to deter entry.

The model contains two aspects: the threat itself and the credibility of the threat. The potential entrant must be convinced that the established firm will respect the threat in case of entry. In other words, the threat has to be credible, it must be accompanied by an "irrevocable" and "irreversible" commitment from the established firm towards R&D [RAI 88]. It also implies that the established firm has an interest to execute the threat. The firm must be assured of "its profitability in the sense that the expenses incurred into thanks to this policy will be more than compensated for by the resulting additional revenue" [JAC 85]. These expenses will not affect the profit of the established firm if the war actually effectively takes place, but otherwise its gains will be reduced by the value of the R&D engagement. A fundamental point regarding this model concerns the irreversibility of the commitment made by the established firm, which is actually known before the potential entrant makes its decision.

The different stages of the game are the same as in the model we described earlier: already knowing the decision of the established firm, the potential entrant decides whether to enter the market or not. In addition, the established firm chooses its pricing policy having to opt between market

share and war. After making a decision, each player takes into account the potential reaction of the other player. We should perhaps mention a third step, which already began when the established firm had to decide whether to remain passive or to engage.

In this sequential game, the player's strategies for any subset constitute a Nash equilibrium where each player adopts the best possible response to the strategies of other players, so as to safeguard his interests. In a case where the entry takes place, it is credible for the established firm to choose to fight in case where the loss due to the sharing is higher than in a war scenario. Knowing this before entering, the entrant will probably choose to stay out if the established firm is seriously committed. "Do not enter" is the optimal strategy for the entrant.

The established firm is capable of sustaining this reasoning by placing itself in the place of the potential entrant. It must then decide whether the optimal strategy will be to remain passive or, conversely, to engage in R&D expenses. It will adopt strategic behavior only if, on blocking the entry, the monopoly gains are greater than the ones the firm would obtain in case of passivity (sharing duopoly). The threat of the established firm will be considered reliable only under the condition that the difference between the monopoly profit and the duopoly profit exceeds the cost of strategic engagement (R&D expenditure), and that the latter is higher than the difference between the profit of duopoly and the gain in case of war. "The entrance will be prevented. The existence of a barrier to entry directly results from the strategy of the established firm" [RAI 88].

5.3. Alliances and strategic barriers to entry

In sectors with high barriers to entry, the strategy of established firms is to try to protect themselves against the entry wishes of potential firms. In the same way, firms applying use different strategic actions to overcome or circumvent these obstacles. Strategic alliances may be used as a means to erect or to overcome barriers to entry. In the first case, existing firms come together to defend their positions and/or to reinforce them. The second strategy can lead to a regrouping of firms, who will concentrate in order to facilitate their entry into an activity [MOR 76].

5.3.1. *Alliances as a means of erecting (or overcoming) barriers to entry*

Established firms decide to pool resources and devote them to research activities so as to create an obstacle to the penetration of isolated firms, thus obstructing their access to certain types of information and market segments. Research activities which are particularly onerous and risky cannot be carried out by firms with low financing capacities. The pooling of resources makes it possible to accumulate technological skills, to avoid excessive or costly duplications and to seek complementarities, in order to finally engender genuine obstacles to entry.

At the same time, alliances are a means of circumventing barriers to entry: two external firms join forces in order to penetrate a market. This choice of alliance strategy stems from the difficulty for the aspiring firm to access the market alone. "When cooperative agreements concern already developed skills, they mainly intend to facilitate the entry into protected markets. Hence, the 'geographical' complementarity between partners becomes an important variable in the choice of partners" [ROC 92].

5.3.2. *Alliances and strategic barriers to entry and R&D*

Strictly speaking, the difficulty in penetrating a market can also result from technological disadvantages. In line with Dixit's model, the behavior of alliances can be formalized. One of the difficulties of the model is related to the introduction of a third player [MUC 91]. Multiple game combinations exist. In such a frame, two main games can be identified:

– alliance between two established firms against a potential entrant;

– alliance between two potential entrants against an established firm.

We will now examine the coalition of two established firms against a potential entrant. For instance, two coalition firms within a R&D *joint venture* raise a barrier and deter another firm from entry by "using their new specific common advantage, which is inaccessible to other potential competitors […]. In the simplest case, by discouraging investment in R&D, production and especially the entry of the other competitor, the coalition must increase its profits by an amount greater than the sum of the profits of each of the two coalesced firms" [MUC 91].

The game is sequential at several stages. Both established firms (1 and 2) decide to cooperate or not to cooperate with each other. They decide to engage (in R&D) or to remain passive. Knowing the decision of the two firms, the potential entrant decides whether or not to enter the market. And then, established firms choose either to adopt sharing or war.

In relation to the initial model (see section 5.2.1.2), the problem now changes in nature, because the decision for the firm implies more than committing or remaining passive. Established firms (1 and 2) have to determine the type of commitment they will acquire in terms of R&D expenditure: cooperative or noncooperative behavior. It is necessary to determine under what conditions cooperative engagement between firms 1 and 2 will be preferred to noncooperative behavior and what will constitute the best strategic barrier to entry.

5.3.2.1. *Cooperative behavior between established firms*

See the case where two established firms explicitly cooperate (joint venture and consortium) and engage in a policy for joint research expenses, in order to bar the entry of potential competitors:

> "The context is described as cooperative if the players can group themselves in coalitions where their strategy is decided in common in order to improve the gains for all the coalition players. Players are in a position to abdicate their decision-making power in the hands of a collective authority which emanates from a coalition to which they belong. They can enter into firm commitments and be forced to maintain them: these commitments can either take the form of threats or promises they intend to keep" [MOU 81].

This situation produces similar results to those of the initial engagement model (see section 5.2.1.2) where the two established firms implemented a coalition.

5.3.2.2. *Noncooperative behavior between established firms*

Two scenarios are possible:

– *strictly noncooperative behavior* between the two firms. This case illustrates a commitment of established firm 1 while firm 2 remains passive;

– *noncooperative collusive behavior* between the two firms. *A priori*, this paradoxical expression refers to the possibility for a firm to be in collusion with another firm in the absence of an explicit agreement between the two units. Both established firms decide to commit themselves separately to the new entrant.

Due to the fact that it is difficult to formalize the problem of entry and the phenomena of strategic alliances only through the use of game theory, other analysis grids are suggested in the following two sections.

5.4. Technological lifecycle, entry conditions and strategic alliances

5.4.1. *Technological lifecycle and entry conditions*

Product lifecycle theory is relatively old and has been applied in different economic fields. In particular, it was employed for completing long-term analysis. In fact, the product cycle is only an incarnation of the long cycle of diffusion of technical change. It has been widely used in the study of industrial and market structures, and specifically in the context of international trade [VER 96, WEL 72]. We will not insist here on the product's cycle, even though product lifecycles have increasingly become shorter and shorter since the early 2000s, as we can infer from the recurrent renewal of products. Since hypercompetition demands a continuous process of innovation and consumers are versatile, these factors may partially explain the phenomenon of acceleration [DAV 94].

The aspect that should be emphasized here is rather the technological cycle associated with product lifecycle. The theory of the technological lifecycle is closely linked not only to the strategies implemented by firms but also, and for the same reason, to alliances. Technological innovations usually take place in clusters[2] and go through a cycle that is divided into four phases: start-up, growth, maturity and decline. Technologies are created; they evolve and spread massively before becoming obsolete.

2 The notion of "cluster" was developed by Schumpeter. After a major innovation takes place (often a disruptive innovation due to technological and even scientific progress), other innovations are triggered by these discoveries (see the cases of the steam machine, integrated circuits, computing, the Internet, nanotechnologies, etc.).

5.4.1.1. *Product lifecycle, technology and industrial cycle*

Several authors [MAG 77, FOS 86] have described the four phases of the technological lifecycle. Not only does each phase correspond to one of the uses of technology, but it also envisions the product from the point of view of its lifecycle. Throughout this cycle, the nature and uses of technology change profoundly.

The pre-introductory phase corresponds to fundamental research. This phase is the one of invention, the one that involves complex technology. At this stage, the product does not exist as such: the action takes place before the beginning of the lifecycle of the product itself. The second phase, that of introduction, is the one of applied research and innovation development. This phase, which involves the introduction of new technology to an existing market, is the one of "sophisticated" technology. It is precisely at this stage of the technology cycle that the product lifecycle begins. The third phase is the one of standardized technology. The implemented technology only has a few improvements and the intensity in R&D decreases. At this point, we move on to large-scale industrial development and the race to differentiate the product properly begins, and this is what corresponds to the second phase in the product lifecycle. The fourth phase is that of commonplace technology, with investment in R&D being practically marginal. This is the final step in the product's cycle.

The technological cycle is generally represented by "S" curves [FOS 86]. Management consulting firm A.D. Little has suggested the following nomenclature, thereby making a distinction between:

– *basic technologies:* these have often been at the origin of the sector, but are widely distributed and are currently available without any competitive advantage. While it is true that the firm (the same as its competitors) masters these technologies, it is at this phase that the company must decide whether to abandon these technologies and launch new ones;

– *key technologies:* those which constitute the competitive foundation of the sector, whose proficiency is absolutely essential for success in the chosen activity or brand. These are exploited both by the company and its competitors, and have significant impact, because their mastery results from the opportunities to differentiate themselves within the sector;

– *emerging technologies:* these are often at their initial stages of development and application, only used in a marginal way in the corresponding sector, but with high potential and candidates to becoming key technologies in the future;

– *embryonic technologies:* these technologies are often at a research phase and have no concrete application, but may be of interest at a later stage of development. Investments at this stage are high.

Other consulting firms in strategic management have worked over and adapted the concept of technological lifecycle. For example, this is the case of Gartner, a consulting group who confirmed that there is a relation between the succession of the four phases and the *hype cycle* [GAL 16]. Gartner's curves characterize the typical progression of emerging technology, from initial enthusiasm towards a period of disillusionment and understanding of the pertinence and the role of technology in a market (Box 5.1). Each phase is characterized by distinct indicators related to the market, investment and the adoption of technology.

The curve represents a product, a service or a technology lifecycle and its trends. It is composed of five development phases:

– *technology trigger*;

– *peak of inflated expectations*;

– *trough of disillusionment*;

– *slope of enlightenment*;

– *plateau of productivity*.

Box 5.1. *Gartner's hyper curves (adapted from [DAI 10c])*

In his most recent report, Gartner [GAR 16] highlighted three key technological features that will be imposed on firms facing a digital transformation of their activities:

> "*Transparently immersive experiences*: Technology will continue to become more human-centric to the point where it will introduce transparency between people, businesses and things [...].

> *The perceptual smart machine age*: Smart machine technologies will be the most disruptive class of technologies over the next 10 years due to radical computational power, near-endless amounts of data, and unprecedented advances in deep neural networks that will allow organizations with smart machine technologies to harness data in order to adapt to new situations and solve problems that no one has encountered previously.
>
> *The platform revolution*: Emerging technologies are revolutionizing the concepts of how platforms are defined and used. The shift from technical infrastructure to ecosystem-enabling platforms is laying the foundations for entirely new business models that are forming the bridge between humans and technology. Within these dynamic ecosystems, organizations must proactively understand and redefine their strategy to create platform-based business models, and to exploit internal and external algorithms in order to generate value.
>
> [These] three overarching technology trends that profoundly create new experiences with unrivaled intelligence and offer platforms that allow organizations to connect with new business ecosystems".

An interesting development of product lifecycle and technology lies in the combination that can be achieved, thanks to the concept of industrial cycle [NPV 83]. At the beginning, the notion of lifecycle used to be applied to so-called "mature" industries, for which different strategies could be adopted in order to improve their competitiveness or competitive advantage. But in fact, the process should have been denominated substitution, because it referred to the introduction of a new generation of products, to the extension of lifecycles through the introduction of "minor" innovations, to other technological changes or to the perpetuation of the maturity stage, by means of increasing internationalization. A parallel between the lifecycle and the diffusion of innovation has been carried out by several authors.

In general, the richness of the product cycle (associated with technological factors and industrial aspects) lies in the intervention of a number of factors (market structure: monopolistic, oligopolistic or competitive, costs and production and shifts in demand) that will surely have an impact on business strategies.

5.4.1.2. *Costs and entry conditions during the different phases of the technological lifecycle*

Lifecycle analysis can be enhanced by associating it with the conditions and the costs of entering an industry. The presentation of [PER 88] leads to a specific analysis in terms of phases, but focusing on the different strategies adopted by the various actors, be it the firms or the public authorities. It is also a means of "breaking the determinism" of the product's lifecycle [JAC 85] or the technological lifecycle.

According to [PER 88], we may consider a four-phase technological lifecycle for which there are four matching elements that determine the real cost of entry for each firm: fixed investment (I); the scientific and technical knowledge required to assimilate innovation (S); the cost of acquiring an experiment (E) and the costs of the disadvantages associated with the elements concerning the setting-up (X), for example, the general infrastructure or the economic and institutional environment of the company.

Phase 1 corresponds to the introductory phase, where the focus is placed on the product itself. It must perform correctly and it is successfully led to the market. In this case, the S threshold will be high whereas E could be low.

Phase 2 constitutes a period of rapid growth in the marketplace. Once the product is defined and it is market-tested with clear growth prospects, the focus will shift towards the production process. Successive improvement measures are implemented both on the product and on the production process, with the aim of increasing production and productivity. As the technological aspects are gradually solved and their solution becomes an integrated part of the product and the production equipment, the S level for imitators drops. But the E threshold in terms of required skills will rapidly increase due to the fact that experience is accumulating within the company. In the measure that the optimum plant size increases, the cost of I becomes higher than that in the previous phase.

In phase 3, we have reliable knowledge concerning the size and the growth rate of the market. Also, we have clearly identified additional incremental innovations in order to increase productivity. At present, the emphasis is placed on managing the growth of the company and conquering new market segments. The actual capital costs and the firms' skills in terms of management required to stay in the race can be sensibly high. The S component of entry costs is now relatively low, but the ever-increasing E and I components are now at their highest level. The advantages to

localization become less important. What is more, in phase 1, the price that a firm would set to sell technology tends to infinity in the measure that the firm has an interest in maintaining a monopoly on technical information (S); but in phase 3, it can still remain relatively high, which can be explained, thanks to the amount of accumulated experience (E) within the firm.

Phase 4 is the maturity stage, when the product and its production process are standardized. Additional investments aimed at improving technology lead to decreasing returns. From the moment the *inputs* are fixed, the advantage in terms of cost-of-production goes back to the firm (or country). This should lead established firms to relocate some of their facilities even at the end of phase 3 (see Chapter 8). But, this could also lead them to focus on other innovations and to suggest alternative technology that makes the technology acquired during previous phases obsolete. Another option is for firms to sell technology in the form of licenses and know-how contracts.

As we can appreciate, entry conditions may differ according to the phase of the cycle under consideration. For instance, in phase 1, an innovator can penetrate a market. However, entry during this phase does not guarantee "survival" in the race. An entry during the maturity phase appears relatively safer, as long as a new product is not substituted for the old one in the market.

On the basis of these factors, it is possible to consider that the strategies of firms differ according to the stage of the lifecycle studied.

5.4.2. *Technological lifecycle and strategic alliances*

The technological lifecycle is closely linked to business strategies. The shortening of lifecycles (be it technological or products) stimulates firms to cooperate more systematically [SCH 90]. As a matter of fact, according to [CIB 91]: "product life-cycle hardly exceeds the necessary time to ensure the production of a license. This diminishes the ability to appropriate technological rents via patents and encourages competitors to cooperate with the intention of appropriating R&D results at the source and to later compete in the traditional fields of production, marketing and distribution".

The results of an earlier theoretical and empirical study [CAI 89] devoted to strategic alliances in the technological lifecycle of industries confirm the idea developed; we have previously discussed that the strategies of firms vary according to the stage of studied the lifecycle. Scholars have confirmed that, for the information technology sector during the period 1980–1986, cooperation operations (joint ventures) between firms took place more frequently during the introduction and decline phases. Cooperation at the beginning of the cycle can specifically be explained due to the high cost of R&D expenditure as well as the uncertainty about potential applications of research. The risk associated with uncertainty at the early stages of the technology's lifecycle is really high. Accordingly, the choice of alliances during the final phase can be partly due to a restructure need, which is relatively expensive.

This perspective can be enriched by considering that strategic alliances do not take place with the same frequency, depending on the phase of the lifecycle that we are pondering. Some forms of cooperation are more adapted to the early phases of the technological lifecycle such as pre-competitive research and corporate venturing. As technology progressively develops, joint ventures are preferred (see Chapter 1).

Other authors have considered these reflections indirectly in their understanding of the technological lifecycle. In particular, [MIT 92] have devoted their research to the use of so-called "pre-entry" alliances; that is to say, alliances preceding the effective entry into new fields of activity with the intention of acquiring the necessary knowledge to take part in a race based on innovation. In fact, a "pre-entry" alliance is an agreement that takes place between a solidly established firm in a given industry, but not in the same segment where its partner operates. These authors tested the hypothesis that the agreements are useful for reducing the risks of engagement over a new market, relying on a partner. The test included 87 firms in the American medical imaging market. The results put the use of alliances in perspective as a means to penetrate a new market. They also showed that firms that already have a cooperative experience in terms of technology and know-how are less likely to resort to alliances again, probably due to unsatisfactory results issued from previous agreements.

5.5. Strategic deterrent power to entry and technological race

One of the main objectives of R&D in the industrial strategy of firms is the creation of barriers to entry. In this way, the barriers that potential entrants face are determined by the nature of the innovative activity that firms exercise in a market. If an innovation is patentable, then the company that first produces an innovation will appropriate the most important profits in the market. Several models of technological race exist. These models show how technologies resulting from strategic actions defined by the intensity of R&D expenses can contribute to deterring the entry of new firms into the market.

5.5.1. *Competition* versus *race?*

It is generally accepted that "competition" can be observed in the product/service market, whereas the "race" between firms occurs at the level of innovation (and this is especially the case for patents). The race is said to occur *ex post* whereas competition appears *ex ante*. In this section, we will focus on the notion of technological race.

One of the factors that helps differentiate competition from rivalry or race is time:

> "The concept of race should be understood as a break-up with the theory of competition, insofar as the temporal dimension is decisive. Two features distinguish the race process from the competition process and the remuneration mode. Unlike competition (in the simplest form as pure and perfect competition), where the date of entry and the corresponding order of arrival are not taken into account, the race assumes that time is a discriminating factor: the race operates a ranking" [COM 94].

Arthur and David were among the first few authors to establish the theoretical foundations of the technological race based on the concept of Increasing Returns to Adoption (IRA). There are five sources of IRAs: learning by doing, network externalities (associated with self-reinforcing mechanisms), increasing returns on information (the more a technology is adopted and known, the lower will be the aversion to risk), economies of scale and technological complementarities (the more a type of technology is adopted, the more it will lead to improvements in related technologies).

As [FOR 89] reminded us, the race process based on the existence of the IRA is characterized by four properties:

– *non-predictability*: it is impossible to know the outcome of the race beforehand on the basis of the information available about technologies at the beginning of the process;

– *inflexibility*: the domination of one of the two technologies becomes irreversible at a certain stage, what leads to a *lock-in* situation;

– *risk of inefficiency*: due to exogenous "small historical events" linked to chance, there is an important risk that the least "efficient" technology will eventually be chosen on the market;

– *path-dependence*: it is the very first stages of the race that will determine the outcome.

The models of technological race were mostly applied in the framework of race between standards [KAT 85].

The logic of technological race proved a real advancement in the understanding of technical change, particularly in what concerns the development of Information and Communications Technologies (ICT). Nevertheless, it triggered a large number of debates mainly related to the specific weight of choice and the adoption of users as the unique criterion for determining the outcome of a standardization process which would probably come about by chance. As it was pointed out by [MAN 93]: "... the random nature of the outcome of the technological race results from the failure to take into account the strategy of firms. [We should fairly value] the importance of technical and strategic choices made before the emergence of technology on the market".

Therefore, it is necessary to take into account the strategic behavior of the different actors involved. These are integrated in the "technological race" models, which stem from the analytical framework of technological race. The analyses in terms of technological race refer to models in which the company uses innovation as a rivalry instrument both from a defensive and an offensive outlook.

5.5.2. *The race for innovation*

There are numerous models of technological race. [GUE 85] described the five most relevant: innovation as a riding ring, innovation as a single treasure hunt, innovation as a chase after various treasures, innovation as a stage treasure hunt and finally, innovation as a race with a fixed line of arrival.

5.5.2.1. *Innovation as a race with a fixed line of arrival*

Preemption could be described as the situation when a firm excessively accelerates its R&D and innovation programs [JAC 87]. According to [FUD 83a], we can identify two types of preemption. Simple preemption refers to the case in which a leading firm cannot be surpassed from the moment it has a certain lead. Competitors then abandon the race on the spot. There is also ε-preemption, which corresponds to the situation in which a firm remains at the head of the race, regardless of the advantage it has over its competitors.

In particular, [FUD 83a] introduced a technological race model of patents with delayed information in which the finish line is fixed. A firm wins the race if it is the first to accumulate a certain amount of knowledge provided *a priori*. It is a game measured in discrete time. The intensity of the R&D efforts can be measured in three values (0, 1 and 2). In other words, both firms have the following choice: either to make zero effort, to learn at a rate of "one unit" or to learn at a rate of two "units".

There is a delay in obtaining information about the competitor's R&D behavior. It is only at period t that firms can be fully informed about the R&D activities carried out by their rivals during the previous period (t – 1). Such is the dynamic that a firm could even surpass the leader because it could accomplish real advances in its technological knowledge without having to reveal its results to the more experienced firm. The inability to monitor a firm's R&D program may cause the leader to be unable to react on the spur of the moment. As a result, he will probably be overtaken.

In the model we are considering, in order to introduce innovation, a firm must have accumulated a certain number of experience "units". The firm's accumulated knowledge is the result of the distance that has been traveled by the company. The experience that remains to be acquired will be the distance still to be traveled. Two cases can be distinguished so as to measure whether the distance to be traveled in order to catch up with the leader has to be considered long or short.

If a firm is kept behind the leader by two "units", we are in front of a preemption phenomenon. The firm which has this delay abandons its R&D activity, what will allow the leader to invest at the lowest rate. If both firms possess the same level of experience, they will engage in intense rivalry provided that the number of challenges before the goal is relatively low. If the distance between the leader and another company is equivalent to one unit, both firms will adopt a mixed strategy. In the latter case, there is no complete preemption.

5.5.2.2. *Innovation as a stage (treasure) hunt*

Fudenberg *et al.* [FUD 83a] conceived an innovation process which can be split into two stages. The model is based on the chance for a latecomer firm to catch up with the leader of the race. A preliminary innovation must be made before the invention can be patented, "to follow the metaphor of the treasure hunt, before efficiently searching for the treasure, we must find the temple in which it is buried" [GUE 85].

In this model [FUD 83a] shows that ε-preemption no longer appears systematically. Let us imagine that two firms (1 and 2) are identical. Firm 1 is supposed to enter the race for the patent before its competitor does. The first stage is characterized by a discovery made by firm 1, what becomes immediately known to the rival firm. Nevertheless, the innovation remains private property of the innovative firm and is kept secret. In this model, firm 2 is yet able to make up for its initial delay, despite a lower level of experience than firm 1. In fact, firm 2 can take the lead during the second stage of the race. At this point, the hypothesis is made that the probability of producing an innovation is constant, because the chance rates have become constant and equal for both firms.

Being the first firm to have entered the race, firm 1 will persevere unless its rival achieves the preliminary innovation before a specified date: w1. The latecomer, firm 2 (who entered the race at $t = t_2$) may adopt one of the following three responses (depending on the value of the parameters): either it quits from the start or it continues its R&D activity until w1, or it persists, unless the leader achieves the preliminary innovation before $w_1 + t_2$.

In this model, the latecomer can begin to accumulate experience during the second stage and catch up with his rival. This modest success will encourage him to give up less easily. In the words of Fudenberg *et al.* [FUD 83a], the laggard can resort to "*leapfrogging*" before his rival.

5.5.3. *The introduction of cooperative phenomena between firms*

5.5.3.1. *The introduction of cooperation in the technological race*

Grossman and Shapiro [GRO 87] developed a two-stage patent race model based on the patent race reported in [LEE 80], where technology has a stochastic character. In order to win the race, a firm must complete two R&D phases of equal difficulty. The two stages should respectively be considered as research and development phases. As such, each firm is fully informed about the progress of its rival and immediately knows if it can take the lead or if it must remain in its current position. Progressively, participants can adjust their tactics as the race progresses.

This model is interesting in that it intends to decipher what encourages firms to adopt cooperative responses at certain stages of the technological race. Grossman and Shapiro identified three alternatives that may alter rivalry dynamics in R&D. First, the leader shares his (intermediate) results with the rival, by means of a license agreement in exchange for the payment of a fee. Second, the government grants intermediate patents to a firm before it reaches all the development stages of an innovation that are necessary to introduce a marketable product. As a result, participation in the race for the latecomer during this initial phase is excluded. The third case corresponds to a situation in which firms enter a research joint venture during the first stage before competing in the development phase.

In the context of a patent race divided into several stages, every time a firm has completed an initial phase of research that its rivals have not yet achieved, the firm should feel motivated to make these results available to other firms in exchange of royalties. In this way, the firm may acquire potential gains for the information exchange, that is to say, it can profit from communicating intermediate results.

The question of potential gains obtained from an information exchange necessarily requires a comparison of the overall industry profits, with and without a license. The license itself is an attractive operation for both firms because it offers the follower the possibility of moving closer to the finish line without incurring into any additional expenses on intermediate results. This way, the follower can endure the race in situations where the only alternative would be for him to withdraw. Nonetheless, from the point of

view of a duopolistic race to the patent, the license has the disadvantage of intensifying rivalry between firms. Without a license, the rivalry period could be altogether avoided, if the leader finished the research program before the follower made progress.

Grossman and Shapiro [GRO 87] found that having recourse to a license may lead to potential gains in several situations. For example, in the event that the follower quits without a license, the fact of using one could increase industry profits when the discount rate is high or, in case of a positive rate, when the elasticity of the R&D cost function is strong enough. In the case where the follower remains active, the license is likely to be more profitable for the firms if the rivalry it gives rise to in the final stage of the race is not too intense. Finally, a high discount rate is conducive to a license, even if the follower remains in the race, because the license reduces the expected time for the discovery.

The second means contemplated in [GRO 87] concerns so-called "intermediate" patents, and more specifically, a government policy which grants a patent to the intermediate stage of the innovation process. Results have shown that at the beginning of the race, rivalry is likely to be more intense if intermediate patents are granted. Thus, patents appear to be beneficial for all firms *ex post*.

The last scenario considered in this model is the one of research joint venture. This tends to increase profits for all participants in the race for two reasons: first, because it eliminates rivalry at the initial stage of the research program. Second, because the firm's access to intermediate results at the moment technological advancements have been made in one of the laboratories avoids duplication efforts in R&D.

We should retain two results extracted from the [GRO 87] model. On the one hand, the leader invests more than the follower, but if the follower succeeds the intermediate phase and recovers his delay, both firms will intensify R&D efforts. On the other hand, the various forms of cooperation (sharing intermediate results by means of licenses, granting of patents in the framework of a technological policy or engagement in a *joint venture* during the first phase of the race) are all conducive to increased profits for the entire industry.

5.5.3.2. *Extension of the model by Fudenberg* et al.*: firm cooperation and noncooperation*

In line with the model of the dynamic patent race suggested in the literature [FUD 83a, HAL 92], we have considered the possibility for firms who compete for a single patent to cooperate at certain stages of the race for specific purposes. In fact, firms may or may not decide on a temporary information exchange agreement, but this possibility is actually challenged at each stage of the technological race. In other words, at every stage of the patent race, firms can either keep the result of their R&D efforts as a secret, or, on the contrary, they can disclose a part or the whole of the progress of their knowledge.

When a firm decides to embark on an R&D program, its cooperation strategy is to provide its rival with a unitary amount of knowledge. In this case, the active company always benefits its temporary "partner" with a positive external effect.

In Fudenberg's model, firms have the choice of offering their competitor the benefit of the whole or half of its investment. Under the agreement itself, it benefits from positive externalities when its rival invests in R&D (but this will only be perceived during the following period). In a situation where there is no agreement, firms increase their stock of knowledge only through their own effort in the race. Actually, they do not exchange any kind of information but results must remain secret:

> "Finally, when they are both active in R&D, the agreement option versus the non-agreement option enables competitors to increase their knowledge stock faster and, consequently shorten the time lapse for obtaining a patent, achieving this at a lower accumulation cost. In particular, if the both firms decide to 'cooperate' on equal terms and invest each at the maximum pace, their experience will increase by three units, two thanks to their own effort, and an additional unit by the effort of their 'partner' for the cost of only two units" [HAL 92].

Contrary to this, the agreement will prove to be a particularly unfavorable strategy for a company who invests while its "partner" is not engaged in a R&D effort. In a situation of maximal externality, the latter will advance the same amount as its rival does, but without providing any effort or cost.

5.6. Strategic dissuasion to entry, alliances and patent race

R&D endeavors play a key role as a barrier to entry (see previous section). The models presented in this section attempt to analyze the technological race for patents, what discourages the entry of new competitors. From the perspective of [GIL 82], in case of preemption, established firms in a monopoly situation may obtain greater gains than the sum of the duopoly gains that would have originated if a new entrant obtained a patent and won the race. The second model developed by [VIC 85] deepens the one developed by [GIL 82] and analyses several established firms which have the possibility of forming a joint venture in order to counteract the entry of a new firm on the market.

5.6.1. *Innovation preemption by a market monopolist*

As a continuation of the work of [DAS 80], [GIL 82] introduced a model[3] in which a firm located in a monopoly market (which may potentially be acquired via innovation) is threatened in its position by a potential entrant. The question is who will invest the most in R&D: the established firm or the entrant. In other words, the analysis focuses on the maximum bid that a firm would be prepared to make in order to acquire a patent that will grant the exclusive exploitation of a manufacturing process [GUE 85].

Let us follow the demonstration suggested by Gilbert and Newbery, and consider two firms: firm *m* and firm *e*. The *m* firm is established on the market of the product, and is a monopoly protected by an old patent; whereas *e* represents the potential entrant. A race starts for a new patent.

3 As it has been shown by Vickers [VIC 85b], the article by Gilbert and Newbery [GIL 82] sparked off a major debate. The controversy was particularly stirred by Reinganum [REI 83] on the question of the persistence of monopoly and the encouragement to invest in R&D for obtaining a patent. The question was to prove who, either the established firm or the potential incomer, would invest the most and would be the first one to innovate. The conclusions arrived at by Gilbert and Newbery [GIL 82], that is to say a patent preemption by the monopolist and a more important R&D activity on the part of the potential incomer, for Reinganum, were totally opposed. That could, up to some extent, be understood due to the different hypothesis chosen by the authors. While Gilbert and Newbery [GIL 82] modeled the race as a deterministic game, with a fixed innovation date known beforehand, Reinganum conceived innovation as a drastic process that would award the victor with monopoly power (see Halmenschlager [HAL 92], who deeply analyzed these models).

The profit of the monopolist, if he wins the race, is π. Contrary to this, if the entrant is victorious, the firms respectively obtain profits πmd and πed. Now, let us analyze the situation in which both firms engage in a strategic race for obtaining the ownership of an innovation. Each of them will maximize their private value of innovation. This element is known as a "competitive" threat [BEA 89] and can be defined by the difference between the profits reserved for the winner of the race and those attributed to the loser. Monopoly value corresponds to the difference between the profit of the established firm in a monopoly situation if it innovates the first πm, and the profit if it lets its rival win the patent, πed. The value of the entrant is only πed since in case he does not get the patent, that is to say, he does not receive any kind of profit.

The maximum bid that the monopolist will make in order to obtain the patent will be $(\pi m - \pi md)$ whereas the maximum bid of the entrant will be πed. The question whether both firms will invest the highest in R&D depends on the effect of efficiency. From this, we can infer that the monopolist is more incited to innovate rather than the potential entrant. Thus, the monopolist's commitment will be greater than or equal to that of the entrant: $\pi m - \pi md \geq \pi ed$.

If the monopolist bids $\pi ed + \varepsilon$, he will win the race, since πed is the maximum bid that the entrant is willing to make. In front of an auction less than πed, the monopolist will be beaten and will lose his bid. In that case, his choice is reduced to bidding $\pi ed + \varepsilon$ or not bidding at all. If he chooses the first alternative, his gain will be: $\pi m - \pi ed + \varepsilon$. If he goes for the other solution, his gain will be πmd. Now, as $\pi m - \pi ed \geq \pi md$, the monopolist has an interest in innovating. So, there is preemption. What is more, the monopolist may be encouraged to invest on a patent for an innovation without even using it (*sleeping patents*) for the sole purpose of preventing a potential entrant from using it. In summary, by the effect of efficiency, a firm in a monopoly situation preempts the entrant and maintains monopoly power.

5.6.2. *Patent preemption, entry conditions and* joint-ventures

The article written by Vickers [VIC 85] is a further development on the works of [GIL 82]. It is true that much attention has been given to the asymmetries between an established monopoly firm and a potential entrant, as well as the consequences for the race towards R&D, but the interest of the Vickers model lies in that it examines asymmetries between established oligopolistic firms and potential entrants. In this case, a preemption of the patent by the established firm will not always be checked for two reasons:

– if the entry of a rival occurs, the decrease in profits should not exceed the profit decline of the new firm that successfully enters the market. In fact, the entrant should have a more significant motivation than the established firm to win the patent race;

– for the established firms, discouragement has the features of a public good. Then, they should under-invest in entry deterrence (in the R&D field), and thus increase the entry probabilities.

Nevertheless, these arguments need to be explored more deeply. For instance, if the patent relates to a technology which is superior to the one in force and is used by established firms, then each firm will have a greater incentive to engage in the race and to win it. This could, in fact, contradict the first proposition introduced above. The superiority of the new technology could imply a negative externality between the established firms: if established firm i wins the patent, then firm j will register a loss. This negative externality could exceed the positive externality of entry deterrence.

We have so far considered the race towards R&D as a noncooperative game. However, the two reasons introduced earlier suggest that a *joint venture* in R&D could be a useful deterrent for established firms. In fact, the formation of a *joint venture* in R&D reduces the probability of entry from the moment that the technological advancement offered by the new patent is not too significant. In the case that a patent provides a sufficiently large advantage, a *joint venture* increases the possibility of entry.

Vickers' first step is to examine the possibility of a free-rider issue. It is true that entry deterrence reunites some of the properties of a public good. If established firm i prevents entry, then all established firms will benefit from the fact that the entry does not take place. This is an aspect that can be clearly illustrated if the patent relates to a technology equivalent to the one in possession of the established firms. The model of Vickers is in the continuity of the R&D models with uncertainty carried out by [LOU 79] and [DAS 80]. Vickers continued his demonstration by considering the case of setting up a *joint venture* in R&D by the established firms confronting a potential entrant. He also added an important element relating to the introduction of a new superior technology, which leads to three results:

– if the new technology is equivalent (or inferior) to the one already employed by established firms, then the entrant has a greater motivation than the established firm to win the patent;

– if the new technology is superior (but not radically superior), the entrant has a greater motivation than the established firm if the innovation is minor, but a weaker motivation if the innovation is of major importance;

– for a superior (radical) technology, motivations remain the same for all firms.

The first two proposals show the extent up to which a *joint venture* in R&D for established firms works as an effective deterrent to entry. This is the case for minor innovations. For major innovations, nevertheless, the formation of a *joint venture* will produce the opposite effect: it will weaken the motivations of established firms by eliminating the competitive impetus between them.

5.7. Conclusion

This chapter was devoted to the articulation between entry conditions (more precisely technological barriers to entry) and strategic alliances.

The "dynamic" nature of agreements was also explored. In fact, if cooperation is studied in a static way at a given moment, the environment in which it appears takes the form of a dynamic race between firms in view of acquiring further knowledge or tighter control (see Chapter 7).

This is the reason why we have decided to thoroughly explore the concept of technological race and we have introduced different patent race models [GIL 83, VIC 85, GRO 87]. These models are characteristic for a real dynamic, in the sense that participants modify their action plans as the course progresses. Their responses become strategic behavior in their own right.

6

From Cooperation to Coopetition

6.1. Introduction

According to Walley (2007), the origin of the term "coopetition" is not clear[1]. Albert (1999) considered that the notion of coopetition emerged in 1991, but many authors state that the concept was originated by Ray Noorda, founder and manager of Novell society, who coined the term in the 1980s.

The concept of coopetition is relatively complex and demands several levels of analysis, which we have already explored in the general introduction of our book. [DAG 07] suggested approaching the concept of coopetition from three perspectives: macroeconomic (country, the totality of firms), mesoeconomic (relationships between firms, manufacturer–supplier relationships) and microeconomic (firms, groups, individuals, within companies).

> "Far from being a compact monolith, the coopetitive strategy is a multidimensional and multifaceted concept which assumes a number of forms and multiple levels of analysis, and for which it is all but easy to grasp its structure, processes and evolving patterns" [DAG 02].

The purpose of this chapter is to study coopetition in association with two concepts: alliances (dyadic level) and a specific form of inter-organizational networks related to business ecosystems. Although in the first phase of our work we studied coopetition in line with the cooperative logic of alliances and agreements, coopetition is increasingly associated with the notion of

1 In 1973, François Perroux already referred that Economics worked under a conflict and cooperation dynamics [PER 73].

Cooperation, Coopetition and Innovation, First Edition. Nabyla Daidj.

business ecosystem and constitutes one of its decisive elements. Building upon the ecological metaphor, business ecosystems are now a concept widely used by both the press and the academic world, after the concepts of alliances and networks blossomed in the 1980s and the 1990s.

6.2. Origins of the concept of coopetition

Strategic management has constantly been enriched by innovative concepts, and this phenomenon has accelerated in recent years. The abundance of concepts and terms reveals the increasing complexity of the context in which companies operate these days, as well as the difficulties encountered for making strategic decisions in an uncertain environment. Every decade is marked by the emergence of a new concept or tool whose "notoriety" can last shorter or longer (see Table 6.1). Even though strategic thinking has evolved thanks to the impulse of academics and professionals, "coopetition" can be considered as a relatively new concept.

Period	Main concepts	Authors
The 1950s	Management via aims	Drucker [DRU 54]
The 1960s	Chandler: link between the organization and strategy. The organization depends on the strategy. Ansoff model (market penetration, product development, etc.) Contingent approach toward strategy SWOT analysis: strengths, weaknesses, threats, opportunities	Chandler [CHA 62] Ansoff [ANS 65] Learned, Christensen, Andrews, Guth [LEA 69]
The 1970s	Mc Kinsey model (1970–1975) Boston Consulting Group model (BCG) Profit Impact of Marketing Strategies (1960–1980): strategic analysis started in 1960 at General Electric, which intends to explain profitability from the crossing of an important number of criteria	Management Consulting firms (BCG, Mc Kinsey, AD Little)
The 1980s	Value chain Resources (RBV), competencies, capabilities Strategic intent Profit models	Porter [PRO 80, POR 85] Barney [BAR 91] Wernerfelt [WER 89] Hamel and Prahalad [HAM 89, HAM 93] Slywotzky and Morrisson [SLY 88]

The 1990s	Hyper-competition	D'Aveni [DAV 94]
	Coopetition, value network	Nalebuff and Brandenburger [NAL 96] Bengtsson and Kock [BEN 99]
	The 10 schools of strategic management thought	Mintzberg [MIN 98] Mintzberg, Ahlstrand and Lampel [MIN 05]
	Disruption: disruptive technologies	Christensen [CRI 00]
	Long tail	Anderson [AND 04]
	Knowledge and knowledge management (KM)	Nonaka and Takeuchi [NON 95] Davenport and Prusak [DAV 98]
The 2000s	Blue ocean versus red ocean	Kim and Mauborgne [KIM 05]
	Business ecosystems	Moore [MOO 06]
	Keystone advantage	Iansiti and Levien [IAN 04]
	Business models	Timmers [TIM 98] Amit and Zott [AMI 01] Afuah and Tucci [AFU 00] Osterwalder and Pigneur [OST 09]
	Open innovation	Chesbrough [CHE 03a, CHE 03b, CHE 03c]
	Platform economies	Gawer and Cusunamo [GAW 02, GAW 08]
	Lean Start-up	Hagiu and Wright [HAG 15] Ries [RIE 11]
The 2010s	Shared value	Porter and Kramer [POR 11]
	Transient advantage	McGrath [MC 13]

Table 6.1. *Concept evolution: some emblematic examples (adapted from [DAI 15b])*

6.3. The theoretical key factors of coopetition: borrowing from the theory of games

As we can deduce from Table 6.2, numerous works [BAG 01, DAG O2, DOW 96, GNY 01, GUL 98, GUL 00, HAK 02, LAD 97] have been devoted to the emergence and development of coopetition, here described as a situation in which competitors simultaneously compete and cooperate [BEN 03]. The first authors to have introduced the notion of coopetition are

[BRA 95, BRA 96], who borrowed numerous contributions from game theory [DAI 07].

Challenges/ implications	Authors	Definitions
Coopetition as a mix between cooperation and competition	Bengtsson, Kock [BEN 03] Lado, Boyd, Hanlon [LAD 97]	"Coopetition is a situation in which rival companies (two or more) simultaneously compete and cooperate with each other" (Bengtsson and Kock [BEN 03]).
Strategic alliances *versus* Coopetition?	Luo [LUO 07]	"The delimitation between strategic alliances and coopetitive practices remains unclear. Coopetition is often considered as an 'extension' of coopetition (in the form of agreements, alliances, strategic alliances) between firms. Coopetition and strategic alliance are connected with each other. Establishing an alliance with competitors emphasizes cooperation only. Its unit of analysis is the alliance itself rather than the parent organizations. Alliances between competitors represent only a part of cooperative endeavors; they cannot reflect the effects of comprehensive competition on a diverse list of products between rivals, nor the insights of other types of cooperation such as collective efforts in lobbying governments, establishing industry standards, or building global or regional clusters of production and supply" [LUO 07, p. 130].
Environment		
Convergence Technology/ innovation High-technology sectors	Gnyawali, Park [GNY 11]	"Coopetition is more critical in high technology contexts because of several challenges such as shrinking product life cycles, need for heavy investments in R&D, convergence of multiple technologies, and importance of standards" (p. 650).
The nature of coopetitive relations		
Motivations Interest Aims	Dagnino, Yami, Le Roy,Czakon [DAG 08] Dagnino, Padula [DAG 02]	Coopetition is "a system of actors that act due to partly coinciding interests and aims" [DAG 08]. Coopetition as "incomplete interest and goal congruence" (Dagnino, Padula, [DAG 02] Access to distinctive resources and core competencies
Coopetition level	Arsenault, Castells [ARS 08]	Coopetition can be observed at different levels: local, regional and national
Dyadic Relations *versus* network	Dagnino, Padula [DAG 02]	"The typology of inter-firm coopetition is based on two basic coopetition forms: i.e. dyadic coopetition and network coopetition"

Static vision *versus* dynamic vision Stable vision *versus* unstable vision	Luo [LUO 07] Park, Russo [PAR 96] Gnyawali, Park [GNY 11] Mellet [MEL 07]	The nature of coopetition is dynamic: cooperative and competitive strategies are not constant in time [LUO 07]. "Dynamics of coopetition would be (thus) shaped by industry and partner conditions as well as firms' capabilities to pursue a win-win approach" [GNY 11] "Coopetitive relationships are unstable" [PAR 96]. "Difficulties to manage coopetitive relationships as they are difficult to maintain and may lead to open conflict" [MEL 07].
Trust	Morris, Kocak, Özer [MOR 07]	"Coopetition is a relationship which is characterized by trust, engagement and mutual benefits [...] Coopetition produces a unique context for trust, in that a firm must trust its partner in two quite different arenas […] A coopetitive partner develops trust regarding how the other firm will share resources, communicate, meet deadlines, use information, and other aspects of the cooperative dimension of the relationship" [MOR 07].
Results/performances		
Value	Dagnino, Padula [DAG 02]	Coopetition is a strategy that enables the simultaneous creation of value and of competition during the distribution of the aforementioned value.
Profit	Walley [WAL 07] Luo [LUO 05] Cringely [CRI 02] Albert [ALB 99] Pelline [PEL 98]	Coopetition can be used as a strategy to make profit and to maximize resources in a long-term perspective.
Applications	Chen, Li [CHE 99] Dvorak, Ramstad [DVO 06] Daidj [DAI 08, DAI 10, DAI 11a, DAI 11b]	High-technology industries (telecommunications, consumer electronics products, media, video games, etc.).

Table 6.2. *Different definitions of coopetition (synthesis performed by the author on the basis of previously quoted scholars)*

Game theory is generally used to either analyze market structures or study the behavior of various players (states, institutions, regulatory authorities, companies, etc.) who have to formalize their negotiation processes: coalition or rivalry. In this framework of analysis, games are situations of strategic interdependence (with two or more players) in which

different (and even opposing) interests confront each other. There are two categories of games: non-cooperative and cooperative games (Nash). Non-cooperative games are zero-sum games, with individualist actors playing on their own interest, whereas cooperative games are non-zero-sum games, understanding is sought, which explains coalition enforcement and alliance forging.

The first memorable "intrusions" of game theory into strategic management were the works of [DIX 91, DIX 99, MIL 92, MAC 92] and [BRA 95, BRA 96, BRA 97]. The latter were convinced about the utility of game theory for analyzing strategic management:

> "The essence of business success lies in making sure you're playing the right game. How do you know if it's the right game? What can you do about it if it's the wrong game? To help managers answer those questions, we've developed a framework that draws on the insights of game theory. After 50 years as a mathematical construct, game theory is about to change the game of business." [BRA 96]

When we analyze the "real world", players are interdependent firms (or countries): the behavior of any of them produces an impact on others and the best course of action for one firm depends on the strategies adopted by the other firms. The attitude of each firm will be determined according to the forecasts that the firm has made anticipating the actions of rival firms. This situation corresponds to a game characteristic for the interdependence between the interests of the different agents (players), which can be conducive to situations of conflict or cooperation. That is the reason why [BRA 96] largely drew on this theoretical corpus to analyze the concept of coopetition. [BRA 96] adopted the mechanisms of game theory (cooperative games) to analyze:

– the value created by *vertical chains*[2], which involve suppliers, firms and customers;

2 The notion of "vertical chain" points to the concept of "network", understanding this as a set of activities from upstream to downstream, linked together by complementary activities. Nevertheless, this vertical representation should not be confused with the notion of "value chain". A value chain can be described at two levels: the level of the firm (with supporting activities and operational activities) and the field of activity. The sector value chain refers to the positioning of the various actors and their capacity to coordinate an immense number of activities and control along the chain.

– the value created by a specific actor: "defined as the value created taking in to account all the players in the vertical chain, minus the value created by all the players except the one in question" [BRA 96];

– the creation of asymmetries between firms: [BRA 96] introduced the concept of "complementors[3]" and suggested incorporating these actors to a new model, as shown in Table 6.2. They insisted on the need to create and capture value. The Value Net represents the interdependencies among all the players whose strategies can evolve. In order to face changing situations, the different firms can play varied roles, for example, they can switch from complementor to competitor and thus turn the context into one of coopetition.

> "Along the vertical dimension of the Value Net, there is a mixture of cooperation and competition […]. Along the horizontal dimension, however, managers tend to see only half the picture. Substitutors are seen only as enemies. Complementors, if viewed at all, are seen only as friends. Such a perspective overlooks another symmetry. There can be a cooperative element to interactions with substitutors" [BRA 95].

> "The vertical dimension designs the company's suppliers and customers (two of the five forces identified by Porter) and "along the horizontal dimension are the players with whom the company interacts but does not transact. They are its substitutors and complementors. Substitutors are alternative players from whom customers may purchase products or to whom suppliers may sell their resources […]. Complementors are players from whom customers buy complementary products or to whom suppliers sell complementary resources […]. The Value net describes the various roles of the players. It's possible for the same player to occupy more than one role simultaneously" [BRA 95].

3 A complementor is an actor who sells products that increase the value of the products of another firm. Strictly speaking, a complementor can be a product, a service or a relationship.

	Customers	
Substitutors	Firms	Complementors
	Suppliers	

Table 6.3. *Who are the actors in the Value Net? (adapted from [BRA 95])*

As we will see in the last section of this chapter, the classic examples of "complementors" are those of firms whose products need to be combined with others in order to be used: hardware and software.

6.4. From coopetition to inter-organizational networks

Coopetition has often been studied within the framework of inter-organizational networks, whose forms and modes vary widely. In this section, we will introduce two cases: the case of clusters and a more recent form that refers to business ecosystems [DAI 10a, DAI 10b, DAI 11].

The notion of "business ecosystem" is currently used not only in academic literature, but also in specialized economic press and by firms. The interpretations can be multiple, according to the context. Besides, the notion of "ecosystem" is adopted in a broad sense by many authors. We will refer to the "innovation ecosystem" as the set of actors involved in the process, their interactions, framework conditions and public policies in favor of research and innovation [SNR 09]. [LAR 08] described growth ecosystems, clusters and so on. As we can see, the concept of ecosystem is currently used in very different contexts.

A firm should not be considered as a single-sector structure, but as an entity belonging to a business ecosystem. It is a "coalition" of various stakeholders coming from different worlds and who share the same interests and values in view of achieving a common goal, be it the adoption of a new technological standard or, in a broader sense, the commitment toward a major innovation process. These innovations can obey an entrepreneurial logic:

> "which crosses a variety of industries. In a business ecosystem companies coevolve capabilities around a new innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations" [MOO 93].

[PEL 04b, PEL04c] also valued the contribution of this form of organization in an increasingly complex and changing context. In line with Moore's work, [IAN 04] also resorted to the biological metaphor in order to describe business ecosystems. They considered that three conditions determine the success of ecosystems: productivity, "robustness" (the ability to resist shocks and to adapt to a changing environment) and the possibility of creating niches and opportunities for new firms. It is interesting to mention that the increase in productivity and the creation of new firms had already been employed for explaining the competitive dynamics of clusters, as [LAR 08] recalls.

Business ecosystems reunite a number of features:

– actors are heterogeneous and these may be firms (suppliers, producers, etc.), institutions, groups of interest, shareholders and so on. They may simultaneously belong to one or more ecosystems;

– business ecosystem actors come from different sectors of activity. This feature is reinforced in a context where several industries converge: IT, telecommunications and media, which are now restructuring around ICT and the Internet [GOS 98, ISC 09]. The traditional notion of industry loses importance;

– the competitive logic is based on the dynamics of coopetition, with the emergence of one or several leaders whose position can be modified according to the evolution of resources and skills belonging to the firms involved.

Other variables are used for describing ecosystems, but some of these are not very specific – among them, we can refer to the emergence of a "community of strategic destiny" [GUE 04, PEL 04a]. Behind this expression, the principle of co-evolution is put forward: firms are envisioned as interdependent entities, which must take into account their respective evolution. On the basis of the works of [MEC 97], however, [TOR 03] reminded us that the "principle of co-evolution is not idiosyncratic to the theory of business ecosystems".

According to certain authors, ecosystems are most likely the only mode of organization based on coopetition. Consequently, Moore [MOO 93] highlighted the phenomenon of coopetition inherent to ecosystems. More recent articles have emphasized this specificity [GUE 09, PEL 05].

> "The logics of cooperation and competition are anchored in the "culture" of business ecosystems and constitute one of its founding dynamics" [PEL 04a].

However, numerous works have focused on the emergence and development of coopetition understood as a situation [BAG 01, DAG 07, DOW 96, GNY 01, GUL 98, GUL 00, HAK 02, LAD 97, NAL 96], in which rival firms simultaneously compete and cooperate [BEN 03], but this research explicitly refers to ecosystems [DAI 10a].

Coopetitive practices can be observed for other types of ancient inter-organizational networks, as in the case of districts or clusters. [MEN 05] recalled, for example, that this is the case of districts:

> "But within a district both cooperative and competitive relations develop simultaneously, and these can be of great intensity. Imitation practices or even downright pillage sometimes constitute permanent (and tacitly accepted) operative rules in the district (Paniccia, 1998, directly refers to "poaching"). However, in the literature about districts, research has focused more on cooperative relations at the heart of the district rather than on interfirm competitive (or rivalry) relations (Boari *et al.* 2004)".

In the analysis of clusters, Porter always stressed the coexistence of rivalry and cooperation between the actors involved:

> "Geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular, are fields that compete but also co-operate" [POR 00].

Cooke and Huggins (2002) also emphasized this dimension:

> "Clusters are geographically proximate firms in vertical and horizontal relationships, involving a localized enterprise support infrastructure with shared developmental vision for business growth, based on competition and cooperation in a specific market field" [COO 02].

The cluster intended to use both the virtues and advantages of competition and cooperation [RAI 01]. The same argument was deployed in a note that the Ministry of Economy, Industry and Employment (2008) drew up referring to the European policy on clusters:

> "We share the premise of "cluster memorandum": "*strong clusters emerge and flourish best in open markets where coopetition exists within and between clusters*". Healthy emulation is fundamental for encouraging the most powerful and performing clusters. Emulation applies not only to the actors of the same cluster (in order to stimulate the innovation process), but should also be encouraged in a context of strong cooperation between the actors."

6.5. Coopetition and dyadic relations

As we pointed out in the previous section, the concept of coopetition has been employed in the context of inter-organizational networks, whether these be districts, clusters or business ecosystems. However, it has also been applied in the so-called dyadic relations.

According to [DAG 02], there are basically four types of coopetition:

– simple dyadic relationship (alliance, R&D consortium with only two partners);

– complex dyadic relationship (alliance in the automotive sector: several partners, different cooperation fields – R&D, component production);

– simple network (coopetition between several firms at a certain level of the value chain);

– complex network (industrial districts, clusters, business ecosystems).

In fact, simple dyadic relationships involving two firms refer to strategic alliances, as they were defined in Chapter 1.

There are numerous examples (see Chapter 9). Let us analyze the case of French TV channels of the 2000s. At the end of the 1990s, the environment changed: technological advances brought about the explosion of the digital technology, the Internet and the growing interest of telecommunications groups in audiovisual industries. As a consequence, the most relevant audiovisual groups engaged in a complex game of alliances incorporating players from other sectors (telecommunications, the Internet).

Probably the most emblematic example of this approach concerns the relationships established between TF1 and M6. Let us briefly recall some of the contextual elements. First, it is interesting to look at the capitalist relations between these different groups. Surprisingly enough, the connections are far more significant than we might think *a priori*. These connections can be illustrated by the combination of two satellite bundles, which were in direct competition by the end of 2005[4]: CanalSat, until then operated by Canal+ and TPS, belonging to TF1. The four main players in private television were directly or indirectly involved in this operation. In what specifically concerns the relationships between TF1 and M6, the analysis deserves further exploration. Although the two channels were direct competitors, their endeavor to increase audience, market shares and advertising revenues caused the relationships between themselves to be far from non-existent. Quite the opposite: the creation of TF6 in 2000[5], of which both groups owned 50% of the shares, is only an indicator of the "rivalry-cooperation" kind of relationship that these two groups maintained.

6.6. Coopetition and technological platforms

Coopetition has also been analyzed from the perspective of platforms, a term that first appeared in the specialized literature in the late 1980s [EIS 08, EIS 06, BAL 09, GAW 09a and GAW 09b]. Today, many industrial sectors are inspired by this platform logic. Platforms have long existed, but all of the latest techniques and tools for processing information have profoundly facilitated their access and functioning, in the same way that they have modified their value creation mechanisms and business

4 This marriage has been the subject of numerous debates and controversies. In 2011, the competent authority even withdrew the authorization to merge the two bundles of satellite TV channels.

5 Created in December 2000, TF6 no longer exists as of 31 December 2014.

models, heavily relying on data [BRO 07, BRO 09, VAN 16]. Platforms have been considered as market categories, two-sided markets [ROC 04, EIS 08, HAG 07a and HAG 07b] or modular technological architectures [BAL 09, FRA 03, GAW 02, GAW 08].

Hub firms (or Keystones) generally resort to platform strategies that allow them to benefit from contributions made by other network players. It seems to us that the most innovative aspect of ecosystems is precisely associated with this notion of platform. Many "industries" obey a platform logic [DAI 09]. [IAN 04] illustrated this idea in the following terms:

> "Whether we are talking about payment methods or about software, keystone strategies demand the efficient sharing of value within a dispersed ecosystem of organizations. The mechanism for this sharing is usually embodied in platforms such as Wal-Mart's Retail Link, TSMC's design tools and libraries, Li&Fung's supply chain system, or Microsoft's .NET".

Firms having access to such platforms play a key role in guaranteeing the coordination of actors and in promoting the creation of values. A platform is composed of several physical and/or software modules linked together by interfaces [GAW 02, GAW 08, BAL 00]. These platforms provide access to resources. According to their nature, platforms can be open or closed, which will influence the kind of value that can be created within the ecosystem. In the first case, the design is based on the use of open and public standards that facilitate the interoperability between platforms. In the second version, design is associated with the use of proprietary regulations that limit the compatibility between platforms. One of the examples that best illustrates this opposition in the "mobile ecosystem" is that of Android (Google) *versus* iPhone (Apple).

Chapters 1 and 3 showed that open-innovation practices progressively developed before coopetitive strategies emerged, particularly in the case of operators in the late 2000s. While the notion of platform refers to technical elements, it equally incorporates a relational dimension, which is fundamental between the different actors constituting an ecosystem. Following the ecosystem typology of [IAN 04]: we can identify the *niche players*, the "*dominators*", the "*hub landlords*" and the *keystones*.

> "In general, becoming a platform leader requires a compelling vision of the future as well as the ability to create a vibrant ecosystem by evangelizing a business model that works both for the platform-leader wannabe and the potential partners" [GAW 08].

We now have a better understanding of the nature of the relational practices adopted by keystones with their various partners within the ecosystem and, specifically, how their coopetitive strategies work.

6.7. Conclusion

A binary outlook of the economic world based on an irreconcilable opposition between competition and cooperation is outdated. Despite the existence of strong rivalry dynamics, we are increasingly witnessing a logic of coopetition which combines both polarities in many sectors.

As we have shown in this chapter, resorting to the classical determinants of alliances is no longer the best means for apprehending the logic of coopetition. New organizational forms (such as business ecosystems and/or platforms) have favored the development of coopetitive practices and reflected the astonishing complexity of the links between increasingly interdependent firms.

7

Theoretical Principles of Inter-firm Cooperation: RBV Approach

7.1. Introduction

The resource-based view (or RBV) and competencies approach, developed by different authors [BAR 91, GRA 91, WER 84], has become a determining framework for the strategies of firms. It was the pioneering work of Penrose (1959) that encouraged the development of this theoretical corpus. The fact that there are multiple approaches in terms of resources, which have inspired numerous authors [HOO 03], makes it difficult to establish a definitive typology.

RBV has opened new perspectives, not only for understanding the consolidation of lasting competitive advantage, but also in what concerns inter-firm cooperation.

7.2. Reversal of the "classic" paradigm of strategic management: strategic management schools

In their book *Strategy Safari: A Guided Tour Through The Wilds of Strategic Management*, Mintzberg, Ahlstrand and Lampel [MIN 99] provided a comprehensive overview of strategic management theories and classified them into ten "schools": the Design School, the Planning School, the

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Positioning School, the Entrepreneurial School, the Cognitive School, the Learning School, the Power School, the Cultural School, the Environmental School and the Configuration School.

It is interesting to observe that Porter's work (value chain, five-force scheme, etc.) was included under the Positioning School, a school that privileges the environment (in the broad sense of the term, beyond the market and its characteristics) as a reference point. These works are in line with the teachings of industrial economy.

Certainly, the first "strategic models" largely drew on the works of industrial economy. In fact, this specification of the sector as a competitive universe is not new and finds its origin in another scheme developed in the 1930s by E. Mason, one of the precursors of the *Industrial Organization* and the triptych "Structure-Conduct-Performance" (SCP). Starting at the level of the market structure, the idea is to analyze the differences in competitive behavior (price, production, investment strategy of firms) and to compare performances between reality and what they could or should be.

In the general context of American capitalism, the SCP model was a product of the reflection on the profitability of industrial firms located in the United States. The model was developed in the second half of the 19th Century, and J. Bain [BAI 59] and W. Sheperd [SHE 79] deepened the triptych. Finally, in 1973, Scherer introduced basic conditions into this "royal sequence" [MOR 85].

In fact, the basic conditions refer to all the technical and economic characteristics of the market. The structure of the market is defined as the set of stable characteristics, which orient the behavior of existing firms or potential incomers. Market "structure" can be described by the number of buyers and sellers, the degree of differentiation between products, the existence or absence of entry barriers, cost structure, the degree of vertical integration and the absence or existence of conglomerate structures. "Conduct" represents strategies as well as the policies followed by the firms, particularly those regarding prices, production, research and development, communication, legal protection and so on. Finally, "performance" stands for the economic performance of firms.

In Porter's model, the firm is directly confronted with the evolution of competitive pressures in the sector where it is deployed. Porter's five-forces model is relevant for understanding the competitive mechanisms inherent to a certain market. In the original model, [POR 82] identified five forces which have a decisive impact on the ability of a firm to develop (or not) competitive advantage: the bargaining power of customers and of suppliers, the threat of new incomers, substitute products and, finally, the intensity of competition. Later, a sixth[1] force was added, which corresponds to the role of the State (subsidy, direct and indirect aids, regulation, taxation, etc.). Currently, the model is known as 5 (+1) forces.

In the five-forces model, for example, firms must take all these forces into account so as to decide whether to leave the market (if they are already present) or to access the market (if they are new entrants). This scheme can also be combined with a logic of strategic groups in which the groupings are defined by putting together the firms which have similar profiles or which offer the same type of goods.

Among the numerous criticisms that the Porter model has given rise to, we can mention the reluctance to take into account the alliances that could be established between firms. This approach has often been considered "deterministic", in that the environment has an important impact on firms, which, in their turn, have no other option than to align and adopt a rather defensive strategy.

It was precisely with the intention of suggesting an alternative view to that of Porter that other authors [BAR 91, PEN 59, WER 84] concentrated on the internal resources of the firm and the extension of the firm's competences.

Until the appearance of Porter's work, firms had to take their environment into account so as to adapt to various external constraints (competitive, regulatory, etc.). This approach led to a reversal of strategic analysis [LER 02]. Thanks to resources and skills, firms could develop a sustainable competitive advantage and have a lasting impact on their environment. At the time, the approach based on resources became an influential analytical framework for corporate strategy [BAR 91]. From this perspective, it was no longer a

1 This sixth force sparked off numerous debates. It led to public powers, innovation or complementors (see Chapter 6, note number 3).

question of concentrating on the external environment of the company, but of analyzing the company's resources in depth. This "sustainability" and solidity were based on a unique combination of resources and skills.

7.3. Strategic intent

As it was pointed out by [SAI 00], the resource approach constitutes a transition from suitability to strategic intent. The concept of strategic intent was originally developed by [HAM 89].

The idea is to place the company once again at the center of strategic decision so as to try to transform the competitive game. This notion is based on three propositions:

– firms shape their current strategy in relation to a clearly defined long-term vision;

– to materialize their intention, firms build their development around fundamental competencies that refer to different types of expertise that they hold, regarding, for example, technology or the specific knowledge of a market;

– these firms are so-called learning firms.

Despite their different conceptual frameworks and hypothesis, we find that resource theory has some "parallels" with the theory of transaction costs and with agency theory.

7.3.1. *What is the connection with the theory of transaction costs?*

An analogy with the theory of transaction costs can be drawn if we meditate on the notions of asset and resource. The resource approach is based on the fact that the organization can be studied as a set of resources that vary from firm to firm.

Tangible resources are of different types:

– physical (machines, settings);

– human (qualifications, level of staff adaptability);

– financial (different sources of liquidity).

Resources may also be of an intangible nature and rely on *goodwill* (existence of intangible assets such as patents, trademarks or brand image and reputation). These resources occupy a special place in the measure that they are difficult to access and imitate. They often constitute strategic resources, because they are truly unique and drive the company's competitive advantage.

For a firm, the challenge lies in identifying these strategic (or distinctive) resources. [BAR 91] suggested four variables for measuring the strategic character of resources:

– Evaluability: ability to assess the contribution of the resource to the overall efficiency of the firm;

– Scarcity: a highly demanded resource with limited availability may eventually become strategic;

– Inimitability: the more difficult it is to imitate the resource, the more it becomes specific and the more it has a chance of becoming strategic;

– Substitutability: scarcity and inimitability are not sufficient conditions for a resource to become strategic. It is also necessary for it to not have an immediate and direct substitute.

It is the so-called "distinctive" resources and the core competencies [BAR 91, PRA 90] of a firm that enable it to become stronger in a market, even to grow beyond its competitors and to develop lasting competitive advantage.

This "strategic" dimension, which is linked to the four factors we discussed above, refers to asset specificity as defined by [WIL 89]. This author distinguished between five types of specificities (geographical situation, physical assets, specific human resources, dedicated assets, intangible assets), a list to which he added a measurement difficulty by

specifying that the list is not exhaustive. In this way, specific human resources correspond to those in which efficiency and competence depend on an individual and for which the supply is not so elastic, because intangible assets are inherently very specific. We thus encounter the underlying notions of rarity and inimitability.

7.3.2. *A possible parallel with agency theory?*

The points in common are less obvious with agency theory (see Chapter 4), but they still exist. It is around the notion of information that comparisons can be established, as [CHA 02] explained:

> "[In agency theory] there is a real cost in engaging the players (these are known as bonding costs). We reckon that these proposals lead to a business model that aims at reducing agency costs and seeks to improve cooperation by promoting an organizational architecture. But this construction would be very abstract and economy-oriented if it did not introduce another concept, very close to the one we evoked with resource-based theory: the concept of specific knowledge. For Jensen, the superiority of organizations (on the market) lies in that they process information coming from the market and that they are capable of learning, that is to say, of assimilating and capitalizing information. Jensen says that this knowledge is specific, it derives from the experience we have of specific objects (customers, suppliers, organizations, places). Information is also difficult to codify and costly to convey by means of a price. When it is voluminous, it is better to give those who own it the right to make decisions for which it is indispensable. But then there is also the problem of agency costs and the risk of misuse of these decision rights."

7.4. RBV extensions

A synthesis of the different RBV extensions may be found in Arrègle and Quélin (2000), who proposed to distinguish three main trends within RBV: RBV in a narrow sense, knowledge-based view (KBV) competence-based view (CBV) and dynamic capabilities.

	RBV	KBV	Dynamic	
			CBV	Dynamics
Highlighted dimensions	All types of resources Resource features Advantage sustainability	Knowledge Learning Knowledge management and production	Intangible resources Competencies Intention Tension Movement strategies	Intangible resources Routines Capabilities Path dependence
	Penrose Wernerfelt Rumelt Lippman and Rumelt Dierickx and Cool Barney Amit and Shoemaker	Grant Spender Kogut and Zander Conner and Prahalad	Hamel and Prahalad Stalk, Evans and Shulman Sanchez and Heene	Teece, Pisano and Shuen
Rent type	Quasi-rents	Schumpeterian quasi-rents	Schumpeterian quasi-rents	Schumpeterian quasi-rents
Management role	Identify and manage rare, valuable, inimitable and non-substituable resources	Management of firm's learning	Management of firm's competencies	Management of firm's competencies and capabilities

Table 7.1. *Different extensions of RBV [ARR 01]*

7.4.1. *KBV extension*

Knowledge-based view (KBV) is an extension of RBV. The firm is considered as a heterogeneous entity [HOS 99]. The KBV esteems that knowledge is a key element for combining distinctive resources as well as

the core competencies of organizations. Be careful, however, not to confuse knowledge with information.

Following the distinction made by [NON 95], information refers to a flow of messages. On the contrary, knowledge is created by the aforementioned flow of information and anchored in the beliefs and commitments of its holder. [DAV 98] considered that knowledge exceeds the level of information, because unlike data and information, knowledge incorporates a judgment dimension. There are two types of knowledge: explicit and tacit [NO 00]. Explicit knowledge is tangible and identifiable [STO 01]; it can be expressed in formal and systematic language and shared in the form of data, scientific formulas, specifications and so on [NO 00]. It is relatively easy to process, store and transmit [NON 00, STO 01]. Furthermore, ICTs can facilitate the integration of this type of knowledge into the strategy of the organization [STO 01].

According to KBV, what is crucial for a firm is its ability to create knowledge [GEH 02, GRA 96, NON 95] and provide not only tacit knowledge but also, fundamentally, knowledge that is difficult to imitate [DAR 03, LUN 07]. This will certainly contribute to the development of sustainable competitive advantage.

7.4.2. *Competencies*

While competencies make it possible to coordinate resources, the concept of competence has been subject to a number of definitions. In general, they refer to the organizational level. If we understand competencies as resources, these are in charge of developing competitive advantage. Sometimes competencies are understood as capabilities or abilities. As such, they constitute the "ability of the firm to multiply its resources by combining them" [PRA 90].

However, above all, it is the so-called fundamental or core competencies that provide firms with the advantage in their market (easy access to and/or broader access to markets) and generate value for customers. They are also identified by their unique character and their being difficult to imitate [REE 90].

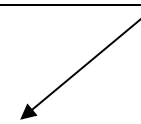
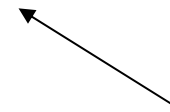
The authors behind the notion of core competence, Prahalad and Hamel [PRA 90], considered the company as a tree:

– the trunk and the main branches being the basic products;

– the smaller branches would be the functional units; leaves, flowers and fruits, the final products;

– the core skills refer to the roots, because they nourish the tree and ensure its stability. They enable the firm to keep its existing branches as well as to engender new ones.

At the same time, the competency approach includes different notions of capability.

Identical to those of competitors or easy to imitate	**Better than those of competitors or difficult to imitate***	
		Resources
Necessary Resources	Unique Resources	
Threshold Competencies	Core Competencies	
		Competencies

* Making it possible to excel over competitors or to engender indisputable surplus of values

Figure 7.1. *Resources, competencies and competitive advantage (according to [JOH 01])*

7.4.3. *Dynamic capabilities*

The dynamic capabilities approach refers to several theoretical corpuses [BAR 10] and particularly to the evolutionary trend [NEL 82]. By definition, the term "dynamic" expresses evolution, which can be linear or cyclical, or can even radically transform over time. Evolution is also reflected in the conceptual framework of RBV. In fact, there are multiple definitions (Table 7.2) and these vary according to the organizational or managerial orientation that has been chosen.

According to [TEE 97] and [TEE 07], dynamic capabilities can empower firms and help them cope with a changing environment and be more adaptable to specific situations. In fact, the resources and competencies of a firm are frequently challenged in a context of hyper-competition [DAV 94] and *high-velocity market* [BOU 88] and [EIS 89b], which leads to the development of temporary but unsustainable competitive advantages [MAG 13, CAR 14]. Dynamic capabilities can take the form of routines that lead to the development of new knowledge and solutions that reinforce the competitive position of a firm in the market.

The concept of dynamic capabilities, suggested by [TEE 97], is a theoretical concept that associates resource-based view (which focuses on resources and competencies) with the principles of evolutionary economics. It designates the ability to integrate, build and re-configure resources and skills in a turbulent environment. The underlying hypothesis is that in many industries the environment is evolving so rapidly that the resources and competencies that long constituted the basis of the competitive advantage of some firms are now seriously challenged. In this way, a radical innovation could render the technological competencies of a leader obsolete (e.g. digital photography) or challenge distribution methods whose mastery constituted a key advantage for existing firms (e.g. the distribution of music on the Internet). Consequently, the term points to the flexibility of a firm in the face of such developments. Several authors have tried to give more concrete content to this very theoretical concept. With this intention, [EIS 00] identified three factors underpinning the dynamic capacities of firms:

– the ability to rapidly develop and introduce new products in the market;

– the ability to build alliances to access missing resources;

– the strategic decision-making system must be flexible enough.

Grant [GRA 91]	Grant made a distinction between resources and capabilities: "Resources are inputs into the production process. These can be financial resources, physical resources, human resources, technological resources, reputation and organizational resources. But resources are not productive in themselves. A capability is the capacity for a team of resources to perform some task or activity. Thus, resources are the source of a firm's capabilities and these in turn are the main source of its competitive advantage."
Amit and Schoemaker [AMI 93]	These authors also made a distinction between resources and capabilities. They defined resources as "stocks of available factors that are owned or controlled by the firm. Resources are converted into final products or services by using a wide range of other firm assets and bonding mechanisms such as technology, management information systems, incentive systems, trust between labor, and more" [AMI 93, p. 35]. Capability refers to the capacity of a firm to deploy its resources by using organizational processes in order to achieve a desired aim. Capabilities are then: "information-based, tangible or intangible processes that are firm-specific and are developed over time through complex interactions among the firm's resources" [AMI 93, p. 35].
Pavlou and El Sawy [PAV 05, PAV 11]	Functional competencies have to be differentiated from dynamic capabilities. The first ones are: "the purposive combinations of resources that enable accomplishing a given task – perform operational activities (e.g., ability to identify valuable alliance opportunities)". The latter can be defined as: "the ability to renew functional competencies by reconfiguring the existing combinations of resources" [PAV 05, p. 7).
Di Guardo and Galvagno [DI 06]	"The ability to build new capabilities that lie in higher levels in the relevant hierarchy of competencies is referred to as dynamic capabilities (Teece, Pisano, Schuen, 1997), integrative capabilities (Verona, 1999), combinative capabilities (Kogut and Zander, 1992) or absorptive capacity (Cohen and Levinthal, 1990). What is actually involved in the ability, which we will simply call dynamic capabilities, is, in essence, the creation and the integration of new competencies out of the already existing stocks of prior competencies held by the organization. This is perhaps the most critical ability of a firm, which is the ability to feel the need to reconfigure its existing structure of competencies and to accomplish successfully the necessary transformations (Amit and Schoemaker, 1993; see also Collis (1994) for a critique on this premise)" (p. 3).
Helfat and Peteraf [HEL 03], Helfat *et al.* [HEL 07]	Dynamic capabilities can transform functional competencies so as to meet the environment's needs.
Teece *et al.* [TEE 97]	"The firm's ability to integrate, build, and re-configure internal and external competences to address rapidly changing environments" (p. 516).

Table 7.2. *From distinctive capabilities to dynamic capabilities*

7.5. RBV approaches

RBV has given rise to many interpretations and also helped to explain a number of concepts in strategic management. We discuss two of these concepts (first-mover advantage and the opposition between lasting advantage and temporary advantage) in this section, before developing a third notion, that of alliances, in the last section of this chapter.

7.5.1. *First-mover advantage*

According to Lieberman and Montgomery [LIE 88], "first-mover advantage" may find its origin in three different sources:

– Technological leadership: advantage is linked to an experience effect that makes it possible to keep an advantage in terms of cost. In a similar way, technological advantage may temporarily be protected by patents;

– Preemption of rare assets, for example, input preemption (such as natural resources or other mobile resources), preemption of sites and spaces or preemptive investments in factories or equipment;

– Development of transfer costs on behalf of the buyer: either because the buyer was obliged to consent to initial transaction costs, because he/she is used to the supplier's goods or because the supplier creates additional costs. Besides this, the buyer may wish to continue an engagement with the same supplier. Choosing alternative suppliers creates unnecessary uncertainty.

However, these mechanisms may be counterbalanced, as [LIE 88] made clear:

– followers may benefit from infrastructure, consumer education efforts and R&D efforts encouraged by leaders;

– after the emergence of a dominant design, competition will be based on prices, giving an advantage to the firms having the most favorable cost structure;

– if the first entrants are not vigilant enough, a new incomer may alter the conditions of the competitive game through a technological innovation that circumvents existing entry barriers;

– first movers may delay reacting to the innovation of other firms because they may be blocked by specific assets, they may be reluctant to cannibalize their existing range or their organization has become too rigid.

7.5.2. *Lasting competitive advantage versus temporary competitive advantage*

While for many decades it was primarily sustainable competitive advantage that was sought by firms and put forward by the various strategic management authors (among which, we can include [POR 86b]), this outlook changed from the end of the 1990s onward. From then on, many authors started questioning the very concept of sustainability. At present, we tend to speak of temporary (or transient) advantage, in line with the works of [DAV 94, FER 01, WIG 05]. This evolution can be appreciated in many sectors [CAR 14].

[MC 13] developed this question in the following terms and provides several examples of firms (including Kodak, Sony, Research in Motion (RIM) and Blockbuster), which have failed to adapt to new market conditions:

> "Stability, not change, is the state that is most dangerous in highly dynamic competitive environments […] The end of competitive advantage means that the assumptions that underpin much of what we used to believe about running organizations are deeply flawed" [MC 13].

RBV has also provided theoretical and empirical reflections on the nature of competitive advantage. This was achieved by identifying a possible shift from sustainable competitive advantage to temporary advantage.

Resource features			**Implications**	**Performance**
Inherently valuable	**Rare**	**Hardly imitable**		
No	–	–	Competitive disadvantage	Under-performance
Yes	No	–	Advantage/disadvantage	Normal
Yes	Yes	No	Temporary competitive advantage	Outstanding Performance
Yes	Yes	Yes	Sustainable competitive advantage	Outstanding Performance

Table 7.3. *From competitive disadvantage to sustainable competitive advantage. An RBV-oriented analysis (adapted from [BAR 97])*

7.6. Alliances and RBV

Finally, the RBV approach is employed for a better understanding of the relationships between firms, especially in the case of alliances and inter-organizational networks.

Motivation	Authors
Access to resources and competencies (knowledge, expertise, behavior)	It is an element frequently mentioned by authors who stressed the importance of sharing and creating knowledge (Gehani, [GEH 02]; Grant, [GRA 96a, GRA 96b]; Nonaka and Takeuchi, [NON 95]), which could account for the infatuation for cooperation on the part of firms (Powell, [POW 98]; Badaracco, [BAD 91]), particularly in the case of *joint ventures* (Inkpen [INK 96]; Tiemessen *et al*. [TIE 97]).
Access to distinctive resources and core competencies	As Grant and Baden-Fuller pointed out (2004, p. 62–63): "Several studies of strategic alliances have identified knowledge sharing (including technology, expertise and organizational capability) as their dominant objective" (Ciborra, 1991; Dyer and Nobeoka, 2000; Inkpen and Crossan, 1995; Kale et al., 2000; Khanna et al., 1998; Larsson et al., 1998; Lyles, 1988; Mody, 1993; Mowery et al., 1996, 1997; Simonin, 1997, 1999). Simonin [SIM 99], Darroch [DAR 03] as well as Lundvall and Nielsen [LUN 07] equally insisted on the contribution of tacit knowledge, hardly imitable knowledge and specific expertise for the cases involving inter-firm cooperation.

Table 7.4. *Strategic foundations of agreements: RBV approach*

Cooperation is a suitable mode of development that stimulates us to smartly combine complementary resources and competencies [PAR 96] but, above all, distinctive resources and core competencies. The combination of these resources/skills is very useful for promoting the joint creation of new products, services or technologies. As it was pointed out by [BLA 11],

> "The theory of resources and competencies (Wernerfelt, 1984; Barney, 1991) suggests the superiority of cooperation between firms in the case of a lack of resources and capabilities, especially when these are difficult to imitate or to transfer. Cooperation is a suitable structure that helps combine tacit and complementary resources (Hennart, 1988), at the time that it facilitates acquisition and exchange, because repetitive personalized interaction between partners enhances learning capacities (Combe, 1998)".

It is in a context of combining resources/competencies between two or more firms that relational rents can be created [DYE 98], particularly in what concerns vertical dyadic relations [MES 08a] or alliance networks [LAV 06].

> "From this perspective, Dyer and Singh (1998) have specified four sources of inter-organizational (or relational) competitive advantage: the establishment of specialized assets inherent to the cooperative relationship; the implementation of information sharing and exchanging (joint learning) within the relationship; the existence of synergy effects associated with the complementarity of partners' resources in the relationship; and the establishment of governance mechanisms specially adapted for favoring the amiable resolution of conflicts between partners, as well as the recourse to informal relationship management mechanisms" [PRE 10].

However, if firms resort to alliances, it is primarily with the aim of learning everything from their partners (competencies and specific knowledge) and of developing core competencies [DUS 00, HAM 89a, HAM 89b, INK 91, INK 97, KUM 98]. Learning processes in the context of business-to-business networks have also been studied in the literature on international business management (Chapter 8), in particular by [KOG 00] and [LAM 97] and by authors who focus on industrial networks [AXE 92, HAA 93, BLA 97].

Concept	Authors
Knowledge-sharing	As Grant and Baden-Fuller mentioned (2004, p. 62–63), "many research papers have identified knowledge-sharing as the primary motivation for forging alliances (Ciborra, 1991; Dyer and Nobeoka, 2000; Inkpen and Crossan, 1995; Kale and Singh, 2000; Khanna *et al.*, 1998; Larsson *et al.*, 1998; Lyles, 1988; Mody, 1993; Mowery *et al.*, 1996, 1997; Simonin, 1997, 1999)".
Transfer of tacit knowledge	During the first stages of knowledge creation, knowledge tends to be tacit (cultural beliefs and values are often tacit). Alliances are forged because they facilitate the transmission of tacit knowledge that is not easily transferable by simple market operations without dependence bonds (Kogut, [KOG 88a, KOG 88b]; Kogut and Zander [KOG 92]). Market is not an efficient transfer mechanism for tacit knowledge (Liebeskind *et al.* [LIE 96]). Alliances might encourage a more efficient transmission for this type of knowledge (Müller-Stewens and Osterloh [MUL 96]).
Interpersonal relations and knowledge transfer at the heart of alliances	Knowledge has a strong social component. According to Singh [SIN 05], the success of alliances and inter-firm cooperation as a means of transferring knowledge also depends on interpersonal bonds between employees. This argument has been validated by the contributions of Mowery *et al.* [MOW 96], Rosenkopf and Almeida [ROS 03], and Gomes-Casseres *et al.* [GOM 06].

Table 7.5. *Developed by the author (on the base of articles written by the aforementioned authors)*

7.7. Conclusion

RBV is one of the most commonly used theoretical corpuses and has been subject to a number of extensions. One of the most widely shared applications has been the area of cooperation agreements. Alliances, in particular, mobilize not only knowledge but also expertise and shared expertise. These applications have been broadly analyzed in a number of academic works employing the RBV approach.

8

Firm Multinationalization, Cooperation and Territorialized Inter-organizational Networks

8.1. Introduction

Many authors have contributed to the renewal of the debate on internationalization, both from an economic perspective (international economy and industrial) and from a strategic one. The logic of internationalization finds nourishment in the sources of a multidisciplinary approach, not a single view. Why internationalization has intensified in the last times can be explained both by external factors (political and regulatory conditions, socio-economic and technological context, cultural and competitive sectoral dynamics) and by firm-inherent factors (market positioning, core competencies, distinctive resources, innovation, corporate culture, etc.).

The globalization of markets has pushed firms of international standing to consistently adopt "global" strategies. Among the different forms of foreign development, alliances were the privileged form chosen in the 1990s, to the point of being considered as a new form of internationalization. Most of the strategic alliances forged in an international context should be studied within the framework of the theory of firm multinationalization because they constitute an alternative means of commitment to international investment and export.

Finally, there is the discussion about to what extent numerous forms of network territorial organizations (such as clusters) are attractive for multinational firms and encourage inter-firm cooperation. The fact that firms belong to clusters functions as an engine for their internationalization and

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expansion in foreign markets. This double "regional/global" constraint is added to the more "ancient" problem around the dichotomy of "local/global" dimensions. What leads us to the ultimate question: how does the dynamic between different networking forms and the internationalization of business activities work?

8.2. The theoretical principles underlying internationalization dynamics

Ever since the late 1960s, firms were forced to grow beyond the national framework of their activities and consider international development. As internationalization progressively became crucial for a larger number of companies, this trend could not help but become stronger. The aim in this chapter is not to introduce a review of the literature on internationalization, multinationalization and the globalization of business activities, but to refresh the main theoretical approaches, so as to mobilize certain concepts that seem particularly relevant to our study.

8.2.1. *Various theoretical approaches*

The theoretical reflections on multinationalization are relatively recent (late 1950s), but have developed widely in recent years, thanks to a number of empirical studies concerning multinational firms (groups and/or SMEs), sectors of activity, and different countries (Table 8.1). International operations have affected not only the competitive (strategic) advantages of firms, but also the comparative advantages of countries [IET 98, IET 05].

The theme of internationalization was also at the heart of the reflection of authors from "different worlds". [OES 11] have mentioned this in particular, and have also emphasized the contributions of different disciplines in the field of international management:

> "Most theories used by IB/IM scholars are borrowed from other subfields of business administration such as strategy, organization, and finance – or even from disciplines outside business administration (e.g. economics and sociology). For instance, this is true for the resource-based view (strategy), real-options theory (finance), information-processing theory (organization), and neo-institutionalism (sociology)".

The first attempt to explain firm multinationalization was made by rejecting the main lessons of international trade theory, because its approach focused solely on raw materials and manufactured goods. While international trade theory was based on models assuming pure and perfect competition, as well as the international immobility of factors of production, there was increasing evidence that firms operated in a world of imperfect competition, generally oligopolistic in nature, and that they were exporting extra amounts of capital.

Authors like [HYM 68] insisted on the importance of taking into account imperfect competition structures and oligopolies as key elements of the multinational firm. In that sense, the concept of "specific advantage" was particularly heightened: firms should possess and/or develop specific advantages transferable at an international level, which will enable them to accomplish greater gains, higher than the costs related to establishing in business. Specific benefits are linked to a number of market imperfections (products, factors of production, economies of scale, government policies favorable to the presence of multinational companies, etc.). This theoretical corpus was criticized in that it could not fully explain why a firm chooses to settle abroad instead of exporting goods and exploiting its specific advantages. Truth be told that there is no specific determinant for multinationalization. The following theoretical analyses will try to apprehend oligopolistic competition on a deeper level: firms are internationalized as a reaction to a competitive context. Vernon's concepts of "product cycle" and of a (temporary) technological monopoly linked to innovation show how an innovative company in a certain country decides to relocate after having exported to the markets of other developed countries.

Nowadays, a progressive analysis of the company and its internal organization is being developed. Competitive factors are no longer decisive as they used to be. The firm is now at the heart of the problem and Foreign Direct Investment (FDI) appears as a result of its development process. The more growth oriented a firm is, the more it will seek to diversify, in particular geographically, in order to reduce risk. The theory of internalization has often been evoked so as to explain this evolution (we will study this aspect on the next section of the chapter).

However, there is also another interesting theory that accounts for the advantages of internationalization: the concept of *liability of foreignness*. The firm that wants to settle abroad holds a certain disadvantage (*liability of foreignness*) compared with domestic firms. This disadvantage can be

explained because of the favorable treatment that domestic firms sometimes receive, to the detriment of foreign investors. Foreign investors have to face not only economic conditions (market, demand structure), but also social conditions (labor law, hours of work, protection of employees) in accordance with the law and with which they are at times unfamiliar. This relative lack of knowledge (at least in the early stages of internationalization) may engender considerable costs, to the point of inviting the multinational firms to leave the country. The concept of *liability of foreignness* was defined by [ZAH 95] as:

> "the costs of doing business abroad that result in a competitive disadvantage for an MNE subunit… broadly defined as all additional costs a firm operating in a market overseas incurs that a local firm would not incur".

These costs are generally associated with:

– geographical distances (costs of transport, staff commuting between headquarters and subsidiaries, coordination costs linked to jet lag, depending on the geographical area);

– specific elements related to a lack of information and specific knowledge about the local environment and the domestic market;

– cultural factors [BRO 01, MES 08b, MEI 13] and policies that may destabilize the foreign firm by questioning its legitimacy (strong nationalistic feeling).

However, how do these arguments relate to Hymer? In fact, Hymer was the first author in the 1960s to notice these disadvantages:

> "[…] national firms have the general advantage of better information about their country: its economy, its language, its laws, and its politics… In given countries, foreigners and nationals may receive very different treatment [from government, consumers, and suppliers]. Foreigners may also have disadvantages […] because of their own government's actions, for international operations are affected by the laws of the home country".

Miller [MIL 02] and Luo [LUO 02] have pointed out that these costs can be overcome thanks to the development of firm-specific advantages linked to specific organizational or managerial capacities [DUN 77, ZAH 95].

In the 1970s, Johanson, Vahlne and Wiedersheim-Paul deepened the notion of distance in their work concerning the Uppsala model (U-model),

where they outlined the main stages of the internationalization process. The Uppsala model is described as progressive and continuous because of the existence of a "psychic" distance between the firm engaged in international activities and the host country [JOH 75, JOH 77]. In this model, four steps are usually identified: single export transactions, later followed by an agent, commercial representation in the host country, and the establishment of a production and/or distribution subsidiary resulting from a deeper knowledge of the local market, thanks to the experience gained by the foreign investor. Some of the criticisms aimed at this model include the irreversibility of phases, the lack of clarity on the reasons behind the transition from one stage to another, and the failure to consider other development modalities such as mergers and acquisitions (which elicit integration issues), alliances (with local partners) and inter-organizational networks.

Founding authors Significant contributions	**Conceptual Approaches**	**Cooperative Factor (Alliances)**
Multinationalization and Monopolistic Advantages		
Kindleberger [KIN 69]	Firms should benefit from specific and internationally transferable advantages. These are "monopolistic" advantages, associated with market failure (products, factors of production) the firm can benefit from.	FDI Advantages
Advantages associated with innovation		
Vernon [VER 66] Caves [CAV 74] Vernon [VER 71] Vernon [VER 77]	Product's Life-cycle. Exports are the salient modality for exploiting external markets. Most often, subsequent licenses (and/or patents) are issued. Production abroad only takes place during the maturity phase, when domestic firms start launching competitive goods.	FDI has a defensive role and aims at preserving advantage in terms of innovation, which favors the innovative firm.
Multinationalization and internationalization of trade		
Williamson [WIL 75] Buckley and Casson [BUC 85] Mucchielli [MUC 88]	Transaction costs theory shows that for a firm which has to acquire raw material or intermediate goods it is interesting to avoid the market and that it is preferable to organize such production within its organization. Thus, we may encounter "internal" markets within a firm, that is to say, internalized at an international scale.	This approach helps us understand why firms choose to settle abroad, instead of resorting to alternative market supply modalities (for example, *joint ventures*)

Dunning [DUN 88, DUN 93a DUN 93b] Brothers *et al.* [BRO 96] Agrawal and Ramaswami, [AGA 92] Williamson [WIL 81]	Eclectic theory combines three categories of advantages: – Specific advantage of the firm (O); – Advantage of delocalizing abroad (L); – Internalization advantage (I).	Arbitration between different forms of penetrating foreign markets (exports, licenses, FDI).
Barney [BAR 91] Grant [GRA 91] Wernerfelt [WER 84] Meyer, Wright and Pruthi, [MEY 09] Peng [PEN 01] Pitelis [PIT 07] Tallman and Fladmoe- Lindquist [TAL 02] Dunning and Lundan [DUN 08] Chung and Alcacer [CHU 02] Le Bas and Sierra [LEB 02] Le Gall [LE 11]	*Resource Based View* or RBV (see Chapter 7). Distinctive resources and core competencies of a firm enable it to become stronger over a certain market, and even to outgrow its international competitors.	If firms have such resources at their disposal, they will most probably expand at an international scale.
Step-by-step internationalization		
Johanson and Wiedersheim-Paul [JOH 75]; Johanson and Vahlne [JOH 77, JOH 90]; Anderson [AND 93]; Calof and Beamish [CAL 95]; Bonascori and Dalli [BON 90]; Poisson and Zhan [POI 96]; Forgsen [FOR 00]; Barkema, Bell and Pennings [BAR 96]; Delios and Beamish [DEL 01]; Li [LI 95]; Luo and Peng [LUO 99]; Evans and Mavondo [EVA 02]	Uppsala model (physical distance concept). For firms, the internationalization process begins with short-distance countries or markets, as regards their market of origin. "Revisited" model: dynamic process (resources)	Firm internationalization takes place step by step: single exports, exports *via* an independent agent, settlement of a subsidiary and its production abroad.
Bikley and Tesar [BIK 77] Cavusgil [CAV 80] Czinkota [CZI 82] Reid [REI 81]	I-Model. This innovation model envisions the internationalization process as a process comparable to the adoption of a new product. The internationalization process corresponds to a series of "organizational innovations".	

***Liability of foreignness* and multinationalization**		
Hymer [HYM 76] Zaheer [ZAH 95] Daamen, Hennart, Kim and Park [DAM 07]	Disadvantage in comparison with domestic firms. How is it possible to overcome this weakness?	
Multinationalization and foreign market penetration modalities		
Anderson and Gatignon [AND 86]; Hennart [HEN 91] Hisey and Caves [HIS 85] Buckley *et al*. [BUC 90] Hill *et al*. [HIL 90]	Each modality for penetrating a foreign market presents both benefits and setbacks.	Localization factor is of the utmost importance in the frame of FDI.
Multinationalization and integration of the cultural factor (business and national culture)		
Perlmutter [PER 69]; Hofstede [HOF 80, HOF 93]; Kogut and Singh [KOG 88]; Adler [ADL 91]; Milliot [MIL 05]; Dumitriu and Capdevila [DUM 12]; Meier [MEI 13]	Need to integrate the cultural factor in all these dimensions.	Localization becomes a decisive factor.

Table 8.1. *Scope of theoretical approaches (elaborated by the author on the basis of quoted references)*

8.2.2. *Arbitration between different methods of penetration in foreign markets*

The different approaches sketched in Table 8.1 attempt to answer a fundamental question: how can a firm benefit from operating internationally? The advantage will particularly depend on the choice of internationalization modalities. The options are truly varied: exports, foreign direct investment (FDI), cooperation agreements and/or licensing [HEN 88, BUC 98, KOG 02, BEA 02]. As we will see in the next paragraphs, these modalities have been studied following step-by-step approaches, each stage of the internationalization process favoring a different mode of market penetration.

Modalities for penetrating foreign markets can be divided into two broad categories. the first one relates to simple market transactions (Table 8.2) and the second one refers to foreign direct investment (FDI), which intends to elicit a larger commitment on the part of the firm and which can be sustained over time (Table 8.3).

Transactions		
Exports	Licenses	*Franchising*

Table 8.2. *Transactional modalities for penetrating foreign markets (adapted from [GRA 02])*

FDI		
– Participation in the capital of a foreign firm (more than 10 % participation) – Merger and acquisition	– *Green field investments* – Creation of totally new settlements	– Cooperation: it may adopt different forms – Shared risk (with possession of capital share by the various partners). *Equity joint ventures* (EJVs) fall under this category – Alliances without capital participation (*non-equity alliances*): R&D agreements, cooperation, sharing of knowledge, of resources, competencies, technology, coproduction contracts, etc. These alliances are often the first phase before the creation of a *joint venture.*

Table 8.3. *FDI different modalities (adapted from [GRA 02, FMI 04])*

The latest report published by UNCTAD [UNC 16], which annually records all FDI operations, states that JVs still play an important role in the internationalization strategies of firms [MAY 11, MAY 13]. There are several reasons that may explain why, from the many types of international cooperation agreements, it is often the *joint venture* form that is privileged, to the detriment of other external growth operations:

> "In this case, while the partners are concerned about the local profitability of production, the parent company of the multinational concentrates on the global profitability of the business. Besides, the transfer of technology to the foreign subsidiary is limited by the risks of the *joint venture* partner's appropriation of the technology. Finally, the intention of the

> parent company to globally fragment production and to transfer prices between subsidiaries may enter into conflict with the strategy of the local partner" [MUC 09].

Back in 1976, Hymer had already insisted on the existence of these forms of international cooperation:

> "Some firms in a certain country are fully controlled by the national interests of this country, while other firms are fully controlled by foreigners. The firm can be a *joint venture* owned 50% by nationals and 50% by foreigners, but the partnership may be uneven: nationals or foreigners may only possess minority shareholding. The foreign firm may not be in possession of the property, but may exert some control by means of a license or a cartel. The relationship may also be of a subtler nature, that is to say, there is the possibility of tacit collusion between firms."

In 2014, investment by multinational firms in developing countries reached unprecedented levels. This trend was led by Asian firms. The statistics revealed that among the top 20 investor countries in the world, 9 were from developing countries or transition economies. Their firms continued to acquire foreign subsidiaries of firms from developed countries in developing countries.

8.3. Firm multinationalization and transaction costs theory

As we have seen in Chapter 2, reflections on the notions of transaction, contracts and coordination costs, with the ultimate objective of increasing performance, have largely contributed to the field of strategic management, and specifically, to a better apprehension of the cooperation phenomenon. Alliance appears to be an intermediate form between market and hierarchy in that it helps reduce transaction costs, while it limits the increase in organizational costs. In this context, *joint ventures* (JVs) act as a specific type of alliance. In the 1980s and 1990s, several authors studied *joint ventures* within the framework of the theory of transaction costs and associated them with the phenomenon of multinationalization [HEN 88, HEN 90b, BEA 87, TAI 88, EVS 82, EVS 84, DEL 91b].

8.3.1. *Application of transaction costs theory to* equity joint-ventures*: Hennart's analysis*

Transaction costs theory can provide a unified framework for the explanation of *joint ventures* (JVs) and, expressly, for the case of equity joint ventures (EJVs). Hennart distinguishes between EJVs and *non-equity joint ventures* (non-EJVs). We observe the existence of EJVs when two (or more) entities contribute assets to an independent legal entity and are remunerated with the profits recovered by the entity, for a part or the totality of their contribution. They represent the participation and the legal entities created by two or more partners (joint subsidiaries). Conversely, we speak of "non-EJVs" when there are contractual arrangements such as licenses, distribution agreements, management support or technical assistance (see Table 8.3 and Chapter 1).

According to [HEN 88], JVs are often perceived as a means of achieving four objectives: economies of scale, bypassing barriers to entry into new markets (see Chapters 2 and 3), pooling knowledge and competencies and reducing political hazards. Regarding this last point, the establishment of multinational firms or the acquisition of a majority share in local industries which may provoke hostile reactions from the part of the host country, JVs appear as an adequate or, in severe cases, the one and only alternative. In countries like this, the foreign investment code requires the establishment of a JV between the foreign partner and a local company. The case of China is a good example.

According to [HEN 88], while the reduction of transaction costs is not the only explanatory factor for the creation of a JV (collusion being another very important reason), this is particularly relevant. The author continues his analysis by establishing an additional distinction between *scale* and *link joint ventures* [HEN 88].

Scale JVs take place when two or more firms get together at a higher stage of production or distribution or in a completely new market. The main feature of these JVs is that they result from a similar movement of the protagonists. They involve firms that hold similar assets which intend to increase their size through partnership.

Link JVs result from a simultaneous market failure for the services of two or more specific assets, and the acquisition of the holding company in question would require substantial management costs. In this type of JV, the situation of the partners is not symmetric. For one of the firms, the JV may

represent a vertical investment while for the other protagonist, it may represent a diversification strategy.

> "*Link* JVs unite partners whose asset contribution is heterogeneous, and which deploy different strategic movements. These types of partners aim to exploit a synergy between complementary assets and competencies held by different firms" [DUS 91].

At the same time, JVs offer the possibility of avoiding inefficient input markets (raw materials, components, loans, distribution services). These different elements explain why firms prefer to internalize transactions. In fact, EJVs are particularly recommended as an effective organizational mode when the two following conditions are simultaneously met:

– the markets of intermediate goods held by each of the parties are deficient;

– acquiring or reproducing these assets would be more expensive than obtaining them under a JV. Some market failures have been explained due to the nature of customers, certain types of tacit know-how or technology.

In case of appearance of a market failure, incentives for opportunistic behavior will be reduced. This will enable the different partners to enter the JV on an equal basis. Suppliers of intermediate goods will have less incentive to take advantage over the buyer by increasing prices or reducing product quality. Simply put, JVs reduce transaction costs by combining intermediate goods. However, as [HEN 88] pointed out, profits are sometimes offset by their costs. Incentives to adopt opportunistic behavior are not totally eliminated, in the sense that each partner may find it beneficial to maximize his own gain at the expense of the arrangement. The effectiveness of a JV ultimately depends on the aims pursued by the various partners involved in the agreement.

8.3.2. *The introduction of time as a variable*

Now the question is: what can motivate the partners of an EJV to justify their involvement in such an operation? As [BEA 87] have pointed out, the explicit intention of the partners is to engage in an EJV with a long-term perspective. On the contrary, contractual JVs are concluded after a fixed period (see Chapter 1). These partnerships are due to be dissolved on a date that the partners set at the beginning of the arrangement.

[BEA 87] also provide a definition of EJVs as long-term cooperation agreements. The use of JVs in the conceptual framework of internalization can only by justified if two conditions are met: on the one hand, the firm must have an asset that enables it to compete in an external market. On the other hand, JV agreements are the best option for appropriating rent by selling this asset on an external market.

At the same time, JVs provide a better solution not only for the "small number" dilemma, but against opportunism problems and uncertainty, in the case of wholly owned subsidiaries. [BEA 87] have focused on these two aspects:

– *One of the most significant problems a JV has to face is the question of opportunism*. [BEA 87] argue that when a JV blossoms in a climate of mutual trust, opportunistic behavior is unlikely to arise. In that situation, agents act on a reciprocal basis, giving up short-term benefits, as [BUC 88] has cleverly noticed. What is more, if these positive attitudes are reinforced by strong organizational connections (profit-sharing, common decision-making procedures, monitoring and control systems), incentives to adopt opportunistic behavior will significantly diminish.

– *The problem of uncertainty can also be efficiently solved within the framework of JVs*. In the absence of opportunism and the disadvantages associated with the small number, there is strong incentive for the parties involved to pool their respective resources and to exchange information about technology, the capital market and local business conditions.

8.4. Strategic alliances and eclectic theory of production

8.4.1. *Eclectic paradigm: multiple advantage identification?*

Dunning is the author of what is known as "eclectic" theory or OLI paradigm (these initials stand for the three major types of advantages associated with multinationalization). Such paradigm was inspired by a large number of theoretical corpuses:

– (O) stands for Ownership Advantage, that is, the specific advantage of the firm is linked to the notion of imperfect competition. This advantage can be based on specialized knowledge (innovation, know-how), control of economies of scope and/or scale, first-mover advantage, etc. [DUN 79] states that this advantage is materialized in the possession of intangible assets, which are exclusive or specific to the firm that owns them, at least for a given period.

– Internalization Advantage (I) is linked to the fact that the internal exploitation of specific advantages is more profitable than their sale or lease. This benefit is linked to the imperfections of intangible resource markets as well as the markets for intermediate goods and services.

– Location Advantage (L) refers to the situation when firms profit from advantages (O) and (I), for example, by internalizing the activities based on its specific advantages outside their country of origin.

0	Factors of production Size and features Governmental policy in terms of innovation, competition and foreign investment	Product technology Differentiation Economies of scale *Input* access Nature of innovation	Size Diversification policy Innovation policy, R&D Attitude towards risk
L	Physical and geographical distances between markets Protectionism Policies in favor of FDI	Resource localization Transportation costs Specific protectionism Nature of competitors Nature of the localized industry (free or not) Sector policies	Settlement strategy FDI experience Position in product's life-cycle Centralized or decentralized organization Passion for risk Management capabilities
I	Differences between international and national market structures Host country infrastructure Policy favorable to internalization	Need to control provision Possibility of contractual negotiation	Organization and control mode Growth and integration capability or outsourcing arrangement, licenses

Table 8.4. *Influence of structural variables over multinationalization advantages (adapted from [DUN 88])*

Dunning's approach is dynamic in the sense that OLI advantages evolve according to three factors: firm-specificity, sector of activity and country involved. Despite the fact that each type of advantage is associated with a specific level of analysis (O for industry, L for country and I for firm), there can be numerous interactions. The monopolistic advantages of the firm may be reinforced by a number of conditions: for example, the existence of a large domestic market in the country of origin, a skilled workforce, major R&D efforts supported by the public authorities and a government policy

encouraging the protection of innovations. The firm can also influence (O) via its own R&D expenses, (L) by the ability of its managers to seize opportunities for relocation and carry them out, and (I) through its ability to organize internalization.

[DUN 88] associates these different elements with the triptych ESP, an acronym coined by [KOO 71]. ESP provides an understanding of FDI flows thanks to the analysis of the evolution of a country´s structural variables such as Environment (E), System (S) and Policy (P). Environment (E) refers to the available resources of a country (including technology) and the capacity of firms to use them in order to supply the domestic market and access foreign markets (see Table 8.5). System (S) makes reference to the organizational framework in which the use and allocation of resources is decided, from issues relative to the division of functions between different modes of coordination (market, firm), to the role of public authorities in allocating transaction costs to different organizational forms. Finally, Policy (P) includes the strategic objectives of governments and the actions taken by them or by public institutions in order to implement these decisions. [DUN 94] focuses on this last aspect in particular. He considers that the role of government policy is fundamental, especially in the field of science and technology. The technological competitiveness of a firm largely depends on the design and enforcement of specific public policies.

	Environment (E)	**System (S)**	**Policies (P)**
Components	Infrastructure Natural resources Economic growth stage Historical and cultural context	Free enterprise (Capitalist) Socialist Mixed Alliances with other countries	Macroeconomics (fiscal, monetary, exchange policies) Microeconomics (industry, trade, competition) General level (education, consumer protection) FDI-specific factors
Results	Production structure and level (specialization) Attitude to work, perception of wealth, attitudes towards foreigners, etc.	Decision-making structure Degree of integration in international trade Market resource allocation Nationalization	Degree and forms of governmental intervention Control Required performances

Table 8.5. *ESP paradigm (adapted from [KOO 71] and quoted by [DUN 88])*

8.4.2. *The real contribution of eclectic theory to inter-firm alliances*

[DUN 88] marries both paradigms (OLI and ESP) so as to determine the different modes of organization for international production. To begin with, the author reminds us of the three reasons why he designated his approach as "eclectic". The first one is related to the fact that eclectic theory makes it possible to explain the multinational phenomenon that emerged in the 1950s. Second, it provides a satisfactory explanation for all types of FDI. Finally, it examines the three main alternative means of penetrating foreign markets, namely direct investment, export and contractual agreements: licensing, technical assistance, franchising and management agreements (see Chapter 1). [DUN 88] analyzes these three types of organizations as a function of OLI advantages.

With this information, Dunning then studies the three main and alternative methods of penetrating foreign markets: licensing, export and FDI:

– licenses are chosen in the case where the undertaking has only one specific advantage: the sale of the license is performed with a local firm which will exploit the domestic market;

– export is preferred when a firm has no localization advantage, but still benefits from the other two advantages (specific advantage and advantage to internationalization);

– FDI is privileged when the firm simultaneously combines the three types of benefits.

	O Advantage	**I Advantage**	**L Advantage**
FDI	Yes	Yes	Yes
Export	Yes	Yes	No
Contractual agreement	Yes	No	No

Table 8.6. *Alternative means of penetrating foreign markets [DUN 88]*

According to the author, an increase in cooperation agreements in the 1980s and the 1990s can be justified because of the evolution of the macroeconomic variables of some countries [DUN 93a, DUN 93b]. From

this perspective, three factors should be considered. The first one is related to major technological advances, which opened the possibility of a whole new range of products and methods of production, and also distinctively changed the way assets and goods are organized and processed. The second one relates to the attitude of governments towards "economic interdependence" and to the international operations of firms. In other words, governments were more open to *joint ventures* between foreign and local companies. The third factor affecting the growth and configuration of international activities was the way in which economic activity was organized. In fact, this was the result of the first two factors, reflecting the increasing inadequacy of traditional modes of production and transaction. This could explain the growing appeal of a broad scope of horizontal and vertical "external" relationships, ranging from FDI to more informal and flexible off shoring/outsourcing collaboration and service agreements.

Nevertheless, Dunning recognizes that the paradigm of international production has certain limitations for illuminating complex strategic alliances:

> "While the conceptual and analytical structure of the paradigm remains largely intact, its operational use decreases as the complexity of the variables which make up the configuration intensifies. For example, it is relatively easy to explain foreign direct investment of a rubber or tobacco firm in terms of truly specific and easily identifiable OLI benefits. But it is quite different to account for the extent, configuration and growth of the international production of a firm such as Philips, with a number of (totally or partially controlled) 350 subsidiaries, having developed more than 800 strategic alliances, some of which involve global leaders in electronics and telecommunications as well as thousands of licenses, technical assistance and subcontracting agreements." [DUN 88].

8.4.3. *Further considerations of the OLI paradigm*

[DUN 88] deepens his analysis by introducing the notion of investment development path (IDP), based on the distinction of several phases which correspond to the level of development of a certain country. In particular, the

concept applies to countries that host FDI and who will, in their turn, become investors during the second phase:

– The first step corresponds to a phase of pre-industrialization. The country is neither an investor abroad nor a host country. At this stage, factor (L) does not play and firms do not find a specific advantage encouraging them to export. Moreover, there is no specific policy for attracting FDI, and the existing infrastructure is inadequate.

– The second stage can be recognized because of an increase in advantages to location, a more active FDI policy, a less restrictive regulatory framework and favorable macroeconomic conditions (labor market).

– The third stage refers to countries which have reached a certain degree of economic maturity. There may still be a discrepancy between the FDI of domestic firms and the investment of foreign firms in the host country. However, at this phase, the country develops its own advantages, which enables national firms to reinforce their specific advantages (O). Technology is at the center of the government's policy.

– The fourth stage witnesses the emergence of the country as an investor abroad. Firms are able to increase their specific advantages. In this phase, the State particularly favors the integration of firms in an international economy.

– Finally, the fifth phase acknowledges a broader consideration of the strategies of competitors in regional markets. At this stage, alliances are particularly favored.

The OLI model, as developed by Dunning, has received numerous criticisms, in particular regarding the existing boundary between the firm's specific advantage (O) and internalization advantage (I). [RUG 11] observes that:

> "Dunning's eclectic paradigm, however, struggles to integrate country and firm level interactions. From the firm's viewpoint, the (O) and (I) are not independent parameters in managerial decision making but need to be considered jointly, with (I) being the dominant consideration. The existence of the MNE itself, resulting from FDI, implies that (O) needed to be internalized in terms of the processes of (O) creation, transfer, deployment, recombination and profitable exploitation".

8.4.4. *Synthetic theory and strategic alliances*

Mucchielli [MUC 85] goes a step beyond the theory developed by Dunning and suggests combining the different types of advantages in a new way. He insists that the three levels (firm, sector, country) should be considered simultaneously. In his own words:

> "Dunning's approach faces its own limitations. The author attempts to take into account the levels of the firm, the sector and the country, but in fact the sector is summarized by the simple nature of the product or technology, conferring (or not) an advantage to internalization; the interface of OLI/ESP approaches appears to us as a firm/country coupling, without it being possible to go beyond. However, the growth of international alliances and cooperation strategies highlights the global strategies enforced by multinationals, which can only be part of a theoretical framework in which the industrial structure should assume its full importance" [MUC 85].

The analysis developed by [MUC 85] has been described as synthetic. In its origins, it connected the notions of comparative advantage of the country and competitive advantage of the firm. Later, it was enriched with the concept of "strategic advantage", what made it possible to broaden the scope of the theory, in particular in the area of international strategic alliances.

There are six common determinants of trade and international investment: international differences in production functions, factor endowments, tastes of economic agents, existence of economies of scale, distortions in the market of products and in factors of production.

A firm presents competitive advantages (or specific advantages) due to its own features such as, for example, technological innovations, a certain level of R&D, or significant human resources. Competitive advantages can also be associated with product differentiation (branding, advertising).

Countries have comparative advantages that include the location advantages mentioned by Dunning. These comparative advantages relate not only to a country's supply capacity (factor endowments, economies of scale, etc.), but also to the size and dynamics of domestic and foreign demands.

Firms offer goods and services and demand inputs that must be obtained at the lowest cost, whereas countries offer factors of production through their factor endowments and productivity (quantity and quality of factors) at the time that they demand product by means of consumers.

Mucchielli establishes a relation between comparative and competitive advantages, and introduces the notion of concordance/discordance between these types of advantages. In a very general way, concordance between the competitive advantages of firms and the comparative advantages of countries encourages firms to export. On the other hand, in the face of discrepancy between these two types of advantages, the firm will probably relocate.

Synthetic analysis integrates new forms of international investment (see Chapter 1), namely cooperative strategies of firms that can lead to the creation of a dominant position. Mucchielli introduces the concept of strategic advantage that results from inter-firm cooperation. In this way, the author arrives at a new grid of analysis implicitly based on the notions of concordance and discordance between the various types of advantages. In a situation where the three types of a firm's advantages (competitive, comparative and strategic) are met, the cooperative strategy will prevail (Table 8.7).

	Competitive advantage	**Host country comparative advantage**	**Strategic advantage**
FDI	+	+	–
Export	+	–	–
License	+	–	+
International cooperation agreement (ICA)	+	+	+

Table 8.7. *International strategies, competitive, comparative and strategic advantage [MUC 91]*

8.4.5. *Comparative advantage, competitive advantage and international cooperation agreements: the empirical analysis*

There are numerous empirical studies regarding comparative and competitive advantages. However, the association of these two types of advantages with the concept of cooperation has not been studied in depth. The works of Shan and Hamilton [SHA 91] are particularly interesting in that they explore the link between the comparative advantages of a country and the competitiveness of a firm, on the one hand, and the various forms of international cooperation, on the other hand. Cooperative relationships are used as a means of acquiring or strengthening comparative advantage [REI 86].

[SHA 91] tested the following hypothesis: a country's advantage (for example, comparative advantage) encourages the signature of international cooperation agreements and is a significant variable for explaining the differences between alliances at a national level and inter-firm international cooperation. Their test was carried out by comparing national and international cooperative relations established by Japanese firms in the area of biotechnology. They chose this sector because, at the time, Japan showed a low level of competitiveness in those activities. The dependent variable chosen for the test developed by [SHA 91] was the nationality of the partner firm involved in the cooperative relationship. The partners were later divided into three groups: Japanese, American and other nationalities. The model used was a multinomial logistic regression analysis in which the dependent variable was split into three categories of values for the nationalities of the partner firms.

The results of the test confirmed the main hypothesis: the comparative advantage of a country is an important motivator for subscribing international cooperation agreements. Nevertheless, this factor alone is not decisive in relation to other explanatory variables of international cooperative relations and there is not a single explanatory variable for accounting for all international *joint ventures*. Although the cultural, institutional and economic context of the country has an important impact on firms, a certain number of features (particularly technology) are specific to the firms themselves. In fact, this inherent value is the one that reflects (or not) the comparative advantage of the country of origin. Again, we encounter the notion of discordance and/or concordance between the comparative advantage of a country and the advantage of the firm [MUC 85].

8.5. Inter-firm international cooperation and territorialized networks

Once more, the local (territorial) dimension is emphasized by the development of regions or by the increasingly important role played by territorialized inter-organizational networks (districts, clusters, competitiveness poles, etc.). In making a decision, a firm that intends to develop at an international level should take into consideration not only the features of the host country, but also those of the region that is becoming a territory on which inter-organizational networks operate [DAI 11a, DAI 11b].

8.5.1. *Comparative advantage, competitive advantage and "regional advantage"*

At the end of the 2000s, [MUC 09] recalled the main teachings that analyzed the localization strategies of multinational firms, which highlighted:

> "A sequence of choices: first, a large geographic area (Asia, Europe, America), then a country, later a region and finally a precise location. Every time, a short list is established and the criteria are set on the basis of a cost/benefit analysis comprising broad macroeconomic elements (potential demand, production costs) up to very specific characteristics of host alternatives (transportation, taxes, land prices, labor availability, etc.) as well as the technical characteristics of the plant" [MUC 09].

Considering that regions become economic actors in their own right, they possess comparative advantages [TIS 99]. [PEC 03] refers to the idea of a differentiating advantage:

> "Our hypothesis is that comparative advantage, in the light of globalization, becomes a "differentiating advantage". Therefore, what matters in terms of territories is not to specialize in a comparative scheme, but rather to escape the laws of competition when they are impossible to follow, and aim at the production for which they could (ideally) become a monopoly".

The more recent problems of firm relocation from developed countries are also part of these reflections. Analyses have shown that relocations are often associated with other factors apart from costs, such as the search for new markets, better productivity, and also a more skilled workforce [MUC 09].

8.5.2. *The expansion of localized industrial systems*

There is a broad palette of terms relating to the different forms of territorialized organizations or groupings of entities belonging to the same sector of activity and located on the same territory. These have been designated as clusters, technological and industrial clusters, industrial districts, technological districts, "radiant" districts, public standing districts, innovative areas, *learning regions*, (technological, excellence, competitive) poles, territorial production systems and localized production systems (LPS). The list continues to expand in order to describe all these different forms. They include *Hubs* and *spokes*, satellite platforms and *state anchored districts* [THO 06].

The origin of the theory of industrial districts goes back to the very beginning of the 20th Century with the works of Alfred Marshall [MAR 90a]. The districts or areas of clustered industrial enterprises already existed in the Marshall era and still exist today. The concept of "industrial district" was developed on the basis of an observation of an organizational form in England. [MAR 90a] was also interested in the concept of agglomeration economies. According to this scholar, there may be external economies of scale linked to the proximity of territories outside urban areas. This could eventually favor a reduction in production costs. In the 1970s, the Marshallian conception of the district experienced a revival, notably through the works of Becattini [BEC 78] who used it for characterizing the industrial organization of the northeastern and central region of Italy.

The concept of an industrial district evolved considerably from the 1980s onwards, in parallel with the changes recorded by the technical-industrial system, an event that led to a gradual transformation of territorial development, no longer centered on the presence of material resources in a production chain, but on activities with an orientation towards "science-technologies-markets".

Other forms, apart from the industrial district, have emerged, which are more or less significant in different countries [LON 91a, LON 91b, MAY 92a, MAY 92b]. In Europe in particular, the situation of different countries concerning the development of territorialized production systems is mixed [MAY 93, MAY 94, MAY 94b]. [PEC 03] has observed that:

> "It appears that the strength of localized production organizations is directly linked to the characteristics of the national production system in which they are inserted. For instance, unlike most other European countries, the French context is characteristic for certain particularities that have not played a role in favor of the development of local productive systems. Instead, Jacobinism has favored centralized action, as it can be deduced from the territorial development of the sixties, an industrial policy which encouraged the constitution of "national champions" or labor relocation from Paris to the West".

8.5.3. *Clusters and firm internationalization: which dynamics?*

As we have observed in previous sections, firm internationalization has inspired a broad literature. However, on reading Table 8.1, we find that while the factor of location is unquestionably fundamental, the phenomenon of territorialization is not a determining factor in these approaches. [SAI 10] consider that localization obeys an allocative logic, whereas territorialization belongs to an anchoring logic. Among the various territorialized inter-organizational networks, clusters have long been at the heart of academic research (Table 8.8).

Trends/authors	**Inter-organizational networks and territorialization/localization logics**
Transaction costs theory (*California School)* Scott and Storper [SCO 86] Scott [SCO 88] Storper [STO 89] Williamson [WIL 85]	Relations between economic actors are complex and it is formal institutions and informal regulations that help reduce the uncertainty inherent to transactions. The suburban area becomes a source of industrial dynamics. The localization of numerous small structures in a restricted territory leads to the reduction of transaction costs and to the emergence of a local labor market that develops a specialized labor force.

Geographical concentration of competitors, customers and suppliers into clusters, as a factor favoring innovation and competitiveness Porter [POR 90, POR 98a, POR 98b]	Porter suggests two definitions of cluster, according to the level of analysis in question (country or region). The first definition refers to the primitive narrow version of the concept, which focuses on national industrial clusters, that is to say, industries or firms established only in one country, in the context of vertical or horizontal relations. The second definition is ample: "Clusters are geographic concentrations of interconnected companies and institutions in a particular field linked by commonalities and complementarities. The geographic scope of a cluster can range from a single city or state to a country or even a network of neighboring countries" [POR 90]. The role of institutions as formal organizations can have a significant impact on the context of regional clusters.
Flexible specialization, trust and interdependence	The region becomes the place of what Storper [STP 97] calls *untraded interdependencies*, that is to say, conventions, informal regulations and personal habits that rule different economic actors in a context of uncertainty. Collaborative networks generally include small firms and institutions that can enhance trust between actors on the basis of information exchange, in particular tacit information, which, by definition, cannot be coded: "Trust arises from the 'digestion' of the experience" [GRA 85].
GREMI (*Groupement européen des milieux innovateurs)* (Aydalot and Keeble [AYD 88], Camagni [CAM 95]).	The role of interaction is crucial for innovative processes. Clustering processes make it possible for firms to benefit from a collective learning process by means of labor force mobility, imitation processes and privileged customer–supplier relation.
Institutionalist and Evolutionist Trend (Boschma [BOS 04]; Mendez and Mercier, [MEN 06]; Nelson and Winter [NEL 82]; Amin and Thrift [AMI 92], Amin [AMI 99])	The evolutionist approach marries technological progress and innovation. Cumulated knowledge in the "region" thanks to the coordinated actions of firms and other institutions invites the development of regional trajectories, and can also be an obstacle to the development and competitiveness of regions (*lock in* or *path dependence* situations).

Table 8.8. *Theoretical determinants of clusters (summary performed on the basis of the works of [NEW 03])*

Finally, we find some common characteristics in the different definitions offered by the authors we quoted above:

– Clusters refer to groupings of firms and institutions located in a specific region, in a given sector. The emergence of ICTs could have abolished borders and put an end to all territorialized forms of organization and, especially, clusters. Authors like [GIL 01] have declared the "death of distance", but this observation is far from being true.

– Firms have similar activities, can share a common area of competence and produce related or complementary goods. There may be development of "off-market" relationships, information exchange and knowledge thanks to informal collaboration that avoids the market sphere. Mature clusters are recognizable for the existence of specific, differentiated and localized links between individuals and organizations. These are coordinated by conventions or routines that often only function in a context of proximity [STO 97]. In terms of geography and activities, the concept of proximity creates positive externalities that can be associated with the access to specific tangible and intangible assets.

– The actors in these clusters are closely intertwined and may establish relations of a different nature (subcontracting, cooperation, etc.). Porter has consistently focused on the coexistence of rivalry and cooperation relations between the different actors:

> "Geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also co-operate" [POR 00].

Other authors have adopted the same approach. This is the case of [COO 02]:

> "Clusters are geographically proximate firms in vertical and horizontal relationships, involving a localized enterprise support infrastructure with shared developmental vision for business growth, based on competition and cooperation in a specific market field".

But also of [MEN 05]: "Firms in business clusters compete and collaborate with great enthusiasm".

Therefore, the cluster seeks to use the virtues or the advantages of both competition and cooperation [RAI 01]. Regions become a factor of attraction for international companies.

Box 8.1 illustrates the idea through the example of the Ile-de-France region. The literature of "the new economic geography", thanks to the contribution of [KRU 91, KRU 95], has focused on the phenomenon of attractiveness. Some regions (hosting clusters) are able to attract business from a large number of enterprises, some of which are multinational. The result is a phenomenon of competition between these different territories in order to attract foreign capital. Tiebout [TIE 56] already reflected on the idea of a "localization market" in the 1950s, where regions would compete to attract investors. More recently, territorial competition had led to the development of "nomadic" business practices and/or the development of new forms of non-territorial inter-organizational networks such as business ecosystems [DAI 11a].

Nine clusters of excellence in Île-de-France region

The region has nine competitiveness clusters, including four global clusters: Advancity Paris-Région (city and sustainable mobility), ASTech Paris-Région (aerospace), Cap Digital Paris-Région (digital, multimedia), Finance innovation Paris-Region (biomedical, health), Mov'eo (automotive), Systematic Paris-region (TIC), Cosmetic Valley and Elastopole (polymers).

Greater Paris will strengthen these large clusters: from 2023, the technological and scientific pole and the future Paris-Saclay University will be accessible directly from Orly *via* the new line 18.

Europe's second most attractive city for foreign investment

According to the 2016 edition of *Global Cities Investment Monitor*, Ile-de-France is the second most attractive metropolis in Europe for foreign investors, London being the first. The region ranks among the world leaders in all categories of strategic functions, such as international research centers and headquarters. According to *Business France*, in 2015, ***six new foreign investment decisions were made, weekly.***

Third world destination for headquarters of major international groups

Out of the 500 companies listed in the *Forbes Fortune Global 500*, 29 have their headquarters in the region of Île-de-France, placing the region in the third position, behind Beijing and Tokyo, and ranking number one in Europe.

Box 8.1. *The attractiveness of Ile-de-France, in numbers*

8.6. Conclusion

Thus far, strategic alliances within an international context have been studied in the light of firm multinationalization theory.

In this chapter, we have intended to follow the guidelines of contemporary theoretical approaches, which attempt to integrate different levels of analysis (microeconomic level), industry (mesoeconomic level) and country (macroeconomic level), so as to heighten their complementarity.

However, a global analysis must also take into account the territorial dimension, be it local or regional. “Globalization mitigates national importance and strengthens international perspectives. In a few years, we have moved from national planning to international management of territories” [TOR 02].

Like countries, regions have become a stake and seek to attract FDI and multinational firms, which makes relational strategies (cooperative in particular) even more complex.

9

Evolution of Strategic Alliances in the Context of Digital Transformation

9.1. Introduction

This chapter is devoted to the types of cooperation established in different sectors: civil space (telecommunication satellites), e-health and the video-gaming industry.

We have chosen these industries because they have already been affected by the use of digital technologies and will continue to do so.

In the case of e-health in particular, digital technologies have provided extra value for health professionals, industries and also for patients. The economic potential of a connected health market has sparked strong interest from heterogeneous actors. Value chains are being reconfigured with a notable redefinition of intermediate activities in new ecosystems. The role of platforms has become essential.

In these three areas, inter-firm cooperation has developed greatly, and with different modalities.

Cooperation, Coopetition and Innovation, First Edition. Nabyla Daidj.

9.2. Aerospatial sector

Like other high-tech sectors that use the terminology developed in the 1980s and 1990s, the aerospatial sector demonstrates many factors and trends that will be detailed in section 9.2.1. Section 9.2.2 will be devoted to the evolution of cooperation agreements during the period 1990–2016.

9.2.1. *The specificities of the aerospatial sector*

9.2.1.1. *The features of the aerospatial products*

Three salient activities constitute the axes of the aerospatial industry. These are space transportation (conventional launchers and US space shuttles operating until 2011), satellites (telecommunications, remote sensing, geolocation, meteorology) and land stations. At the same time, these categories combine into a complex network of systems, subsystems and components during the manufacturing process.

> "The construction of the launcher requires assemblying and integrating metallic elements (structure, cap), propulsion systems, fuel, cells and other components (turbopumps, equipment boxes, board computers, inertial guidance, telemetry, etc.) which are produced thanks to the combination of mechanical engineering, the chemical industry and electrical and electronic engineering firms [...]" [OEC 85].

Properly speaking, a satellite is composed of two fundamental elements: a platform and a payload, containing the equipment that will provide the satellite with its mission and specificity. Generally, the payload is provided by an electronics company while the platform remains under the responsibility sphere of an aerospace firm.

As [GUG 02] observed, "the emergence of system products is a feature of the globalization of markets making inter-firm cooperation agreements attractive".

9.2.1.2. *Massive investment in intangible assets*

One of the most important features of the space sector is that it demands an enormous amount of fixed and intangible investments, which are the source of barriers to entering and exiting markets. All "space products" (be

they launchers or satellites) are the result of systems, subsystems and components that can be produced in different countries.

The development of space activities gave countries originally engaged in this adventure the possibility of developing new technical processes and testing many technologies, despite the fact that the high technological level of the space sector is more focused on integrating external technologies rather than on generating its own technology. Space production is closely linked to other high-tech sectors and results from the application of diverse techniques issued from the combination of aerospace, computer and composite materials industries. The space industry has also benefited from technical changes that affected the telecommunications and semiconductors sector.

In this industry complexity derives from the need to continuously integrate technical innovations. This results in an extension of the development phase for certain space products which do not fully comply with a large-scale manufacturing logic.

> "The satellite industry is craft, even haute couture! Satellites are tailor-made and the volumes are not very large; on a good year, the prime contractors receive about 20 orders, but some years it barely amounts to a dozen satellites" [BLA 10].

The costs of designing and launching new products are steadily increasing. This increase proves the extent of complexity and diversity of basic technologies [COL 02]. At the same time, the life span of satellites has substantially expanded. This is shown in Table 9.1, the Intelsat satellite series is representative of the spectacular growth of space telecommunications.

	Intelsat 1 (Early Bird)	**Intelsat 7**	**Intelsat 20**	**Intelsat 36**
Launch year	1965	1993	2012	2016 (August)
Life span	Initially planned for a life span of 18 months (4 years duration)	14-18 years	Minimum span 15 years (24 years)	Minimum span 15 years

Table 9.1. *Intelsat Satellite life span (elaborated by the author on the basis of information provided by Intelsat)*

9.2.1.3. *High entry and exit barriers*

The intensity of barriers to entry (capital, R&D, know-how, etc.) and exit (sunk costs related to investment in machinery, equipment, etc.) varies according to the spatial activity in question. While barriers are lower in satellite activity, they are still high for launchers.

In the field of launchers, the costs of entry refer not only to the costs of the equipment and the necessary infrastructure required for manufacturing and testing the prototypes, but most importantly the research costs. The technique of launchers is far more complex than that of satellites. These key technologies (cryogenic propulsion for the upper stages of launchers) demand considerable expenses in R&D.

The high threshold for initial fixed investment is so large that it can only be assumed by governments and public funding, at least at the beginning of the project. In fact, in the United States (NASA) and in Europe (CNES, European Space Agency), the initial investment was obtained via national space agencies. Based on the success of the first public space program, private structures later emerged. This is how Arianespace, a private European company settled in France, was founded and is now responsible for the commercialization and operation of space launch systems such as Ariane. In the United States, private investors also have an important role. SpaceX (or Space Exploration Technologies Corporation) was founded in 2002 by Elon Musk, a private provider with whom NASA entered into a freight contract for the International Space Station (ISS) under the COTS program.

In both sectors (launchers and satellites), the learning curve (several years for satellites, at least a decade for launchers) gives decisive advantages to first movers.

9.2.2. *Supply structure and dynamics in the aerospace industry: numerous alliances*

Understanding the space sector as a whole involves taking into account the “competition-cooperation” dyad. As we have seen in Chapter 6, these two concepts are inexorably connected.

In this chapter, it is mainly inter-firm agreements in the field of telecommunication satellites that we will study because with regard to the aerospace industry, they constitute a privileged application market and are the most open to international competition.

9.2.2.1. *The 1980s: the consortium, a privileged form of cooperation*

In the industry we are studying, consortiums and joint ventures were the most common forms of cooperation in the 1980s.

> "The choice of industrial consortiums as a privileged, if not exclusive, form of cooperation in these sectors [aeronautics and space] is directly linked to their "strategic" or "political" character. In all these sectors the threat of a monopoly or quasi-monopoly situation is more than real and the constitution of industrial alliances is the means for certain companies and certain countries to continue to produce, in such a way that a minimum degree of competition remains on world markets" [CHE 88a].

Agreements according to geographical origin of firms	**Participating firms**	**Organizational forms of the agreement**	**Motivations underlying the alliance**
United States/Japan agreements			
	Melco-Ford Aerospace		Knowledge acquisition
	Toshiba-GE (General Electric)	Informal base	
	NEC-Hughes Aircraft		
Agreements between European countries			
Eurosatellite	MBB-Aerospatiale	Franco-German consortium	Satellite production agreement (Spacebus satellites destined to export)

Satcom International	Matra Espace British Aerospace (BAe) (Aeritalia, Selenia Spazio, Fokker)	EIG	Satellite production and commercialization agreement (Eurostar platform destined to export)
Matra Marconi Space (MMS)	Matra (15%) GEC Marconi (49%)	French-British *Joint-venture*	Global alliance for spatial activities
3A	Aerospatial Alcatel Espace Alenia*	Franco-Italian alliance	Global agreement (technical, industrial and commercial cooperation)
United States/European agreements			
	Aerospatial Ford Aerospace	French-American consortium	Production of Arabsat satellite
	Alcatel Espace Ford Aerospace	Outsourcing	Satellite production
* In April 1991 this agreement was followed by a participation of three firms (45%) in one of the biggest American spatial firms, Space Systems Loral (SSL), a spatial branch mainly possessed by Ford Aerospace and acquired by Loral in October 1990. Mitsubishi and Deutsche Aerospace have also taken part in this alliance.			

Table 9.2. *Agreements in the telecommunications satellite industry (elaborated by the author on the basis of Euroconsult data, 1990 and specialized press)*

The consortium of prime contractors and subcontractors brings together industrialists for a sufficiently long period (the time required to carry out a program), which may exceed 10 years. In the space industry, we may encounter two types of consortia:

– an alliance with a large company, a prime contractor, and a host of subcontractors. In general, these subcontractors are smaller in size;

– a consortium of equal or almost equal partners, "where the question arises concerning industrial and technological leadership within the alliance, as well as a discussion about labor division between firms" [CHE 88a].

During this period, the type of consortium integrated between American companies on the one hand and European and/or Japanese companies on the other hand demonstrated the predominance of the American prime contractor.

9.2.2.2. *The 1990s-2000s: acceleration of the restructuring process of the aerospatial industry via the renewal and development of new alliances*

The cooperation agreements concluded during this decade differ from those concluded in the previous period:

– consortium is no longer the preferred form for industrialists who desire to conclude an agreement. We are gradually moving towards strategic alliances (between rivals);

– agreements between European companies are now made on the basis of financial and commercial requirements. From a historical perspective, while the policy adopted by the European Space Agency (ESA) was necessary, its contribution was nonetheless insufficient to efficiently prepare the European space industry for facing stiff international competition. Unlike the major American competitors, at the moment, no single European company was capable of single-handedly carrying out the totality of a satellite. The European Space Agency had yet to reach a size that allowed it to compete with the United States on an equal footing.

In parallel with the production agreements, the telecommunication satellites sector also experienced large-scale concentration in the form of external growth. For a long time, the sector concentrated on the level of American manufacturers: Hughes Aircraft (purchased by General Motors in 1985) and Ford and General Electric, who took control of RCA in 1986. In the 1980s, almost three-quarters of the world market for civilian telecommunication satellites were supplied by these three firms.

In the 1990s, important maneuvers took place in the industry. For a start, Loral acquired Space Systems/Loral division of the Ford car company in 1990. Nine years later, General Motors decided to sell Hughes Space and Communications to Boeing. In 1994, Martin Marietta and Lockheed, who long benefited from contracts with NASA and the Defense Department (DoD), announced the merger of their military and space activities.

On the European side, two poles emerged in the 1990s: one with Matra Marconi Space (MMS) and the other with Aerospatiale, Alcatel and Alenia (Italy). The end of the 1990s was marked by several mergers that led to the consolidation of the European industry in the face of the all-powerful American companies:

– after Aérospatiale was privatized in 1998, the two French historical competitors, Aérospatiale and Matra, decided to merge in 1999;

– on October 14, 1999, there was a merger agreement between Aerospatiale Matra and Daimler-Chrysler Aerospace (DASA);

– on June 12, 1999, the German DASA and the Italian CASA (Construcciones Aeronautica) merged.

In July 2000, as a result of these mergers, the European Aeronautical Defense and Space Company (EADS) was created. Astrium became a satellite subsidiary of the EADS group. A Dutch company, EADS registered its offices in Amsterdam. It then became the European leader and world's second largest aerospace and defense industry ahead of BAE Systems - until that moment known as British Aerospace, the world's fourth largest defense and aerospace company.

The second European grouping in 2000 was Thales Alenia Space, a joint venture between France and Italy, founded in April 2007 by Alcatel-based space activities. At the end of the 2000s, the sector was composed of five major players:

> "From the five manufacturers of telecommunication satellites in the world, three are American. These are Loral, Boeing and Lockheed-Martin. The other two are European, EADS-Astrium and Thales Alenia Space. Each manufacturer holds about 20% of the world's market and offers a production capacity of about four satellites per year" [BLA 10].

During the 2000s, EADS implemented a number of business reorganization plans, which were more or less successful [DAI 15a]. With a failure of the merger with the British firm BAE (opposition of the Germans), the strategic plan *Vision 2020* conceived by Louis Gallois yielded less than average results.

Thus Marwan Lahoud, President of EADS France, could say before the Economic Affairs Committee to the National Assembly on October 16, 2013:

> "[...] while civilian activity is experiencing an exponential growth of 5%, the military and the space sector are stagnating or even slightly decreasing. Confronted against such lasting trends and having confirmed the failure of the merger with BAE, it had to be assumed that the balance between the two activities was not possible".

9.2.2.3. *The 2010s: new technological and competitive challenges*

With the arrival of Tom Enders in 2012 as the CEO of EADS and the change of the name "EADS" to"Airbus Group" in 2013, the strategy of internationalization quickly became stronger:

> "What we are revealing today is an evolution, not a revolution. This comes as a logical step in the development of our company. Today, we affirm the predominance of commercial aviation in our Group. We are restructuring and reorienting our Space and Defense businesses as a means of reducing costs, improving profitability and obtaining a better position in the market. Our change of name is a simple way of placing the whole company under the aegis of our best brand, a symbol of internationalization, innovation and integration, and also the trademark that represents two-thirds of our turnover. This cannot help but reinforce the message "*we make things fly*". Tom Enders (Airbus Group, 2013).

Nowadays, Airbus Group is composed of three renamed entities: Airbus (civil aircraft), Airbus Defense & Space (Cassidian, Airbus Military and Astrium) and Airbus Helicopters (Eurocopter).

The period 2010-2016 yielded contrasting results for telecommunication satellites in the international market. To begin with, the early 2010s were rather favorable to European groups. Thalès Alenia Space (TAS) and Astrium accounted for 32% of the market share over the 2009-2011 period [PRO 12]. On the other hand, in 2013, the decline in backlogs affected the activity of Astrium and TAS, resulting in downsizing policies. At the same time, competition against American companies intensified, with Boeing strengthening its position in the fast growing segment of electrically

powered satellites. While maintaining the same performances, this type of technology makes it possible to manufacture satellites which are lighter than those functioning on the basis of chemical propulsion. On the other hand, Loral, the world leader in telecommunication satellites offers satellites at very competitive prices enabling the firm to accumulate orders. At the same time, European companies witnessed a significant recovery in the years 2015-2016: as a matter of fact, Astrium and TAS accounted for around 30% of 2015 orders for telecom satellites. The rise in the dollar was also favorable for them over the period to the point that Astrium is now emerging as one of the world leaders in electric-powered satellites.

At this point, it is important to reckon that the intensity of rivalry between different players in the space telecommunications sector must not overshadow the development of cooperative strategies. [FER 13, FER 15] studied cooperative relations between TAS and Astrium in the telecommunications satellite industry. The authors showed that cooperation exists between these two competitors and has caused numerous tensions, not only at an inter-organizational level but also at an intra-organizational one.

In the space sector, other developments are anticipated which will have a direct and indirect impact on the telecommunications satellite markets. In a report published in July 2016, Fioraso recalled the three elements that are currently revolutionizing the sector: a drastic reduction in the costs of launchers and probably satellites, an acceleration of digital technology with the identification of space as a major provider of valuable data (Big Data) and increasing competition on the part of emerging countries [FIO 16]. The data obtained from the space sector is attracting growing interest from digital players such as GAFA (Google, Apple, Facebook, Amazon), but also One Web, Virgin Galactic and a whole constellation of start-ups. The arrival of new entrants will have repercussions on the way in which the actors already present in the market interact (cooperation, coopetition). Finally, the report is also a meditation on how the offer will evolve towards “applications guided by the uses and not only driven by technological progress”.

9.3. E-health: towards a new ecosystem?

Health systems in developed countries and particularly the French health care system are facing numerous challenges: an aging population, the management of dependency, an explosion of chronic diseases and the significant increase in healthcare expenses. E-health is considered as one of the solutions for alleviating a part of these structural difficulties.

Nevertheless, the development of such practices also raises many questions in relation to technical solutions (mainly the digital coverage requirements for the whole territory), the confidentiality of personal data and the responsibility for patients in the case of a domiciliary follow-up in parallel with the strengthening of doctor-patient interactions.

E-health also raises many questions concerning the markets and positioning of the various companies involved. Is it too early to speak of the development of a new ecosystem?

9.3.1. *E-health: still an ambiguous concept?*

The notion of e-health has been defined in a variety of ways. An ample definition [ITU 08] would suggest including telemedicine, prevention, electronic patient monitoring for remote chronic disease diagnosis, self-measurement via connected objects and communication of results via electronic means (quantified self), personal electronic medical records, electronic refund of care, etc.

Other authors have restricted the field of e-health to digital services for the well-being of the individual and placed great emphasis on the use of information and communication technologies (ICT). Mitchell has defined e-health as "the combined use of the Internet and information technologies for clinical, educational and administrative purposes, both locally and remotely" [MIT 99]. Other authors have suggested associating technologies with changing attitudes, in which the growing use of ICTs is necessary but not a sufficient condition:

> "E-health is an emerging field at the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only technical development, but also a state of mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technologies" [EYS 01].

Among the most quoted definitions, we find the one from the World Health Organization, according to which cyber-health (or e-health) is:

> "the use, in a safe and cost-effective manner, of information and communication technologies for health support and related areas, including health care services, health surveillance, health literature and education, knowledge and health-oriented research" [WHO 05].

The debate on terminology is not anecdotal because depending on the definition we adopt, the term will acknowledge a greater or smaller number of actors and more or less complex relational strategies.

9.3.2. *E-health market: towards a greater number of actors involved?*

In the past, the health sector used to refer to public and private health professionals, pharmaceutical firms, biotechnology, the medical equipment and technological sectors as well as more general services.

Nowadays, the dynamism of *the e-health sector* is attracting new investors. According to the statistics elaborated by PIPAME (2016), "e-health in France represents a market valued at 2.7 billion euros in 2014 and which could represent between 28,000 and 38,000 jobs. 15,000 jobs could originate in telemedicine, including 10,000 specifically generated by telemonitoring".

The arrival of new entrants has encouraged the repositioning of certain "historical" players and significantly reconfigured the value chain. For instance, a study carried out by XERFI-PRECEPTA in 2013 revealed that there are five types of major players in the field of e-health. These are software publishers, service providers, medical device manufacturers, health data hosts and stakeholders (telecom operators, telehealth/telemedicine specialists, insurers and social welfare organizations, personal service providers, etc.).

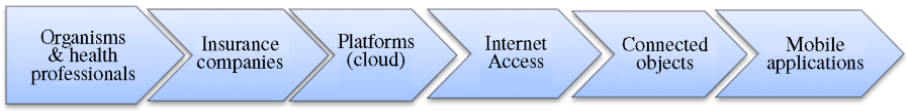

Figure 9.1. *Reconfiguration of the simplified value chain in the field of e-health*

XERFI-PRECEPTA has quoted a few names for each of these categories: software publishers (McKesson, CompuGroup Medical, Corwin, Medisys, Meditrans, etc.); IT service providers (SSII/integrators such as Atos Origin or Sopra Group[1]); manufacturers of medical devices (Philips, Biotronik, Medtronic, Sorin, GE Healthcare, etc.); health data hosts (2CSI, Carestream Health, Cegedim, Cerner, Sigems, etc.); other players including telecom operators (Orange, SFR) and telemedicine and telehealth service providers (Intervox, H2AD, Wengo Santé, N2TS).

In parallel with the arrival of these manufacturers and service providers, "traditional" actors such as healthcare organizations will also have to adapt their activities to incorporate the use of information systems so as to integrate the work of different health professionals.

9.3.3. *The IoT (Internet of Things) market: data at the heart of the value chain*

E-health activities are associated with the collection of individual data that are almost unanimously regarded as the "new black oil" of the digital economy even if this metaphor with oil is partially false, as has been suggested by [VER 13]:

> "We understand the metaphor, but it remains tiresome all the same [...]. Oil is a non-renewable natural resource [...], while data are not natural. Data are produced by technical devices developed by engineers according to certain objectives and which have found a source of funding ... In some way, they are articulated with the real world, of which they are the trace, the symbol or the imprint. A reality that can sometimes even reflect the inalienable and non-transferable inner heart of the individual… Data may sometimes be extracted (like oil), but

1 In 2014, Sopra Group launched a *public offer of amiable exchange* on Steria, leading to the birth of a new group called: Sopra-Steria, which specializes in digital services and digital transformation.

> more often they are produced and freely exchanged by individuals. These are not scarce resources. Not only do they not wear out when used, but they may even progressively acquire value. This value, like their meaning, depends deeply on the context. Data can be monopolized, but is difficult to store, in particular because it becomes less costly to produce and because the multitude itself always ends up producing information at low prices. Data can also be used to constitute non-rival shared goods. Their value is therefore more than transitive (the whole is worth more than the sum of the parts). And at the same time, data is "more" than raw material or energy. Data becomes imperceptible at the same time that it represents the container and the content of the digital revolution. Data becomes the new code at the heart of the Internet machine, the flow from which all other applications get nourished, the principle of organization and regulation of the digital. Data simultaneously combines meaning, reason, imagination and even aesthetics, in a fluid and manageable format".

Personal health information is at the heart of the strategies of various actors involved in creating and/or capturing value. Beyond the ethical and legal issues surrounding the protection of personal health information, digital technology is seen as a means of moving from a curative perspective to a preventive paradigm, under reserve of the support of customers for the incorporation of these new technologies. The early identification of certain diseases would reduce the cost of associated medical treatments. This is the reason why information collected in advance is the object of such enthusiasm today.

9.3.4. *The intensification of inter-firm collaborative practices in the e-health ecosystem*

Most of the actors involved in e-health do not control all of the activities in the value chain discussed above nor do they have all the resources and skills required. As a consequence, it is necessary for them to develop partnerships and collaborations, especially in the area of technology for large diversified groups and pure players. These trends are already observable nowadays.

– *Insurance and mutual health insurance companies* partially finance the healthcare system in France and their main objective is to collect a large

number of data concerning patients in order to prevent potential losses and to be able to adjust their insurance primes accordingly. The development of connected objects would allow them to set tariffs according to the (more or less) risky behavior of the insured. This would encourage the use of "*pay how you behave*": paying according to behavior not only in the health field, but also in everyday life. From this perspective, the core business of insurance history could evolve from "regulator" insurer to "protective" insurer. Prevention offers in the area of insurance contracts based on connected objects are beginning to emerge in the market. Finally, in the battle over information, insurance companies and mutual societies will be obliged either to invest in start-ups or associate with firms specializing in technology in order to avoid any risk of disintermediation or uberization [DAI 17].

Insurance company	Growth modalities
AXA	Axa – Withings cooperation Axa launched a complementary insurance health offer including a connected object: the O2 Withings activity tracker (a tracker that controls activity and sleep, as well as vital signs. This helps the user to improve their general health condition). Withings offers a broad scope of connected objects in the field of health and well-being.
CNP Assurances	CNP Assurances – Lyfe – MonDocteur.fr cooperation In 2015 CNP Assurances launched a digital platform of services in the field of health (Lyfe) accessible at all times. In July 2016, an agreement was signed with MonDocteur.fr, the first French website for medical appointments. With 6000 medical offices including 60 medical and paramedical specialities in the directory of 550 French villages, the MonDocteur.fr website monthly manages more than 1.5 million medical appointments.
La MAIF	Participation share La Maif became the first shareholder of Numa (*start-up* accelerator) with an investment of 3 million Euros.

Table 9.3. *Growth modalities of insurance companies in the field of e-health: between cooperation and external growth (participation share)*

– *Assistants* (or supporting companies) position themselves in the area of complementary services offered: call center platforms could take over from alerts initiated by a connected object. Supporting companies envision themselves as trusted third parties who could reassure end-users. Decades of

assisting and repatriating people led companies at the heart of this historical profession to collect information and sensitive health data while guaranteeing confidentiality. Their call platforms have already been confronted with the stress of handling emergency calls in large numbers. This confirms that they are potentially able to handle information coming from connected objects. Support companies favor co-development partnerships with insurance companies.

– *Telecommunication operators* are also "stakeholders" in the development of e-health, particularly through the Internet of Things (IoT). They develop cloud platforms and machine-to-machine (M2M) telecommunication networks which are in charge of communicating connected objects with Internet infrastructures (smartphones, servers, data centers, cloud, etc.) that exploit the information. This procedure will also encourage future partnerships. The example of the mobile network operator Orange is particularly significant in this collaborative approach.

Orange Healthcare is a subsidiary of Orange Business Services and has recently set up a network of infrastructure and connected services which acts as an interface with healthcare professionals and home-based care personal services for patients in a situation of dependency. In order to meet this purpose, Orange Healthcare has developed a cloud platform that makes it possible to collect, analyze and host well-being related information. All of the customers can independently manage connected objects.

The key issue for this modality to perform remains the connectivity to the Internet. In order to solve this issue, in addition to its cellular networks, Orange has invested in a Low Power Wide Area (LPWA) network based on LoRa (Long Range) technology, which guarantees low consumption connectivity at a low cost, thus anticipating the development of the IoT.

As far as collaboration with other players is concerned, Orange is already very involved in this strategy. The last major agreement was signed in April 2016 with Harmonie Mutuelle (the first health mutual in France), extending the collaboration that had already started in 2013. This exclusive innovation partnership engages the firms to implement and innovative experiments and e-health projects for a sum of up to 1.2 million euros. The aim is to develop common services for their members and customers. These include promoting access to care for all and improving the quality of home-life for the isolated or the sick.

Box 9.1. *Orange's strategy in the field of e-health*

– The strategy of *Giant Internet (*GAFA) or *over-the-top (*OTT*) entrants* for entering this sector consists of manipulating health data management (platform) and self-quantified via connected objects (iWatch) or sensors integrated into smartphones. In 2014, Apple proceeded with the creation of a HealthBook that centralized all health-related data (blood pressure, heart rate, biological parameters or blood glucose). More broadly, Apple tries to position itself as a platform, an aggregator of content and thus facilitate the journey of the user of connected objects (health and/or well-being).

Google has also launched a number of applications dedicated to e-health, and this performed with varying degrees of success. In 2007, Google created Google Health, but this application failed in 2012. As a response to Apple, Google then launched Google Fit, an e-health platform that arrived in the markets in 2014. A smartphone or a connected bracelet are the means for getting access to the application. All personal data is collected and can be viewed in the form of graphics.

Web players will probably need to develop partnerships with drug and equipment manufacturers, healthcare providers and healthcare organizations (payers).

– *Platforms for collecting, hosting and managing data* (from connected objects and sensors). The growth of the IoT will severely depend on this type of technology because the use of a single platform will help to overcome the challenge of interoperability between different standards. What should the nature of the platform be like: unique, open, closed, with a declared owner? Many players are positioning themselves, either by developing their own platform, or by associating themselves with actors who master these technologies. Platforms hosting health-related data have to confront strict regulations from some countries. This is delaying their implementation and integration into pathways of coordinated care for the sick. For example, France is a clear case illustrating this problem.

As we have seen, there are numerous actors involved in e-health activities, which means that they are undoubtedly part of a business ecosystem whose outlines are not definitively drawn. Until now, the technological, economic and financial stakes are considerable not only for all the firms involved, but also for paying healthcare organizations and healthcare professionals. E-health also refers to other issues related to the improvement of the care path and placing the patient at the center of the system.

9.4. Consoles and the video-gaming industry

The video game sector (consoles and games) is a pillar of the entertainment industry, including not only hobbies, but mostly cinema. The industry has to deal with high network externalities, a lock-in phenomenon, increasing technological complexity because consoles are subjected to cycles, a structural upward tendency in the costs for developing games, and the predominant weight of strategic marketing [DAI 17]. This trend could be observed from the beginning of the 2000s by major events: the arrival of Microsoft in 2001 to the consoles segment, a growing interest of game publishers for other platforms, the emergence of new media as well as the unstoppable development of online gaming. All these elements contributed to a fundamental impact on the value chain and the strategy of the actors already in place.

9.4.1. *A highly competitive oligopolic market*

We are now witnessing the globalization of the video game market as well as its highly competitive character.

Ever since the year 1973, when Atari launched its first console (USA), the market saw various phases alternating between quasi-monopoly, duopoly and oligopoly:

– 1973-1983: quasi-monopoly of Atari;

– 1983-1986: quasi-monopoly of Nintendo;

– 1986-1994: Sega-Nintendo duopoly;

– from 1995 onwards: oligopoly with the arrival of Sony (PlayStation), Nintendo (N64 launched in 1996) and Sega (Saturn). From 1998, release of new consoles: launch by Sega of the Dreamcast (1998), by Sony of the PS2 (2000), by Nintendo of the Game Boy Advance (2001);

– 2001: this was a pivotal year in the evolution of market structures, not only because of the withdrawal of Sega from the consoles market in 2001 (The Dreamcast did not have the expected success) but also because of the arrival of Microsoft with the Xbox. At the same time, Nintendo launched the Gamecube.

Nowadays, the market is dominated by three major players: Microsoft, Nintendo and Sony.

9.4.1.1. *Nintendo or the strategy of a pure player*

Hiroshi Yamauchi is known both as the historical CEO and iconic figure of Nintendo. This entrepreneur largely contributed to the success of the firm by focusing on R&D activities. The arrival of Satoru Iwata to Nintendo in 2002 created a new dynamic based on reorganization of activities.

Known in particular for its portable consoles, Nintendo achieved considerable success in the 1990s as has been shown by the popularity of this form of entertainment in the younger audience. In 2006, the group decided to launch a new model console, the Wii, and thus adopted a different position from its competitors:

– an expanded target for players aged 7-77 and women;

– a console that is more "playful" than technically efficient. As a console, the Wii is less sophisticated than the PS3 and the Xbox 360. It does not include a DVD player and does not have very powerful processors. Its chip is limited to 750 MHz while that of its rivals reaches 3.2 GHz. From a technological point of view, Nintendo made a strategic decision expecting that the originality of the Wii would compensate for the slightest graphic quality among the general public. However, compared to its competitors, the Wii's gameplay advances were incontestable (Box 9.2). Nintendo also capitalized on the success of games like EyeToy (Sony). As history later showed, the success of the Wii was immediate and sales exploded. Nintendo also announced that unlike its competitors, the Wii was not sold at a loss.

There are numerous accessories for playing with the Wii:

– handle in the form of remote control equipped with motion detectors. Depending on the game, the player can manipulate the controller like a sword, a revolver, a tennis racket and so on. These controllers reveal new sensations to the player;

– Wii Balance Board: a "scale" which makes it possible to control characters or objects and which reacts according to the weight felt under one foot or under the other. This equipment is associated with a set of Wii Fit games including simulations of ski jumps, yoga classes, etc.;

– a steering wheel: by inserting the handle of the Wii with recognition of movements to the rest of the device, racing car simulations become more "real".

Box 9.2. *A simplified explanation of the Wii's ludic character*

In November 2012, Nintendo tried to renew the considerable success of the Wii by launching the Wii U. Nevertheless, the results were far below expectations. The Wii U sold a limited number of units in comparison to the Wii. So far, Nintendo has not decided the fate of the Wii U. The launch of a new generation of consoles under the name Switch was expected for March 2017.

9.4.1.2. *Sony: a long-standing unrivalled leader*

Sony's strategy in this business area dates back to the early 1990s after significant investment. The firm finally entered the market in 1994 with the succesful introduction of the PlayStation. The launch of this console followed the failure of its collaboration with Nintendo in the early 1990s when they had attempted to create a CD-ROM driver for Super NES. Its involvement in the video game industry was reflected in the creation of a subsidiary known as Sony Computer Entertainment (SCE), which held the manufacturing rights for the PlayStation and its video games, as well as for managing third-party publishers. Consoles and video games quickly became a strategic business unit (SBU). The success of the entire Playstation range contributed to making SCE a heavyweight in the market with the unparalleled success of the PlayStation 2, which, until the beginning of 2013, held the world record for console sales.

9.4.1.3. *Microsoft: an important rival*

From the moment it entered the console market, Microsoft made quick progress despite difficult beginnings: the Xbox was largely out distanced by the PS2. With the Xbox 360, and Xbox One starting in 2013, Microsoft became a dangerous competitor to Sony and achieved undeniable sales performances. The sales of the PS3 and Xbox 360 can be compared by taking a look at Table 9.4. The success was mainly due to competitive pricing policy for consoles. This choice allowed the firm to gradually attract a larger number of consumers while increasing its profits with the sale of the games. The figures in Table 9.4 show the commercial performance of various consoles and the distribution of market shares of the three players. After having produced it for 11 relentless years, Bill Gates announced the end of production for the Xbox 360 in April 2016.

Ranking	Consoles	United States	Europe	Japan	Rest of the world	Global market
1	PlayStation 2 (PS2)	53.65	55.28	23.18	25.57	157.68
2	Nintendo DS (DS)	57.37	52.07	33.01	12.43	154.88
3	Game Boy (GB)	43.18	40.05	32.47	2.99	118.69
4	PlayStation (PS)	38.94	36.91	19.36	9.04	104.25
5	Wii (Wii)	45.38	33.75	12.77	9.28	101.18
6	**PlayStation 3 (PS3)**	**29.30**	**34.34**	**10.41**	**12.35**	**86.40**
7	**Xbox 360 (X360)**	**48.88**	**25.79**	**1.66**	**9.12**	**85.45**
8	Game Boy Advance	40.39	21.31	16.96	2.85	81.51
9	PlayStation Portable (PSP)	21.41	24.14	20.01	15.26	80.82
13	PlayStation 4 (PS4)	14.82	15.83	2.61	6.55	39.81
17	Xbox (XB)	15.77	7.17	0.53	1.18	24.65
18	GameCube (GC)	12.55	4.44	4.04	0.71	21.74
19	Xbox One (XOne)	12.85	5.45	0.07	2.35	20.72
21	Wii U (Wii U)	5.89	3.13	3.12	0.84	12.98
(Total of cumulated sales since launch, in millions of units)						

Table 9.4. *Total worldwide sales per platform (main video games consoles) (VGChartz, April 2016)*

With regard to the positioning of the three players in the "new generation of consoles" market, Sony continues leading the sales with its PS4, far ahead of Microsoft and Nintendo. The sales of the PS4 exceeded even those of the Xbox One and the Wii U considered together. It may be that a part of Sony's strategy relies on a non-zoned platform which does not require a mandatory Internet connection.

9.4.2. *Numerous alliances between console manufacturers and video-game publishers*

In spite of overwhelming competition, consoles manufacturers are also engaged in "exclusive" partnerships with video game publishers (Box 9.3). This can be inferred from the fact that some games are exclusively dedicated to a console because exclusiveness may be temporary. Publishers engage in the production phase, take charge of the financing, manufacturing and marketing of the games. Among its many functions, the editor will select the titles to publish, finance the development of these titles, adapt the game for each of the broadcasting countries, ensure the production of the games, manage the distribution, and organize its marketing strategy.

Publishers are often large structures, sometimes with subsidiaries in several countries, but do not benefit from the plurality of distribution modes that exist in other sectors because this could make them vulnerable. Market dynamics based on innovation may weaken publishers because these cannot rely on a cumulative fleet nor on the creation of catalogs to cushion investments that are being challenged every six years, approximately when a new generation of consoles is launched. Nowadays, the costs of manufacturing games are increasing. This means that publishers seeking to minimize costs have to increasingly implement multi-platforms. As a consequence, publishers rely heavily on a limited number of very expensive titles.

Interdependence links between consoles and gaming software were described by the French Council on Competition, in a public decision under the number 07-D-06, dating from February 28, 2007. This regulation concerns practices implemented in the game consoles sector as well as the video games industry: "[...] Game software is marketed independently of consoles, but the links between the two products provided the game consoles market with the features of a two-sided market: Console manufacturers offer a platform whose value in the eyes of consumers depends on the richness of the catalog of games available for the console in question, while the value of the console in the eyes of the game developers depends on the market share among consumers. These interdependencies are a source of network effects. Thus, video game publishers seek to create products for the most popular game consoles among consumers. In the same way, end consumers tend to be more appreciative of game consoles that offer the most complete software selection."

Box 9.3. *Interdependence links between console manufacturers and video game publishers (French Council on Competition, 2015)*

Beyond the question of exclusivity, games obey two other logics: franchises and licenses. The press often assimilates these commercial transactions to agreements (Table 9.5 and Chapter 1). Franchises are fundamental to gaining a competitive advantage for publishers. Indeed, it is mostly the latter who negotiate with franchise manufacturers for the edition of new episodes (in the same way that it occurs with successful films that give rise to successive versions). These franchises allow publishers to retain exclusive rights.

	Mergers/acquisitions	**Partnerships/alliances**
Console manufacturers		
Microsoft	2002: Rareware acquisition 2002: Failure to acquire Sega and Squaresoft 2006: Lionhead Studios acquisition 2006: Massive acquisition	2002: agreement with Lionhead (Halo) 2002: agreement with Tecmo (DOA 3, DOA X, Ninja Gaiden) 2004: agreement with Electronic Arts* 2006?: partnership with Atari, Activision, Namco 2006: agreement with RealTime Worlds
Sony	2005: SN Systems acquisition (development tools) after almost a 10-year collaboration 2005: acquisition of Guerilla Games developer (Killzone) 2006: acquisition of Zipper Interactive developer (SOCOM: U.S. Navy SEALS) after a cooperation phase of 6 years	Agreements over different technologies (engines, etc.) integrated in the PS3**Development Kit 2005: signed agreement with Epic games who developed Unreal 3 technology, used in game engines 2005: agreement with Havok 2005: agreement with AGEIA Technologies 2007: global partnership with FIFA (from 1-01-2007 until 31-12-2014)

* This agreement can be considered historical in that Electronic Arts (EA) had long exclusively worked for Sony.

** These agreements refer to new development tools (and/or technologies) provided by console manufacturers and integrated in the development kits dedicated to each console, which are "at the disposal" of editors-developers.

Table 9.5. *Microsoft and Sony's main external growth operations and partnerships for the period 2000–2007*

Early 2010 was also an important year because of the various partnerships that took place between manufacturers and editors of video games. An emblematic example is the alliance signed in 2015 between Nintendo and Activision rivals on the market for children's video games with figurines.

9.4.2.1. *Still limited alliances between all the actors in the sector*

So far, emphasis has been placed on the links between the game console manufacturers and publishers. However, we must bear in mind that other actors also play a role in this sector. For example, this is the case with development studios, which are devoted to creating games. In general, these are small businesses who design the game and create a master that is sold to the publisher. Until the mid-1990s, the creation (or development) of games was mainly done by teams integrated within publishing companies. Nowadays, development studios have become more autonomous giving rise to other problems associated with the nature of their subcontracting mission.

Along with these three main categories of players in video games, we should add:

– during the upstream phase: manufacturers of electronic components which are necessary for manufacturing and operating games and consoles. Issues in this area are becoming increasingly important (see section 9.4.2.2);

– on the downstream end: manufacturers of various accessories, retail trade (dedicated retailers and mass retailers) as well as specialized media.

At the end of the 2000s, IDATE highlighted the need to encourage industrial cooperation and open standardization in favor of innovation. Achieving this objective included interoperability, open standards and the use of open source software:

> "Developing activities in a more open and better shared standard environment remains a fundamental question, which must aim at the progressive shift from technological competitiveness for content developers, towards creative and innovative competitiveness […]

These are the actions that should be taken next:

– The cooperative development of tools, software and platforms such as middlewares, which rely on interoperable and/or open and community-based international standards.

– The development of collective actions at the European level in view of promoting or enhancing technological growth that favors diversity, innovation and creation in an environment for equipment and software that is as open as possible. We should revisit the hypothesis of an emerging "European equipment manufacturer", which could act as a catalyst for a global industrial movement with knowledge of the complexity of the stakes and strategy of each of the actors involved.

– The development of tools common to all players in the innovation synergy (competitiveness clusters, local productive systems, professional and institutional networks, service providers in networking and intermediation between actors, new cooperative practices within the company, etc.)" [IDA 07].

9.4.2.2. *The evidence of coopetitive practices?*

There are no strategic partnerships between console manufacturers. Despite this, apart from their independent activities, Sony and Microsoft have forged links with the same suppliers (IBM and Toshiba) in view of developing different products (and/or technologies). This led to the emergence of "coopetition" between the firms. From the year 2000, Sony was involved in an alliance with IBM[2] and Toshiba to produce the Cell[3] microprocessor (integrated in the PS3), but at the same time Sony embarked on the battle of DVD players in high definition against Toshiba, who was then involved in an alliance with Microsoft. Sony has successfully defended its Blu-Ray format (integrated in the PS3) against the HD-DVD, which was offered as an option with the Xbox 360 (Figure 9.2).

2 IBM equally cooperates with the chips (architectured around the Power PC) devoted to the XBox 360 and the Wii.

3 The very powerful microprocessor Cell was not devoted to the PS3, but had to be integrated in other equipment (phone, TV set).

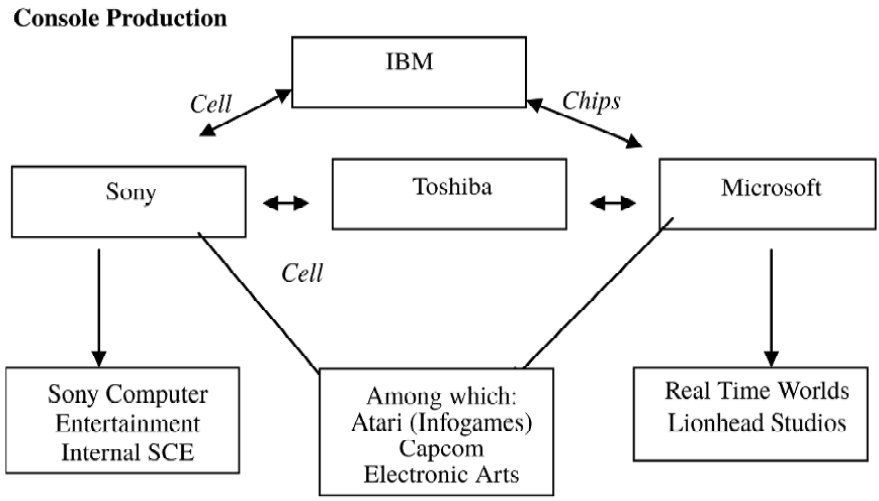

Figure 9.2. *Relations between the main actors in video games [DAI 07, DAI 08a]*

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CORSI Patrick *et al.*
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Bibliography

[ADL 91] ADLER N.J., *International Dimensions of Organisational Behaviour*, 2nd ed., PWS-Kent Publishing Company, Boston, 1991.

[AFU 00] AFUAH A., TUCCI C.L., *Internet Business Models and Strategies: Text and Cases*, Irwin/McGraw-Hill, New York, 2000.

[AGA 92] AGARWAL S., RAMASWAMI S.N., "Choice of foreign market entry mode: impact of ownership location and internalization factors", *Journal of International Business Studies*, vol. 23, no. 1, pp. 1–27, 1992.

[AKE 70] AKERLOF G.-A., "The market for "Lemons": quality, uncertainty and the market mechanism", *Quarterly Journal of Economics*, vol. 84, pp. 488–500, 1970.

[ALB 99] ALBERT S., "E-commerce revitalizes co-opetition", *Computerworld*, vol. 33, no. 15, p. 36, 1999.

[ALC 72] ALCHIAN A., DEMSETZ H., "Production, information costs and economic organization", *American Economic Review*, vol. 62, no. 5, pp. 777–795, 1972.

[AMI 92] AMIN A., THRIFT N., "Neo-Marshallian nodes in global networks", *International Journal of Urban and Regional Research*, vol. 16, no. 4, pp. 571–587, 1992.

[AMI 93] AMIT R., SCHOEMAKER P., "Strategic Assets and Organizational Rent", *Strategic Management Journal*, vol. 14, no. 1, pp. 32–46, 1993.

[AMI 99] AMIN A., "An institutionalist perspective on regional economic development", *International Journal of Urban and Regional Research*, vol. 23, no. 2, pp. 365–378. 1999.

Cooperation, Coopetition and Innovation, First Edition. Nabyla Daidj.

[AMI 01] AMIT R., ZOTT C., "Value Creation in e-Business", *Strategic Management Journal*, vol. 22, nos. 6/7, pp. 493–520, 2001.

[AND 86] ANDERSON E., GATIGNON H., "Modes of Foreign Entry: A Transaction Cost Analysis and Propositions", *Journal of International Business Studies*, vol. 17, no. 3, pp. 1–26, 1986.

[AND 93] ANDERSEN O., "On the Internationalization Process of Firms: A Critical Analysis", *Journal of International Business Studies*, vol. 24, no. 2, pp. 209–231, 1993.

[AND 04] ANDERSON C., "The Long Tail", *Wired*, October, 2004.

[ANS 65] ANSOFF H., *Corporate Strategy*, McGraw-Hill, New York, 1965 (French translation: *Stratégie du développement de l'entreprise*, Hommes et Techniques, Paris, 1971).

[AOK 88] AOKI M., *Information, Incentives and Bargaining in the Japanese Economy*, Cambridge University Press, Cambridge, 1988.

[ARG 92] ARGAWAL S., RAMASWAMI S.-N., "Choice of foreign market entry: impact of ownership, location and internalization factors", *Journal of International Business Studies*, vol. 23, no. 1, pp. 1–27, 1992.

[ARL 87] ARLANDIS J., "De l'alliance stratégique à la stratégie d'alliance", *Revue d'économie industrielle*, vol. 39, no. 1, pp. 228–243, 1987.

[ARR 71] ARROW K., *Essays in the Theory of Risk*, North Holland Publishing, Amsterdam, 1971.

[ARR 96] ARRÈGLE J.-L., "Analyse resource based et identification des actifs stratégiques", *Revue française de gestion*, no. 108, pp. 25–36, March–May 1996.

[ARR 00] ARRÈGLE J.-L., QUELIN B., *Le management stratégique des compétences*, Ellipses, Paris, 2000.

[ARR 01] ARRÈGLE J.-L., QUELIN B., "Les approches basées sur les ressources", in MARTINET A.C, THIÉTART R.-A. (eds), *Stratégie: actualités et futur de la recherche*, Vuibert, Paris, 2001.

[ARS 08] ARSENAULT A.H., CASTELLS M., "The structure and Dynamics of Global Multi-Media Business Networks", *International Journal of Communication*, vol. 2, no. 1, pp. 707–748, 2008.

[ASK 06] ASKTAS N., DE BODT E., LIAGRE L., "Le décollage d'EADS: le point de vue des marchés financiers", *Finance Contrôle Stratégie*, vol. 9, no. 5, pp. 5–34, 2006.

[ASS 13] ASSEMBLÉE NATIONALE, Commission des Affaires économiques, Audition ouverte à la presse de M. Marwan Lahoud, président d'EADS France et directeur général délégué du groupe EADS, report no. 9, 16 October 2013.

[AXE 92] AXELSSON B., EASTON G., *Industrial Networks: A New View of the Reality*, Routledge, London, 1992.

[AYD 88] AYDALOT PH., KEEBLE D. (eds), *High Technology Industries and Innovative Environments: the European Experience*, Routledge, London, 1988.

[BAD 91] BADARACCO J.-L.Jr., *The Knowledge Link: How Firms Compete through Strategic Alliances*, Harvard Business School Press, Boston, 1991.

[BAG 01] BAGSHAW M., BAGSHAW C., "Coopetition applied to training – a case study", *Industrial and Commercial Training*, vol. 33, no. 5, pp. 175–177, 2001.

[BAI 59] BAIN J.S., *Industrial Organization: A Treatise*, John Wiley, 1959.

[BAL 00] BALDWIN C., CLARK K.-B., *Design Rules: The Power of Modularity*, MIT Press, Cambridge, 2000.

[BAL 09] BALDWIN C., WOODWARD C., "The architecture of platforms: a unified view", in GAWER A. (eds), *Platforms, Markets and Innovation*, Edward Elgar Publishing Limited, Cheltenham, 2009.

[BAN 89] BANVILLE (DE) E., "Le développement du partenariat industriel", *Revue d'économie industrielle*, vol. 47, pp. 125–136, 1989.

[BAR 82] BARRAEYRE P.-U., BOUCHE M., "Pour une meilleure compétitivité fondée sur la solidarité intra-enterprises: les politiques d'impartition", *Revue française de gestion*, pp. 8–17, September–October 1982.

[BAR 86] BARNEY J.-B., OUCHI W. (eds), *Organizational Economics*, Jossey-Bass, San Francisco, 1986.

[BAR 91] BARNEY J.-B., "Firm resources and sustained competitive advantage", *Journal of Management*, vol. 17, no. 1, pp. 99–120, 1991.

[BAR 96] BARKEMA H.G., BELL J.H., PENNINGS J.M., "Foreign entry, cultural barriers and learning", *Strategic Management Journal*, vol. 17, no. 2, pp. 151–66. 1996.

[BAR 01a] BARNEY J.-B., "Is the resource-based view a useful perspective for strategic management research? Yes", *Academy of Management Review*, vol. 26, no. 1, pp. 41–56, 2001.

[BAR 01b] BARNEY J.-B., "Resource-based theories of competitive advantage: a ten-year retrospective on the resource-based view", *Journal of Management*, vol. 27, no. 6, pp. 643–650, 2001.

[BAR 10] BARRETO I., "Dynamic capabilities: a review of past research and an agenda for the future", *Journal of Management*, vol. 36, no. 1, pp. 256–280, 2010.

[BAU 91] BAUDRY B., "Une analyse économique des contrats de partenariat industriel: l'apport de l'économie des coûts de transaction", *Revue d'économie industrielle*, vol. 56, pp. 46–57, 1991.

[BAU 92] BAUDRY B., "Contrat, autorité et confiance: la relation de sous-traitance est-elle assimilable à la relation d'emploi?", *Revue économique*, vol. 43, no. 5, pp. 871–894, 1992.

[BEA 87] BEAMISH P., BANKS J., "Equity joint ventures and the theory of the multinational enterprise", *Journal of International Business Studies*, vol. 19, pp. 1–17, 1987.

[BEA 88] BEATH J., KATSOULACOS Y., ULPH D., "R&D Rivalry versus R& Cooperation under Uncertainty", *Recherches économiques de Louvain*, vol. 54, pp. 373–384, 1988.

[BEA 89] BEATH J., KATSOULACOS Y., ULPH D., "Strategic R&D and policy", *Economic Journal*, vol. 99, pp. 74–83, 1989.

[BEC 78] BECATTINI G., "The Economic Development of Tuscany: an Interpretation", *Economic Notes*, vols. 2–3, pp. 107–123, 1978.

[BEH 85] BEHRENS P., "The firm as a complex institution", *Zeitschrift für die gesamte Staatswissenschaft/Journal of Institutional and Theoretical Economics*, vol. 141, no. 1, pp. 62–75, 1985.

[BEN 92] BENKO G., LIPIETZ A., *Les régions qui gagnent. Districts et réseaux: les nouveaux paradigmes de la géographie économique*, PUF, Paris, 1992.

[BEN 99] BENGTSSON M., KOCK S., "Cooperation and competition in relationships between competitors in business networks", *Journal of Business and Industrial Marketing*, vol. 14, no. 3, pp. 178–194, 1999.

[BEN 03] BENGTSSON M., KOCK S., "Tension in Co-opetition", *Paper Presented at the 2003 Academy of Marketing Science Annual Conference*, Washington, DC, 28–31 May 2003.

[BHA 13] BHARADWAJ A., EL SAWY O.A., PAVLOU P.-A. *et al.*, "Digital business strategy: toward a next generation of insights", *MIS Quarterly*, vol. 37, no. 2, pp. 471–482, 2013.

[BIK 77] BILKEY W.J., TESAR G., "The Export Behavior of Smaller Sized Wisconsin Manufacturing Firms", *Journal of International Business Studies*, vol. 8, no. 1, pp. 93–98. 1977.

[BIN 15] BINCTIN N., Propriété intellectuelle et innovation: quels enjeux?, available at: http://www.lepetitjuriste.fr/propriete-intellectuelle/propriete-intellectuelle-et-innovation-quels-enjeux, 22 June 2015.

[BLA 06] BLANCHOT F., "Alliances et performances: un essai de synthèse", *Cahiers de recherche CREPA/DRM*, no. 1, Paris Dauphine University, January 2006.

[BLA 10] BLANC Y., "Le marché du satellite: un artisanat à haut risque", *Les Cahiers de l'ARCEP*, November 2010.

[BLA 11] BLANCHOT F., GUILLOUZO R., "La rupture des alliances stratégiques: une grille d'analyse", *Management International/International Management/Gestión Internacional*, vol. 15, no. 2, pp. 95–107, 2011.

[BLO 00] BLOM M.-H., SENNEQUIER N., "L'espace privatisé: les transitions originales au secteur privé de l'opération de satellites", *Annales des Mines*, pp. 10–15, 2000.

[BNP 13] BNP PARIBAS ATELIER, Les objets connectés, au centre d'un nouvel écosystème de santé?, Survey carried out by IFOP, December, p. 9, 2013.

[BON 90] BONACCORSI A., DALLI D., "Internationalization Process and Entry Channels: Evidence from Small Italian Exporters", in MUHLBACHER H., JOCHUM C. (eds), *Advanced Research in Marketing, Proceedings of the 19th Annual Conference of the European Marketing Academy*, Innsbruck, 1990.

[BOS 04] BOSCHMA R.A., "Competitiveness of regions from an evolutionary perspective", *Regional Studies*, vol. 38, no. 9, pp. 993–1006, 2004.

[BOU 88] BOURGEOIS L., EISENHARDT K., "Strategic decision processes in high velocity environments: four cases in the microcomputer industry", *Management Science*, vol. 34, no. 7, pp. 816–835, 1988.

[BOU 94] BOUVIER-PATRON P., "La dimension interentreprises de production dans le modèle "J" d'Aoki", *Revue d'économie politique*, vol. 104, no. 1, pp. 119–144, 1994.

[BOU 11] BOURCIER D., VAN ANDEL P., *La sérendipité, le hasard heureux*, Hermann, Paris, 2011.

[BRA 95] BRANDENBURGER A.-M., NALEBUFF B.-J., "The right game: use game theory to shape strategy", *Harvard Business Review*, July–August 1995.

[BRA 96] BRANDENBURGER A.-M., NALEBUFF B.-J., *Coopetition*, Currency/Doubleday, New York, 1996.

[BRA 97] BRANDENBURGER A.-M., NALEBUFF B.-J., "Coopetition: competitive and cooperative business strategies for the digital economy", *Strategy & Leadership*, vol. 25, no. 6, pp. 28–33, 1997.

[BRI 87] BRICKLEY J.-A., DARK F-.H., "The choice of organisational form: the case of franchising", *Journal of Financial Economics*, vol. 18, pp. 401–420, 1987.

[BRO 89] BROUSSEAU E., "L'approche néo-institutionnelle de l'économie des coûts de transaction", *Revue française d'économie*, vol. 4, pp. 123–166, 1989.

[BRO 93] BROUSSEAU E., "Les théories de contrats: une revue", *Revue d'économie politique*, vol. 103, no. 1, pp. 1–82, January–February 1993.

[BRO 96] BROUTHERS K.-D., BROUTHERS L.E., WERNER S., "Dunning's Eclectic Theory and the Smaller Firm: the Impact of Ownership and Locational Advantages on the Choice of Entry-modes in the Computer Software Industry", *International Business Review*, vol. 5, no. 4, pp. 377–394, 1996.

[BRO 01] BROUTHERS K.-D., BROUTHERS L.-E., "Explaining the national cultural distance paradox", *Journal of International Business Studies*, vol. 32, no. 1, pp. 177–189, 2001.

[BRO 07] BROUSSEAU E., PENARD T., "The economics of digital business models: a framework for analyzing the economics of platforms", *Review of Network Economics*, vol. 6, no. 2, pp. 81–114, 2007.

[BRO 09] BROUSSEAU E., PENARD T., "Assembling platforms: strategy and competition", in MADDEN G., COOPER R. (eds), *The Economics of Digital Markets*, Edward Elgar Publishing, Cheltenham, pp. 13–26, 2009.

[BUC 85] BUCKLEY P.J., CASSON M.C., *The Economic Theory of the Multinational Enterprise*, Macmillan, London, 1985.

[BUC 88] BUCKLEY P.J., CASSON M., "A theory of cooperation in international business", in CONTRACTOR F., LORANGE P. (eds), *Cooperative Strategies in International Business*, Lexington Books, Rowan & Littlefield, Lanham, 1988.

[BUC 90] BUCKLEY P.J., PASS C.L., PRESCOTT K., "Foreign Market Servicing by Multinationals: An Integrated Approach", *International Marketing Review*, vol. 7, no. 4, pp. 25–40, 1990.

[CAH 93] CAHUC P., *La nouvelle microéconomie*, La Découverte, Paris, 1993.

[CAI 89] CAINARCA G.-C., COOMBO M.-G., MARIOTTI S., "The case of flexible automation", *Research Policy*, vol. 18, no. 2, pp. 59–86, 1989.

[CAL 95] CALOF J.L., BEAMISH P.W., "Adapting to foreign markets: explaining internationalization", *International Business Review*, vol. 4, no. 2, pp. 115–131, 1995.

[CAM 95] CAMAGNI R., "Global Networks and Local Milieu: Towards a Theory of Economic Space", in CONTI S., MALECKI E., OINAS P. (eds), *The Industrial Enterprise and Its Environment: Spatial Perspectives*, Aldershot, Ashgate, 1995.

[CAR 91] CARNEY M., GEDAJLOVIC E., "Vertical integration in franchise systems: agency theory and resource explanations", *Strategic Management Journal*, vol. 12, pp. 607–629, 1991.

[CAR 14] CARPENTER M., DAIDJ N., MORENO C., "Game console manufacturers: the end of sustainable competitive advantage?", *Digiworld Economic Journal*, vol. 1, no. 94, pp. 39–60, 2014.

[CAV 74] CAVES R.E., "Multinational Firms, Competition, and Productivity in Host-Country Markets", *Economica*, vol. 41, pp. 176–193, 1974.

[CAV 80] CAVUSGIL S.T., "On the Internationalization Process of Firms", *European Research*, vol. 8, no. 6, pp. 273–281, 1980.

[CHA 62] CHANDLER A.-D., *Strategy and Structure*, MIT Press, Cambridge, MA, 1962.

[CHA 87] CHARREAUX G., "La théorie positive de l'agence: une synthèse de la littérature", in CHARREAUX G., COURET A. (eds), *De nouvelles théories pour gérer l'entreprise*, Economica, Paris, 1987.

[CHA 88] CHANDLER A.-D., "The development of modern management structure in the US and UK", in MCGRAW T.K. (ed.), *The Essential Alfred Chandler: Essays Toward an Historical Theory of Big Business*, Harvard University Press, Cambridge, 1988.

[CHA 13] CHALLENGES, "Comment Astrium réagit à la baisse mondiale des commandes de satellites, available at: http://www.challenges.fr/entreprise/comment-astrium-reagit-a-la baisse-mondiale-des-commandes-de-satellites_8639, 2013.

[CHE 88] CHESNAIS F., "Les accords de coopération technique entre firmes indépendantes", *STI Revue*, no. 4, OECD, Paris, pp. 97–148, 1988.

[CHE 99] CHEN R., LI M., "Strategic alliances and new product development: an empirical study of the US semiconductor start-up firms", *Advances in Competitiveness Research*, vol. 7, no. 1, pp. 35–61, 1999.

[CHE 03a] CHESBROUGH H., "Open innovation: a new paradigm for understanding industrial innovation", in CHESBROUGH H. *et al.* (eds.), *Open Innovation: Researching a New Paradigm*, Oxford University Press, Oxford, 2006.

[CHE 03b] CHESBROUGH H., "The Era of open innovation", *Sloan Management Review*, vol. 44, no. 3, pp. 35–41, 2003.

[CHE 03c] CHESBROUGH H., *Open Innovation: The New Imperative for Creating and Profiting from Technology*, Harvard Business School Press, Harvard, 2003.

[CHE 03d] CHESBROUGH H., "The logic of open innovation: managing intellectual property", *California Management Review*, vol. 45, no. 3, pp. 33–58, 2003.

[CHE 06] CHESBROUGH H., VANHAVERBEKE W., WEST J., *Open Innovation: Researching a New Paradigm*, Oxford University Press, Oxford, 2006.

[CHE 07] CHESBROUGH H., APPLEYARD M., "Open innovation and strategy", *California Management Review*, vol. 50, no. 1, pp. 57–76, 2007.

[CHR 05] CHRISTENSEN J.-F., OLESEN M.-H., KJAER J.-S., "The industrial dynamics of open innovation: evidence from the transformation of consumer electronics", *Research Policy*, vol. 34, no. 10, pp. 1533–1549, 2005.

[CHU 02] CHUNG W., ALCÁCER J., "Knowledge Seeking and Location Choice of Foreign Direct Investment in the United States", *Management Science*, vol. 48, no. 12, pp.1534–1554, 2002.

[CIB 91] CIBORRA C., "Alliances as learning experiments: cooperation, competition and change in hightech industries", in MYTELKA L.K. (ed.), *Strategic Partnerships, States, Firms and International Competition*, Pinter Publishers, London, 1991.

[COA 37] COASE R., "The nature of the firm", *Economica*, vol. 4, pp. 386–405, 1937.

[COH 92] COHENDET P., HÉRAUD J.-A., ZUSCOVITCH E., "Apprentissage technologique, réseaux économiques et appropriabilité des innovations", in FREEMAN C., FORAY D. (eds), *Technologie et Richesse des Nations*, Economica, Paris, 1992.

[COL 92] COLLINS T.-M., DOORLEY T.-L., *Les alliances stratégiques,* InterEditions, Paris, 1992.

[COM 93] COMBE E., FAYOLLE J., MILEWSKI F., "La politique industrielle communautaire", *Observations et diagnostics économiques*, *Revue de l'OFCE*, vol. 43, pp. 399–454, January 1993.

[CON 88] CONTRACTOR F., LORANGE P., *Cooperative Strategies in International Business*, Lexington Books, Rowan & Littlefield, Lanham, 1988.

[COO 00] COOKE P., BOEKHOLT P., TÖDTLING F., *The Governance of Innovation in Europe. Regional perspectives on Global Competitiveness*, Pinter, London, 2000.

[COU 92] COURLET C., PECQUEUR B., "Les systèmes industriels localisés en France: un nouveau modèle de développement", in BENKO G., LIPIETZ A. (eds), *Les régions qui gagnent. Districts et réseaux: les nouveaux paradigmes de la géographie économique*, PUF, Paris, 1992.

[CRE 89] CREVOISIER O., MAILLAT D., Milieu, organisation et système de production territoriaux: vers une nouvelle théorie du développement spatial, dossier no. 24, IRER, Neuchâtel, 1989.

[CRI 00] CHRISTENSEN C.M., *The Innovator's Dilemma*, HarperCollins, New York, 2000.

[CRI 02] CRINGELY R.S., "A peaceful coexistence", *Info World*, vol. 24, no. 15, p. 12, 2002.

[CZI 82] CZINKOTA M., *Export Development Strategies: US Promotion Policies*, Praeger, New York, 1982.

[DAG 02] DAGNINO G.-B., PADULA G., "Coopetition strategy: a new kind of inter-firm dynamics for value creation", *Paper Presented at the Second European Academy of Management Annual Conference*, Stockholm, 9–11 May 2002.

[DAG 07] DAGNINO G.-B., PADULA G., "Untangling the rise of coopetition. the intrusion of competition in a cooperative game structure", *International Studies of Management & Organization*, vol. 37, no. 2, pp. 32–52, 2007.

[DAG 08] DAGNINO G.-B., YAMI S., LE ROY F. *et al*, "Strategie Koopetycji – Nowa Forma Dynamiki Międzyorganizacyjnej?", *Przegląd organizacji*, vol. 6, pp. 3–7, 2008.

[DAI 07] DAIDJ N., HAMMOUDI A., *Le management stratégique par la théorie des jeux. Une introduction*, Hermès Science-Lavoisier, Paris, 2007.

[DAI 08] DAIDJ N., "How does co-opetition change according to industry evolution? The case of video games consoles sector", *3rd Workshop on 'Coopetition' Strategy – Stretching the Boundaries of 'Coopetition' (EIASM)*, Madrid, Spain, February 7–8, 2008.

[DAI 09] DAIDJ N., ISCKIA T., "Entering the economic models of game console manufacturers", *Communications & Strategies*, vol. 73, pp. 23–42, 2009.

[DAI 10a] DAIDJ N., "De l'évolution des formes d'organisation en réseau: des clusters aux écosystèmes d'affaires", *Une revue de la littérature*, *XIX^e conférence internationale de management stratégique*, Luxembourg, 2–4 June 2010.

[DAI 10b] DAIDJ N., "Territoires, industries et mutations des organisations en réseau", *Colloque international: Penser l'industrie autrement,* ISERAM (ISEG), Paris, 25 March 2010.

[DAI 10c] DAIDJ N., ENSMINGER J., Nortel: chronique d'une mort annoncée, Case style no. G1695, Centrale de cas et de médias pédagogiques, Paris, 2010.

[DAI 10d] DAIDJ N., GRAZIA C., HAMMOUDI A., "Introduction to the non-cooperative approach to forming coalitions: the case of the Blu-Ray/HD-DVD standards' war", *Journal of Media Economics*, vol. 23, no. 4, pp. 192–215, 2010.

[DAI 11a] DAIDJ N., "Media Convergence and Business Ecosystems", *Global Media Journal*, no. 11, vol. 19, pp. 1–12, 2011.

[DAI 11b] DAIDJ N., "Les écosystèmes d'affaires : une nouvelle forme d'organisation en réseau", *Revue Management et Avenir*, vol. 46, no. 6, pp. 105–130, 2011.

[DAI 15a] DAIDJ N., "Internationalisation, gestion des risques et compliance. Le cas d'Airbus Group", *Case study* no. *G1872*, Centrale de cas et de médias pédagogiques, Paris, May 2015.

[DAI 15b] DAIDJ N., *Developing Strategic Business Models and Competitive Advantage in the Digital Sector*, IGI Global, Hershey, 2015.

[DAI 16] DAIDJ N., SALAHALDIN L., "The impact of cognitive radio technology on mobile network operators' interorganizational networks and business models", *Journal of High Technology Management Research*, vol. 27, no. 2, pp. 101–214, 2016.

[DAI 17] DAIDJ N., "Uberization (or uberification) of the economy", in KHOSROW-POUR M. (ed.), *Encyclopedia of Information Science and Technology*, 4th ed., IGI Global, Hershey, 2017.

[DAM 07] DAAMEN B., HENNART J.-F., KIM D.-J. *et al.*, "Sources of and Responses to the Liability of Foreignness: The Case of Korean Companies in the Netherlands", *Global Economic Review*, vol. 36, no. 1, pp. 17–35, 2007.

[DAR 03] DARROCH J., "Knowledge management, innovation and firm performance", *Journal of Knowledge Management*, vol. 9, no. 3, pp. 101–115, 2003.

[DAS 80] DASGUPTA P., STIGLITZ J., "Industrial structure and the nature of innovative activity", *Economic Journal*, vol. 90, no. 358, pp. 266–93, 1980.

[DAS 83] D'ASPREMONT C., JACQUEMIN A., GABSZEWICZ J. *et al.*, "On the stability of collusive price leadership", *Canadian Journal of Economics*, vol. 16, pp. 17–25, 1983.

[DAS 88] D'ASPREMONT C., JACQUEMIN A., "Cooperative and noncooperative R&D in duopoly with spillovers", *American Economic Review*, vol. 78, pp. 1133–1137, 1988.

[DAS 90] D'ASPREMONT C., JACQUEMIN A., "Erratum", *American Economic Review*, vol. 80, pp. 641–642, 1990.

[DAV 71] DAVIS L., NORTH D.-C., SMORODIN C., *Institutional Change and American Economic Growth*, Cambridge University Press, Cambridge, 1971.

[DAV 94] D'AVENI R.-A., *Hypercompetition: Managing the Dynamics of Strategic Manoeuvring*, The Free Press, New York, 1994.

[DAV 98] DAVENPORT T.T.H, PRUSAK L., *Working Knowledge*, Harvard Business School Press, 1998.

[DAV 10] D'AVENI R.-A., DAGNINO G.-B., SMITH K.-G., "The age of temporary advantage", *Strategic Management Journal*, vol. 31, no. 13, pp. 1371–1385, 2010.

[DE 88] DE WOOT P., *Les entreprises de haute technologie et l'Europe*, Economica, Paris, 1988.

[DE 89a] DE MONTMORILLON B., "La croissance contractuelle", *Revue francaise de gestion*, vol. 77, pp. 97–106, 1989.

[DE 89b] DE MONTMORILLON B., "Vers une reformulation de la theorie du groupe", *Revue d'economie industrielle*, vol. 47, pp. 14–26, 1989.

[DEL 91a] DELAPIERRE M., "Les accords interentreprises, partage ou partenariat? Les stratégies des groupes européens du traitement de l'information", *Revue d'économie industrielle*, no. 55, pp. 135–161, 1991.

[DEL 91b] DELAPIERRE M., MICHALET C.-A., "Vers un changement des structures des multinationales: le principe d'internalisation en question", *Revue d'économie industrielle*, no. 47, pp. 27–43, 1991.

[DEL 01] DELIOS A., BEAMISH P.W., "Survival profitability: The roles of experience and intangible assets inforeign subsidiary performance", *Academy of Management Journal*, vol. 44, no. 5, pp. 1028–1038, 2001.

[DEM 67] DEMSETZ H., "Towards a theory of property rights", *American Economic Review*, vol. 57, no. 2, pp. 347–373, 1967.

[DI 06] DI GUARDO C.-M., GALVAGNO M., "The dynamic capabilities view of coopetition: the case of intel, apple and microsoft", *2nd EIASM Workshop on Coopetition*, Bocconi University, Milan, September 2006.

[DIE 09] DIENER K., PILLER F.-H., The market for open innovation increasing the efficiency and effectiveness of the innovation process, *Open Innovation Accelerator Survey 2009*, RWTH Aachen University, TIM Group, London, 2009.

[DIT 05] DITTER J.-G., "Clusters et terroirs: les systèmes productifs localisés dans la filière vinicole", *Reflets & Perspectives de la vie économique*, vd. XLIV, no. 4, 2005.

[DIX 82] DIXIT A., "Recent developments in oligopoly theory", *The American Economic Review*, vol. 72, no. 2, pp. 12–17, 1982.

[DIX 91] DIXIT A., NALEBUFF B., *Thinking Strategically. The Competitive Edge in Business, Politics and Everyday Life*, W.W. Norton, New York, 1991.

[DIX 99] DIXIT A., SKEATH S., *Games of Strategy*, W.W. Norton, New York, 1999.

[DOW 96] DOWLING M.J., ROERING W.D., CARLLIN B.A. *et al.*, "Multifaceted relationships under coopetition-description and theory", *Journal of Management Inquiry*, vol. 5, no. 2, pp. 155–167, 1996.

[DOZ 86] DOZ Y., HAMEL G., PRAHALAD C.-K., "Strategic partnerships: success or surrender? The challenge of competitive collaboration", *AIB-EIBA Joint Annual Meeting*, London, November 1986.

[DRU 54] DRUCKER P., *The Practice of Management*, Harper & Brothers, 1954.

[DUL 94] DUBELCCO P., "La coopération comme mécanisme de coordination temporelle", *Revue d'économie politique*, vol. 104, no. 4, pp. 517–537, 1994.

[DUM 12] DUMITRIU C., CAPDEVILA I., "L'entreprise multinationale à la croisée de la mondialisation et du management intercultural: comment relever le défi pose par la distance linguistique?", *Management et Avenir*, no. 55, pp. 103–124, July–August, 2012.

[DUN 77] DUNNING J.-H., "Trade, Location of Economic Activity and the MNE: A Search for an Eclectic Approach", in OHLIN B., HESSELBORN P.-O., WIJKMAN P.M. (eds), *The International Allocation of Economic Activity*, Macmillan, London, 1977.

[DUN 80] DUNNING J.-H., "Explaining changing patterns of international production: in defence of the eclectic theory", *Oxford Bulletin of Economics and Statistics*, vol. 41, no. 4, pp. 269–295, 1980.

[DUN 81] DUNNING J.-H., *International Production and the Multinational Enterprise*, Allen and Unwin, London, 1981.

[DUN 88] DUNNING J.-H., "The Eclectic Paradigm of International production: a Restatement and Some Possible Extensions", *Journal of International Business Studies*, vol. 19, no. 1, pp. 1–31, 1988.

[DUN 93a] DUNNING J.-H., *Multinational Enterprises and the Global Economy*, Addison Wesley, Wokingham, 1993.

[DUN 93b] DUNNING J.-H., *The Globalization of Business*, Routledge, London, 1993.

[DUN 97] DUNNING J.-H., *Alliance Capitalism and Global Business*, Routledge, London, 1997.

[DUN 02] DUNNING J.-H., MUCCHIELLI J.-L., *Multinational Firms, The Global-Local Dilemma*, Routledge, London, 2002.

[DUN 08] DUNNING J.-H., LUNDAN S., "Institutions and the OLI paradigm of the multinational enterprise", *Asia Pacific Journal of Management*, vol. 25, no. 4, pp. 573–593, 2008.

[DUS 88] DUSSAUGE P., RAMANANTSOA B., *Stratégies relationnelles et stratégies d'alliances: les partenaires technologiques*, McGraw-Hill, New York, pp. 149–167, 1988.

[DUS 90] DUSSAUGE P., "Les alliances stratégiques entre firmes concurrentes, le cas des industries aérospatiale et de l'armement", *Revue française de gestion*, vol. 80, pp. 5–16, September–October 1990.

[DUS 91] DUSSAUGE P., GARRETTE B., "Alliances stratégiques, mode d'emploi", *Revue française de gestion*, vol. 85, pp. 4–18, September–October 1991.

[DVO 06] DVORAK J.H., RAMSTAD E., "TV marriage: behind Sony-Samsung rivalry, an unlikely alliance develops electronic giants join forces on flat-panel technology", *The Wall Street Journal*, January 3, 2006.

[DYE 98] DYER J.-H., SINGH H., "The relational view: cooperative strategy and sources of interorganizational competitive advantage", *Academy of Management Review*, vol. 23, no. 4, pp. 660–679, 1998.

[EDE 03] EDEN L., "A critical reflection and some conclusions on OLI", in CANTWELL J., NARULA R. (eds), *International Business and the Eclectic Paradigm: Developing the OLI Framework*, Routledge, London, 2003.

[EIS 85] EISENHARDT K.-M., "Control: organizational and economic approaches", *Management Science*, vol. 31, pp. 134–149, 1985.

[EIS 89a] EISENHARDT K.-M., "Agency theory: an assessment and review", *The Academy of Management Review*, vol. 14, no. 1, pp. 57–74, January 1989.

[EIS 89b] EISENHARDT K.-M., "Making fast strategic decisions in high-velocity environments", *The Academy of Management Journal*, vol. 32, no. 3, pp. 543–576, 1989.

[EIS 00] EISENHARDT K.-M., MARTIN J., "Dynamic capabilities: what are they?", *Strategic Management Journal*, vol. 21, no. 10–11, pp. 1105–1121, 2000.

[EIS 06] EISENMANN T., PARKER G., VAN ALSTYNE M., "Strategies for two-sided markets", *Harvard Business Review*, vol. 84, no. 10, pp. 92–101, October 2006.

[EIS 08] EISENMANN T., "Managing proprietary and shared platforms", *California Management Review*, vol. 50, no. 4, pp. 31–53, 2008.

[EIS 09] EISENMANN T., PARKER G., VAN ALSTYNE M., "Opening platforms: how, when and why?", in GAWER A. (ed.), *Platforms, Markets and Innovation*, Edward Elgar Publishing Limited, Cheltenham, pp. 131–162, 2009.

[EIV 07] EVANS D., SCHMALENSEE R., "The industrial organization of markets with two-sided platforms", *Competition Policy International*, vol. 3, no. 1, pp. 151–179, 2007.

[EVA 90] EVAN W.-M., OLK P., "R&D consortia: a new US organizational form", *Sloan Management Review*, vol. 31, no. 3, pp. 37–45, 1990.

[EVA 02] EVANS J., MAVONDO F.T., "Psychic distance and organizational performance: An empirical examination of international retailing operations", *Journal of International Business Studies*, vol. 33, no. 3, pp. 515–532, 2002.

[EYS 01] EYSENBACH G., "Editorial", *Journal of Medical Internet Research*, vol. 3, no. 2, e20, available at: http://www.jmir.org/2001/2/e20, published online 16 June 2001.

[FAM 80] FAMA E., "Agency problems and the theory of the firm", *Journal of Political Economy*, vol. 88, no. 2, pp. 288–307, 1980.

[FAM 83] FAMA E., JENSEN M., "Separation of ownership and control", *Journal of Law and Economics*, vol. 26, pp. 301–325, 1983.

[FER 01] FERRIER W., "Navigating the competitive landscape: the drivers and consequences of competitive aggressiveness", *Academy of Management Journal*, vol. 44, pp. 858–877, 2001.

[FER 13] FERNANDEZ A.-S., LE ROY F., "Comment coopérer avec un concurrent?", *Revue française de gestion*, vol. 39, no. 232, pp. 61–80, 2013.

[FER 15] FERNANDEZ A.-S., LE ROY F., "Les stratégies de coopétition comme source de tensions multiples: le cas EADS-Thales dans l'industrie des satellites de télécommunications", *Management International*, vol. 19, no. 3, pp. 115–128, 2015.

[FIO 16] FIORASO G., L'ouverture comme réponse aux défis de la filière spatiale, Report to the French Prime Minister on the French Space Sector, available at: http://www.gouvernement.fr/partage/7791-rapport-de-genevieve-fioraso-sur-la-filiere-spatiale francaise, 2016.

[FLO 92] FLORENS J-P., NAFFRICHOUX N., "Estimation du taux de partage des risques dans les contrats État-industries spatiales", *Revue économique*, vol. 43, no. 5, pp. 851–870, 1992.

[FOR 89] FORAY D., "Les modèles de compétition technologique. Une revue de la littérature", *Revue d'économie industrielle*, no. 48, pp. 16–34, 1989.

[FOR 92] FORAY D., FREEMAN C., *Technologie et richesse des nations*, Economica, Paris, 1992.

[FOR 00] FORSGERN M., Some critical notes on learning in the Uppsala internationalization process model, Working Paper, Department of Business Studies, no. 2, Uppsala University, 2000.

[FOS 86] FOSTER R.-N., *Innovation, avantage à l'attaquant*, InterEditions, Paris, 1986.

[FRA 03] FRANKE N., VON HIPPEL E., "Satisfying heterogeneous user needs via innovation toolkits: the case of Apache security software", *Research Policy*, vol. 32, no. 7, pp. 1199–1215, 2003.

[FRE 10] FRERY F., "Les écosystèmes d'affaires: un malentendu fertile", *XIX^e Conférence internationale de Management stratégique*, Luxembourg, 2–4 June 2010.

[FRO 99] FRONTIER S., *Les écosystèmes*, PUF, Paris, 1999.

[FUD 83a] FUDENBERG D., GILBERT R., STIGLITZ J. *et al.*, "Preemption, leapfrogging and competition in patent races", *European Economic Review*, vol. 22, pp. 3–31, 1983.

[FUD 83b] FUDENBERG D., TIROLE J., "Sequential bargaining with incomplete information", *The Review of Economic Studies*, vol. 50, no. 2, pp. 221–247, April 1983.

[GEE 00] GEE E.P., "Co-opetition: the new market milieu", *Journal of Healthcare Management*, vol. 45, pp. 359–363, 2000.

[GAF 89] GAFFARD J.-L., "Marchés et organisations dans les stratégies technologiques des firmes industrielles", *Revue d'économie industrielle*, vol. 48, no. 1, pp. 35–51, 1989.

[GAF 90] GAFFARD J.-L., *Economie industrielle et de l'innovation*, Dalloz, Paris, 1990.

[GAF 92] GAFFARD J.-L., "Vers une théorie du changement technologique en tant que processus de changement hors de l'équilibre", in FREEMAN C., FORAY D. (eds), *Technologie et Richesse des Nations*, Economica, Paris, 1992.

[GAN 11] GANDIA R., BRION S., MOTHE C., "Innovation ouverte et management de la propriété intellectuelle: quelles stratégies dans le secteur du jeu vidéo?", *Revue française de gestion*, vol. 1, no. 210, pp. 117–131, 2011.

[GAN 92] GANNE B., "Place et évolution de systèmes industriels locaux en France: économie politique d'une transformation", pp. 315–346, in BENKO G., LIPIETZ A. (eds), *Les Régions qui gagnent. Districts et réseaux: les nouveaux paradigmes de la géographie économique*, PUF, Paris, 1992.

[GAR 89] GARRETTE B., "Actifs spécifiques et coopération: une analyse des stratégies d'alliance", *Revue d'économie industrielle*, no. 50, pp. 15–31, 1989.

[GAR 92] GAROFOLI G., "Les systèmes de petites entreprises: un cas paradigmatique de développement endogène", in BENKO G., LIPIETZ A. (eds), *Les Régions qui gagnent. Districts et réseaux: les nouveaux paradigmes de la géographie économique*, PUF, Paris, 1992.

[GAR 16] GARTNER, Gartner's 2016 Hype Cycle for Emerging Technologies Identifies Three Key Trends That Organizations Must Track to Gain Competitive Advantage, 2016 Hype Cycle Special, 2016.

[GAW 02] GAWER A., CUSUMANO M.-A., *Platform Leadership: How Intel, Microsoft, and Cisco Drive Industry Innovation*, Harvard Business School Press, Harvard, 2002.

[GAW 08] GAWER A., CUSUMANO M.-A., "How companies become platform leaders", *MIT Sloan Management Review*, vol. 49, no. 2, pp. 28–35, 2008.

[GAW 09a] GAWER A., "Introduction", *Platforms, Markets and Innovation*, Edward Elgar Publishing Limited, Cheltenham, pp. 11–16, 2009.

[GAW 09b] GAWER A., "Platform dynamics and strategies: from products to service", *Platforms, Markets and Innovation*, Edward Elgar Publishing Limited, Cheltenham, pp. 45–76, 2009.

[GAW 14] GAWER A., "Bridging differing perspectives on technological platforms: toward an integrative framework", *Research Policy*, vol. 43, no. 7, pp. 1239–1249, September 2014.

[GEH 02] GEHANI R.-R., "Chester Barnard's "executive" and the knowledge-based firm", *Management Decision*, vol. 40, no. 10, pp. 980–991, 2002.

[GHE 97] GHEMAWAT P., *Game Businesses Play: Cases and Models*, MIT Press, Cambridge, 1997.

[GIL 82] GILBERT R., NEWBERY D., "Preemptive patenting and the persistence of monopoly", *American Economic Review*, vol. 72, no. 3, pp. 514–26, 1982.

[GIL 87] GILLY J.-P., "Innovation et territoire: pour une approche méso-économique des technopoles", *Revue d'économie régionale et urbaine*, vol. 5, pp. 785–794, 1987.

[GIQ 86] GIQUEL C., "Les accords dits OEM et les formes de coopération industrielle", *Revue d'économie politique*, vol. 6, pp. 666–687, 1986.

[GLA 92] GLAIS M., *Economie industrielle: les stratégies commerciales des firmes*, ITEC, Paris, 1992.

[GNY 01] GNYAWALI D.-R., MADHAVAN R., "Cooperative networks and competitive dynamics: a structural embeddedness perspective", *Academy of Management Review*, vol. 26, no. 3, pp. 431–445, 2001.

[GNY 06] GNYAWALI D.-R., HE J.-Y., MADHAVAN R., "Impact of co-opetition on firm competitive behavior: an empirical examination", *Journal of Management*, vol. 32, pp. 507–530, 2006.

[GNY 11] GNYAWALI D.-R., PARK B., "Co-opetition between giants: Collaboration with competitors for technological innovation", *Research Policy*, vol. 40, no. 5, pp. 650–663, 2011.

[GOM 06] GOMES-CASSERES B., HAGEDOORN J., JAFFE A.B., "Do alliances promote knowledge flows?", *Journal of Financial Economics*, vol. 80, pp. 5–33, 2006.

[GOS 98] GOSSAIN S., KANDIAH G., "Reinventing value: the new business ecosystem", *Strategy & Leadership*, vol. 26, no. 5, pp. 28–33, 1998.

[GRA 91] GRANT M., "The resource-based theory of competitive advantage: implications for strategy", *California Management Review*, vol. 22, pp. 114–135, 1991.

[GRA 93] GRABHER G., "The weakness of strong ties: The lock-in of regional development in the Ruhr area", in *The Embedded Firm: On the Socio-Economics of Industrial Networks*, Routledge, London, 1993.

[GRA 96a] GRANT R.-M., "Toward a knowledge-based theory of the firm", *Strategic Management Journal*, *Special Winter Issue*, vol. 17, pp. 109–122, 1996.

[GRA 96b] GRANT R.-M., BADEN-FULLER C., "A knowledge accessing theory of strategic alliances", *Journal of Management Studies*, vol. 41, no. 1, pp. 61–84, 1996.

[GRA 02] GRANT R.-M., *Contemporary Strategy Analysis: Concepts, Techniques and Applications*, Blackwell Publishing, Oxford, 2002.

[GRI 79] GRILICHES Z., "Issues in assessing the contribution of research and development to productivity growth", *Bell Journal of Economics*, vol. 10, no. 1, pp. 92–116, 1979.

[GRI 92] GRILICHES Z., "The search for R&D spillovers", *Scandinavian Journal of Economics*, vol. 94, pp. 29–48, 1992.

[GRI 95] GRILICHES Z., "R&D and productivity: econometric results and measurement issues", in STONEMAN P. (ed.), *Handbook of the Economics of Innovation and Technological Change*, Blackwell Publishers, Oxford, 1995.

[GRO 86] GROSSMAN S.-J., HART O., "The costs and benefits of ownership: a theory of vertical and lateral integration", *Journal of Political Economy*, vol. 94, no. 4, 1986.

[GRO 87] GROSSMAN G., SHAPIRO C., "Dynamic R&D competition", *Economic Journal*, vol. 97, pp. 372–387, 1987.

[GUE 85] GUESNERIE R., TIROLE J., "L'économie de la recherche-développement: introduction à certains travaux théoriques", *Revue économique*, vol. 36, no. 5, pp. 843–872, 1985.

[GUE 04] GUEGUEN G., TORRES O., "Fondements et dynamiques concurrentielles des écosystèmes d'affaires: l'exemple de Linux contre Microsoft", *Revue française de gestion*, vol. 30, no. 148, 2004.

[GUE 08] GUEGUEN G., "Développement des écosystèmes d'affaires. Le cas des terminaux mobiles intelligents Symbian versus Windows Mobile", *Journée de recherche AIMS: politiques relationnelles et écosystèmes d'affaires*, 28 November, 2008.

[GUE 10] GUELLEC D., MADIES T., PRAGER J.-C., Les marchés de brevets dans l'économie de la connaissance, Report to Direction de l'information légale et administrative, Paris, 2010.

[GUG 91] GUGLER P., *Les alliances stratégiques transnationales*, Editions Universitaires de Fribourg, Fribourg, 1991.

[GUI 83] GUICHARD J.-P., "La sous-traitance dans la production capitaliste", in BERTHOMIEU C., *Structure industrielle et sous-traitance*, PUF, Paris, 1983.

[GUI 90] GUILHON B., GIANFALDONI P., "Chaînes de compétences et réseaux", *Revue d'économie industrielle*, vol. 51, pp. 97–112, 1990.

[GUL 98] GULATI R., "Alliances and networks", *Strategic Management Journal*, vol. 19, no. 4, pp. 293–317, 1998.

[GUL 00] GULATI R., NOHRIA N., ZAHEER A., "Strategic networks", *Strategic Management Journal*, vol. 21, no. 3, pp. 203–215, 2000.

[HAG 07a] HAGIU A., "Merchant or two-sided platform?", *Review of Network Economics*, vol. 6, no. 2, pp. 115–133, 2007.

[HAG 07b] HAGIU A., Multi sided platforms: from microfoundations to design and expansion strategies, Working paper, no. 07-094, Harvard Business School, 2007.

[HAG 09] HAGIU A., YOFFIE D., "What's your Google strategy?", *Harvard Business Review*, pp. 1–9, April 2009.

[HAG 15] HAGIU A., WRIGHT J., "Multi-sided platforms", *International Journal of Industrial Organization*, vol. 43, issue C, pp. 162–174, 2015.

[HAK 87] HAKLISCH C.-S., *Technical Alliances in the Semiconductor Industry*, Center for Science and Technology Policy, New York University, 1986.

[HAK 02] HAKANSSON H., FORD D., "How should companies interact in business networks?", *Journal of Business Research*, vol. 55, no. 2, pp. 133–139, 2002.

[HAL 92] HALMENSCHLAGER C., Recherche-développement : une analyse en termes de strategies concurrentielles, PhD Thesis, Université de Paris 2, 1992.

[HAL 04a] HALMENSCHLAGER C., "Les externalités de diffusion du savoir-faire permettent-elles de rattraper le retard dans les courses à l'innovation?", *Recherche économique de Louvain*, vol. 70, no. 3, pp. 341–361, 2004.

[HAL 04b] HALMENSCHLAGER C., "R&D-cooperating laggards versus a technological leader", *Economics of Innovation and New Technology*, vol. 13, no. 8, pp. 717–732, 2004.

[HAL 06] HALMENSCHLAGER C., "Spillovers and absorptive capacity in a patent race", *The Manchester School*, vol. 79, no. 1, pp. 85–102, 2006.

[HAL 10] HALL B.-H., "Open innovation and intellectual property rights – The two-edged sword", *Japan Spotlight*, pp. 18–19, January–February 2010.

[HAL 12] HALMENSCHLAGER C., "Une entreprise peut-elle rattraper son retard technologique? Quelques éléments de réponse en économie de l'innovation", *Revue d'économie politique*, vol. 122, pp. 1–35, 2012.

[HAM 89a] HAMEL G., PRAHALAD C.-K., "Strategic intent", *Harvard Business Review*, vol. 67, no. 3, pp. 63–78, 1989.

[HAM 89b] HAMEL G., PRAHALAD C.-K., "Strategy as stretch and leverage", *Harvard Business Review*, vol. 71, no. 2, pp. 75–84, 1989.

[HAM 93] HAMEL G., PRAHALAD C.-K., "Strategy as stretch and leverage", *Harvard Business Review*, vol. 71, no. 2, pp. 75–84, 1993.

[HAM 94] HAMEL G., PRAHALAD C.-K., *Competing for the Future: Breakthrough Strategies for Seizing Control of Your Industry and Creating the Markets of Tomorrow*, Harvard Business School Press, Boston, 1994.

[HEL 03] HELFAT C., PETERAF M., "The dynamic resource-based view: capability lifecycles", *Strategic Management Journal*, vol. 24, pp. 997–1010, 2003.

[HEL 07] HELFAT C., PETERAF M., FINKELSTEIN S. *et al.*, *Dynamic Capabilities: Understanding Strategic Change in Organization*s, Blackwell, Oxford, 2007.

[HEN 88] HENNART J.-F., "The transaction costs theory of equity joint ventures", *Strategic Management Journal*, vol. 9, pp. 361–374, 1988.

[HEN 90a] HENRIQUES I., "Cooperative and noncooperative R&D in duopoly spillovers: comment", *American Economic Review*, vol. 80, pp. 638–642, 1990.

[HEN 90b] HENNART J.F., "Some Empirical Dimension of Countertrade", *Journal of International Business Studies*, vol. 21, no. 2, pp. 243–270, 1990.

[HEN 91] HENNART J.-F., "Control in Multinational Firms: The role of price and hierarchy", *Management International Review*, vol. 31, Special issue, pp. 71–96, 1991.

[HEN 09] HENNART J.-F., "Down with MNE-Centric Theories! Market Entry and Expansion as the Bundling of MNE and Local Assets", *Journal of International Business Studies*, vol. 40, no. 9, pp. 1432–1454, 2009.

[HIL 90] HILL C.W.L., HWANG P., KIM C., "An Eclectic Theory of the Choice of International Entry Mode", *Strategic Management Journal*, vol. 11, no. 2, pp. 117–128, 1990.

[HIS 85] HISEY K.B., CAVES R.E., "Diversification strategy and choice of country: Diversifying acquisitions abroad by U.S. multinationals, 1978–1980", *Journal of International Business Studies*, vol. 16, no. 2, pp. 51–64, 1985.

[HOF 80] HOFSTEDE G. "Culture and organizations", *International Studies of Management and Organization*, vol. 10, no. 4, pp. 15–41, 1980.

[HOF 93] HOFSTEDE G., "Cultural Constraints in Management Theories", *Academy of Management Executive*, vol. 7, no. 1, pp. 81–94, 1993.

[HOG 05] HOGAN J., "Open Innovation Or Open House: How to Protect Your Most Valuable Assets", *Medical Device Technology*, vol. 16, no. 3, pp. 30–31, 2005.

[HOL 79] HOLMSTRÖM B., "Moral hazard and observability", *Bell Journal of Economics*, vol. 10, pp. 74–91, 1979.

[HOO 03] HOOPES D.-G., MADSEN T.-L., WALKER G., "Why is there a resource-based view? Toward a theory of competitive heterogeneity", *Strategic Management Journal*, vol. 24, no. 10, pp. 889–902, 2003.

[HOR 87] HORSTMANN I., MARKUSSEN J.-R., "Licensing versus direct investment: a model of internalization by the multinational enterprise", *Canadian Journal of Economics*, vol. 20, no. 3, pp. 464–481, 1987.

[HOU 57] HOUSSIAUX J., "Le concept de "quasi-intégration" et le rôle des sous-traitants dans l'industrie", *Revue économique*, no. 2, pp. 221–247, 1957.

[HUD 99] HUDSON R., "The learning economy, the learning firm and the learning region: a sympathetic critique of the limits to learning", *European Urban and Regional Studies*, vol. 6, no. 1, pp. 59–72, 1999.

[HYM 76] HYMER S., *The International Operations of National Firms: A Study of Direct Investment*, MIT Press, Cambridge, 1976.

[IAN 04] IANSITI M., LEVIEN R., *The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability*, Harvard Business School Press, Boston, 2004.

[IET 98] IETTO-GILLIES G., "Different conceptual frameworks for the assessment of the degree of internationalization: an empirical analysis of various indices for the top 100 transnational corporations", *Transnational Corporations*, vol. 7, no. 1, pp. 17–39, 1998.

[IET 05] IETTO-GILLIES G., *Transnational Corporations and International Production: Concepts, Theories and Effects*, Edward Elgar, Cheltenham, 2005.

[IMA 84] IMAI K., ITAMI H., "Interpenetration of organization and market, Japan's firms in the comparison with the US", *International Journal of Industrial Organization*, no. 2, pp. 285–310, 1984.

[INK 96] INKPEN A.-C., "Creating knowledge through collaboration", *California Management Review*, vol. 39, no. 1, pp. 123–140, 1996.

[INK 97] INKPEN A.-C., "An examination of knowledge management in international joint-ventures", in BEAMISH P., KILLING J.-P. (eds), *Cooperative Strategies-North American Perspectives*, New Lexington, San Francisco, 1997.

[INK 05] INKPEN A.-C., TSANG E.W.K., "Social capital, networks, and knowledge transfer", *Academy of Management Review*, vol. 30, pp. 146–165, 2005.

[ISC 09] ISCKIA T., "Amazon.com's Ecosystem: Amazon's Strategy Revisited", *Canadian Journal of Administrative Sciences*, *Special Issue on eServic*, vol. 26, no. 4, pp. 332–343, December 2009.

[JAC 85] JACQUEMIN A., *Sélection et pouvoir dans la nouvelle économie industrielle*, Economica, Paris, 1985.

[JAC 86] JACQUEMIN A., Compétition européenne et coopération entre entreprises en matière de recherche-développement, Eu Commission Working document Publications Office of the European Union, Luxembourg, 1986.

[JAC 87] JACQUEMIN A., "Bilans et essais: comportements collusifs et accords en recherche-développement", *Revue d'économie politique*, no. 1, pp. 1–23, 1987.

[JAC 89a] JACQUEMIN A., BUIGUES P., ILZKOVITZ F., "Horizontal mergers and competition policy in the European Community", *European Economy*, no. 40, pp. 1–95, 1989.

[JAC 89b] JACQUEMIN A., SLADE M.-E., "Cartels, collusion and horizontal merger", in SCHMALENSE R., WILLIG R. (eds), *Handbook of Industrial Organization*, Elsevier Science Publishers, Amsterdam, 1989.

[JAR 88] JARILLO J.-C., "On strategic networks", *Strategic Management Journal*, vol. 9, no. 1, pp. 31–41, 1988.

[JEA 11] JEAN B., "Propriété intellectuelle et Open Innovation: les frères ennemis?", *Revue Lamy, droit de l'immatériel*, no. 77, December 2011.

[JEN 76] JENSEN M.-C., MECKLING W.-H., "Theory of the firm: Managerial behavior, agency costs and ownership structure", *Journal of Financial Economics*, vol. 3, no. 4, pp. 305–360, 1976.

[JOF 86] JOFFRE P., "De la vente internationale au partenariat mondial", *Chroniques d'actualité de la SEDEIS*, no. 3, pp. 108–113, 1986.

[JOF 87] JOFFRE P., "L'économie des coûts de transaction", in JOFFRE P., KŒNIG G. (eds), *De nouvelles théories pour gérer l'entreprise*, Economica, Paris, 1987.

[JOH 75] JOHANSON J., WIEDERSHEIM-PAUL F., "The Internationalization of the Firm—Four Swedish Cases", *Journal of Management Studies*, vol. 12, pp. 305–323, 1975.

[JOH 77] JOHANSON J., VAHLNE J.-E., "The internationalization process of the firm – A model of knowledge development and increasing foreign market commitments", *Journal of International Business Studies*, vol. 8, no. 1, pp. 23–32, 1977.

[JOH 90] JOHANSON J., VAHLNE J.-E., "The mechanism of internationalization", *International Marketing Review*, vol. 7, no. 4, pp. 11–24, 1990.

[JOH 01] JOHNSON G., SCHOLES H., *Stratégique,* Publi-Union Editions, Paris, 2001.

[JOH 03] JOHANSON J., VAHLNE J.-E., "Business relationship learning and commitment in the internationalization process", *Journal of International Entrepreneurship*, vol. 1, no. 1, pp. 83–101, 2003.

[JOH 09] JOHANSON J., VAHLNE J.-E., "The Uppsala internationalization process model revisited: from liability of foreignness to liability of outsider-ship", *Journal of International Business Studies*, vol. 40, no. 9, pp. 1411–1431, 2009.

[JOR 89] JORDE T., TEECE D., "Competition and cooperation: strinking the right balance", *California Management Review*, vol. 31, no. 3, pp. 25–37, 1989.

[JUL 94] JULIEN P.-A., "L'entreprise partagée: contraintes et avantages", *Gestion*, vol. 19, no. 4, pp. 48–58, 1994.

[KAT 90] KATZ M.-L., ORDOVER J.-A., "R&D cooperation and competition", *Brookings Papers: Microeconomics*, pp. 137–192, 1990.

[KAW 87] KAWASAKI S., MCMILLAN J., "The design of contracts: evidence from Japanese subcontracting", *Journal of the Japanese and International Economies*, vol. 1, no. 3, pp. 327–349, 1987.

[KET 03] KETELS C.-M., "The development of the cluster concept – present experiences and further developments", *NRW Conference on Clusters*, Duisburg, 5 December 2003.

[KIM 05] KIM W.C. MAUBORGNE R., *Blue Ocean Strategy*, Harvard Business School Press, 2005.

[KIN 69] KINDLEBERGER C., *American Business Abroad*, Yale University Press, New Haven, 1969.

[KLE 83] KLEIN B., "Contracting costs and residual claims: the separation of ownership and control", *Journal of Law and Economics*, vol. 26, no. 2, pp. 367–374, 1983.

[KOG 88] KOGUT B., SINGH H., "The effect of national culture on the choice of entry mode", *Journal of International Business Studies*, vol. 19, no. 3, pp. 1–32, 1988.

[KOG 88a] KOGUT B., "Joint ventures: theoretical and empirical perspectives", *Strategic Management Journal*, vol. 9, no. 4, pp. 319–322, 1988.

[KOG 88b] KOGUT B., "A study of the life cycle of joint ventures", *Management International Review*, vol. 28, no. 4, pp. 39–52, 1988.

[KOG 92] KOGUT B., ZANDER U., "Knowledge of the firm, combinative capabilities, and the replication of technology", *Organisation Science*, vol. 3, pp. 383–397, 1992.

[KOG 00] KOGUT B., "The network as knowledge: generative rules and the emergence of structure", *Strategic Management Journal*, vol. 21, no. 3 pp. 405–425, 2000.

[KOO 71] KOOPMANS T.-C., MONTIAS J.-M., "On the description and comparison of economic systems", in ECKSTEIN A. (eds), *Comparison of Economic Systems: Theoretical and Methodological Approaches*, Berkeley University of California Press, 1971.

[KRO 09] KRONBORG D., THOMSEN S., "Foreign ownership and long-term survival", *Strategic Management Journal*, vol. 30, no. 2, pp. 207–220, 2009.

[KRU 91] KRUGMAN P., *Geography and Trade*, MIT Press, Cambridge, 1991.

[KRU 95] KRUGMAN P., "Rendements croissants et géographie économique", in RALLET A., TORRE A. (eds), *Economie industrielle et économie spatiale*, Economica, Paris, 1995.

[KUM 98] KUMAR R., NTI K.O., "Differential learning and interaction in alliance dynamics: a process and outcome discrepancy model", *Organization Science*, vol. 9, no. 3, pp. 356–367, 1998.

[LAA 16] LAAMANEN T., "Co-opetition", *The Palgrave Encyclopedia of Strategic Management*, pp. 1–2, 2016.

[LAD 97] LADO A.-A., BOYD N., HANLON S.-C., "Competition, cooperation, and the search for economic rents: a syncretic model", *Academy of Management Review*, vol. 22, no. 1, pp. 110–141, 1997.

[LAF 87] LAFFONT J.-J., "Le risque moral dans la relation de mandat", *Revue économique*, vol. 38, no. 1, pp. 5–24, 1987.

[LAG 97] LAGENDIJK A., From new industrial spaces to regional innovation systems and beyond. how and from whom should industrial geography learn?, Working paper, Centre for Urban and Regional Development Studies, University of Newcastle upon Tyne, 1997.

[LAM 16] LAMIGEON V., "Satellites: comment Airbus et Thales ont repris la main face aux Américains", *Challenges*, available at: http://www.challenges.fr/challenges-soir/satellites-comment-airbus-et-thales-ont-repris-la-main-face-aux-americains_37598, 2016.

[LAR 08] LARGIER A., LARTIGUE S., SOULARD O. *et al.*, Clusters mondiaux. Regards croisés sur la théorie et la réalité des clusters. Identification et cartographie des principaux clusters internationaux, Study carried out on behalf of the Conseil Régional d'Ile-de-France, 2008.

[LAU 06] LAURSEN K., SALTER A., "Open for innovation: The role of openness in explaining innovation performance among UK manufacturing firms", *Strategic Management Journal*, vol. 27, no. 2, pp. 131–150, 2006.

[LAV 06] LAVIE D., "The competitive advantage of interconnected firms: an extension of the resource based view", *Academy of Management Review*, vol. 31, no. 3, pp. 638–658, 2006.

[LE 10] LE BAS C., MOTHE C., "Le brevet bloquant: quelle utilisation de la part des entreprises françaises? Bilan d'une étude auprès de conseils en propriété industrielle", *Management International Review*, vol. 14, no. 3, pp. 29–43, 2010.

[LE 14] LE BRAS P.-L., LOTH A., Rapport sur la gouvernance et l'utilisation des données de santé, September 2013, available at: http://www.drees.sante.gouv.fr/rapport-sur-la-gouvernance-et-l-utilisation-des-donnees-de-11202, published 14 January 2014.

[LE 11] LE GALL S., "Les stratégies de localisation des firmes multinationales et leurs rapports au territoire local étranger: une approche par les ressources", *Management International*, vol. 16, no. 1, pp. 59–73, 2011.

[LEA 65] LEARNED E., CRISTENSEN C., ANDREWS K. *et al.*, *Business Policy-Text and Cases*, Richard D. Irwin, Homewood, 1965.

[LEA 69] LEARNED E.P., CHRISTENSEN C.R., ANDREWS K.R. *et al.*, *Business Policy,* Irwin, Homewood, 1969.

[LEB 02] LE BAS C., SIERRA C., "Location versus home advantages' in R&D activities: Some further results on multinationals' location strategies", *Research Policy*, vol. 31, no. 4, pp. 589–609, 2002.

[LEE 80] LEE T., WILDE L.-L., "Market structure and innovation: a reformulation", *The Quarterly Journal of Economics*, vol. 94, no. 2, pp. 429–436, 1980.

[LEP 85] LEPAGE H., *Pourquoi la propriété?*, Hachette, Paris, 1985.

[LEV 88] LEVINTHAL D., "A survey of agency models of organizations", *Journal of Economic Behavior and Organizations*, vol. 9, no. 2, pp. 153–185, 1988.

[LEV 98] LEVESQUE B., KLEIN J.-L., FONTAN J.-M., *Les systèmes industriels localisés: état de la recherche*, UQAM, Montreal, 1998.

[LEW 99] LEWIN R., *Complexity: Life at the Edge of Chaos*, The University of Chicago Press, Chicago, 1999.

[LI 95] LI J., "Foreign entry and survival: Effects of strategic choices on performance in international markets", *Strategic Management Journal*, vol. 16, no. 5, pp. 333–351, 1995.

[LIE 88] LIEBERMAN L., MONTGOMERY D., "First mover (dis) advantage: retrospective and link with the Resource-Based View", *Strategic Management Journal*, vol. 19, no. 12, pp. 1111–1125, 1988.

[LIE 96] LIEBESKIND J., "Knowledge, strategy, and the theory of the firm", *Strategic Management Journal*, vol. 17, pp. 93–108, 1996.

[LIO 99] LIOTARD I., "Les droits de propriété intellectuelle, une nouvelle arme stratégique des firmes", *Revue d'économie industrielle*, vol. 89, no. 1, pp. 69–84, 1999.

[LON 91a] LONGHI C., QUERE M., "Les microsystèmes productifs", in ARENA R., BENZONI L. DE BANT J. (eds), *Traité d'économie industrielle*, Economica, Paris, pp. 356–372, 1991.

[LON 91b] LONGHI C., QUERE M., "Les systèmes locaux d'innovation: éléments empiriques et analytiques", in COURLET C., SOULAGE B. (eds), *Industrie, territoires et politiques publiques*, L'Harmattan, Paris, 1991.

[LOU 79] LOURY G., "Market structure and innovation", *Quarterly Journal of Economics*, vol. 93, no. 3, pp. 395–410, 1979.

[LUN 94] LUNDVALL B.-Å., JOHNSON B., "The learning economy", *Journal of Industry Studies*, vol. 1, no. 2, pp. 23–42, 1994.

[LUN 07] LUNDVALL B-Å., NIELSEN P., "Knowledge management and innovation performance", *International Journal of Manpower*, vol. 28, nos. 3/4, pp. 207–223, 2007.

[LUO 99] LUO Y., PENG M., "Learning to Compete in a Transition Economy: Experience, Environment, and Performance", *Journal of International Business Studies,* vol. 30, no 2, pp. 269–295, 1999.

[LUO 02] LUO Y., MEZIAS J.M., "Liabilities of foreignness: Concepts, constructs, and consequences", *Journal of International Management*, vol. 8, no. 3, pp. 217–221, 2002.

[LUO 05] LUO Y., "How does globalization affect corporate governance and accountability? A perspective from MNEs", *Journal of International Management*, vol. 11, no. 1, pp. 19–41, 2005.

[LUO 07] LUO Y., "A co-opetition perspective of global competition", *Journal of World Business*, vol. 42, no. 2, pp. 129–144, 2007.

[MAC 91] MACHO-STADLER I., PEREZ-CASTRILLO J.-D., "Moral hazard and cooperation", *Economic Letters*, vol. 35, no. 1, pp. 17–20, 1991.

[MAC 92a] MACHO-STADLER I., PEREZ-CASTRILLO J.-D., "Le rôle de la délégation dans une relation d'agence", *Economie et prévision*, no. 102–103, pp. 67–77, 1992.

[MAC 92b] MACMILLAN J., *Games, Strategies and Managers: How Managers can Use Game Theory to Make Better Business Decisions*, Oxford University Press, Oxford, 1992.

[MAC 02] MACKINNON D., CUMBERS A., CHAPMAN K., "Learning, innovation and regional of critical appraisal of recent debates", *Progress in Human Geography*, vol. 26, no. 3, pp. 293–311, 2002.

[MAG 77] MAGEE S.-P., "Multinational corporations, the industry technology cycle and development", *Journal of World Trade Law*, vol. 11, no. 2, pp. 297–321, 1977.

[MAG 15] MAGNE S., LEMOINE F., "Essai de classification des pratiques de cocréation de produits et services", *6th Meeting of the AIMS Thematic Research Group on "Innovation"*, BETA, Strasbourg, 17–18 September 2015.

[MAH 92] MAHONEY J.T. "Organizational Economics Within the Conversation of Strategic Management", *Advances in Strategic Management*, vol. 8, pp. 103–155, 1992.

[MAI 92a] MAILLAT D., "Milieux et dynamique territoriale de l'innovation", *Revue canadienne des sciences régionales*, vol. 15, no. 2, pp. 199–218, 1992.

[MAI 92b] MAILLAT D., PERRIN J.-C. (eds), *Entreprises innovatrices et développement territorial*, GREMI, EDES, Neuchâtel, 1992.

[MAI 93] MAILLAT D., QUEVIT M., SENN L. (eds), *Réseaux d'innovation et milieux innovateurs: un pari pour le développement régional*, EDES, Neuchâtel, 1993.

[MAI 94a] MAILLAT D., "Comportements spatiaux et milieux innovateurs", in AURAY J.-P., BAILLY A., DERYCKE J.-P. *et al*. (eds), *Encyclopédie d'économie spatiale. Concepts, comportements, organisations*, Economica, Paris, 1994.

[MAI 94b] MAILLAT D., CREVOISIER O., LECOQ B., "Innovation networks and territorial dynamics: a tentative typology", in JOHANSSON B., KARLSSON C., WESTIN L. (eds), *Patterns of a Network Economy*, Springer Verlag, Berlin, 1994.

[MAI 99] MAILLAT D., GROSJEAN N., Globalisation et systèmes territoriaux de production, Working paper, no. 9906a, University of Neuchâtel, December 1999.

[MAL 96] MALMBERG A., SÖLVELL Ö., ZANDER I., "Spatial clustering, local accumulation of knowledge and firm competitiveness", *Geografiska Annaler*, vol. 78B, pp. 85–97, 1996.

[MAN 84] MANSFIELD E., "R&D and innovation: Some empirical findings", in GRILICHES Z. (eds), *R&D, Patent and Productivity*, University of Chicago Press, Chicago, 1984.

[MAN 93] MANGEMATIN V., "Compétition technologique. Les coulisses de la mise sur le marché", *Annales des Mines, Gérer et Comprendre*, no. 31, pp. 4–16, 1993.

[MAN 96] MANSFIELD E., *Economie appliquée à la gestion*, 3rd ed., Economica, Paris, 1996.

[MAR 90a] MARSHALL A., *The Principles of Economics*, McMillan, London, 1890.

[MAR 83] MARITI P., SMILEY R.-H., "Cooperative agreements and the organization of the industry", *Journal of Industrial Economics*, vol. 31, no. 4, pp. 437–451, 1983.

[MAR 90b] MARGIRIER G., "L'impact des technologies d'information sur les performances et l'organisation de la firme. Le cas des réseaux locaux industriels", *Revue d'économie industrielle*, no. 51, pp. 75–96, 1990.

[MAR 90c] MARTINET A.-C., "Epistémologie de la stratégie", in MARTINET A.-C. (eds), *Epistémologies et Sciences de Gestion*, Economica, Paris, 1990.

[MAR 05] MARCIANO A., Glossaire des termes spécifiques aux logiques de coopérations industrielles sur le territoire (clusters, districts, SPL), Commission nationale SPL, 18 January 2005.

[MAR 09] MAREMBAUD O., "Une politique industrielle dans un monde de profond bouleversement: enjeux, vision prospective, conditions et priorités permettant à la France de préparer l'avenir de ses activités productives en s'inscrivant dans le développement durable", Construire l'avenir pour une France plus forte et plus solidaire in Report, Conseil économique, social et environnemental, Paris, 3 December 2009.

[MAS 84] MASTEN S.E., "The organization of production: Evidence from the aerospace industry", *Journal of Law and Economics*, vol. 27, pp. 403–417, 1984.

[MAT 85] MATHEWSON G.F., WINTER R.A., "The Economics of Franchise Contracts", *The Journal of Law & Economics*, vol. 28, no. 3, pp. 503–526, October, 1985.

[MAY 11] MAYRHOFER U., "La gestion des relations sièges-filiales: un enjeu stratégique pour les firmes multinationales", *Revue française de gestion*, vol. 37, no. 212, pp. 65–75, 2011.

[MAY 13] MAYRHOFER U., *Management of Multinational Companies: A French Perspective*, Palgrave Macmillan, Basingstoke, 2013.

[MC 13] MC GRATH R.G., *The End of Competitive Advantage*, Harvard Business Review Press, 2013.

[MEI 13] MEIER O., *Management interculturel. Stratégie, Organisation et Performance*, 5th ed., Dunod, Paris, 2013.

[MEL 07] MELLET K., The structuring of markets for infomediation: horizontal versus vertical dynamics, Working paper, 2007–13, Economix, Université Paris 10, 2007.

[MEN 90] MENARD C., *L'économie des organisations*, La Découverte, Paris, 1990.

[MEN 05] MENDEZ A., "Les effets de la mondialisation sur l'organisation et la compétitivité des districts industriels", *Revue internationale sur le travail et la société*, vol. 3, no. 2, pp. 1–30, 2005.

[MEN 06] MENDEZ A., MERCIER D., "Compétences-clés de territoires. Le rôle des relations interorganisationnelles", *Revue française de gestion*, no. 164, pp. 253–275, 2006.

[MES 08a] MESCHI P.-X., EDSON L.-R., "Country risk, national cultural differences between partners and survival of international joint ventures in Brazil", *International Business Review*, vol. 17, no. 3, pp. 250–266, 2008.

[MES 08b] MESQUITA L.-F., ANAND J., BRUSH T.-H., "Comparing the resource-based and relational views: knowledge transfer and spillover in vertical alliances", *Strategic Management Journal*, vol. 29, no. 9, pp. 913–941, 2008.

[MEY 09] MEYER K.F., WRIGHT M.W., PRUTHI S., "Managing knowledge in foreign entry strategies: A resource-based analysis", *Strategic Management Journal*, vol. 30 , no. 5, pp. 557–574, 2009.

[MIL 86] MILES R.-E., SNOW C., "Organizations: new concepts for new forms", *California Management Review*, vol. 28, no. 3, pp. 62–73, 1986.

[MIL 02] MILLER S.R., PARKHE A., "Is There a LOF in Global Banking? An Empirical Test of Banks' X-Efficiency", *Strategic Management Journal*, vol. 23, no. 1, pp. 55–75, 2002.

[MIL 05] MILLIOT E., "Stratégies d'internationalisation : une articulation des travaux de Porter et Perlmutter", *Management et Avenir*, no. 3, pp. 43–60, 2005.

[MIN 98] MINTZBERG H., *Le management. Voyage au centre des organisations*, Éditions d'Organisation, 1998.

[MIN 99] MINTZBERG H., AHLSTRAND B., LAMPEL J., *Safari en pays stratégie*, Village Mondial, Paris, 1999.

[MIN 05] MINTZBERG H., LAMPEL J., AHLSTRAND B., *Strategy Safari: A Guided Tour through the Wilds of Strategic Management*, Free Press, New York, 2005.

[MIT 92] MITCHELL W., SINGH K., "Incumbents' use of pre-entry alliances before expansion into new technical subfields of an industry", *Journal of Economic Behavior and Organization*, vol. 18, no. 3, pp. 347–372, 1992.

[MIT 99] MITCHELL J., From telehealth to e-health: the unstoppable rise of e-health, National Office for the Information Technology, Canberra, 1999.

[MOH 91] MOHNEN P., "Survol de la littérature sur les externalités technologiques", in DE BANDT J., FORAY D. (eds), *L'Evaluation économique de la recherche et du changement technique*, CNRS, Paris, 1991.

[MOH 96] MOHNEN P., "R&D externalities and productivity growth", *STI Review*, vol. 18, pp. 39–66, 1996.

[MON 82] MONTEVERDE K., TEECE D., "Supplier switching costs and vertical integration in the automobile industry", *Bell Journal of Economics*, vol. 13, pp. 206–213, 1982.

[MOO 93] MOORE J.-F., "Predators and prey: a new ecology of competition", *Harvard Business Review*, vol. 71, no. 3, pp. 75–86, 1993.

[MOO 96] MOORE J.-F., *The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems*, Harper Business, New York, 1996.

[MOO 98] MOORE J.-F., "The rise of a new corporate form", *The Washington Quarterly*, vol. 21, no. 1, pp. 167–181, 1998.

[MOO 06] MOORE J.F., "Business ecosystems and the view from the *firm", The Antitrust Bulletin*, vol. 51, no. 1, pp. 31–75. 2006.

[MOR 91] MORVAN Y., *Fondements d'économie industrielle*, Economica, Paris, 1991.

[MOR 07] MORRIS M.H., KOCAK A., OZER A., "Coopetition as a small business strategy: Implications for performance", *Journal of Small Business Strategy*, vol. 18, no. 1, pp. 35–55, 2007.

[MOU 81] MOULIN H., *Théorie des jeux pour l'économie et la politique*, Hermann, Paris, 1981.

[MOW 96] MOWERY D.C., OXLEY J.E., SILVERMAN B.S., "Strategic alliances and interfirm knowledge transfer", *Strategic Management Journal*, vol. 17, S2, pp. 77–91, 1996.

[MUC 85] MUCCHIELLI J.-L., *Les firmes multinationales : mutations et nouvelles perspectives*. Economica, Paris, 1985

[MUC 88] MUCCHIELLI J.-L., *Principes d'économie internationale*, Economica, Paris, 1988.

[MUC 91] MUCCHIELLI J.-L., "Alliances stratégiques et firmes multinationales: une nouvelle théorie pour de nouvelles formes de multinationalisation", *Revue d'économie industrielle*, vol. 55, no. 1, pp. 118–134, 1991.

[MUC 92] MUCCHIELLI J.-L., BURGENMEIER B. (eds), *Multinationals and Europe 1992: Strategies for the Future*, Routledge, London, 1992.

[MUC 09] MUCCHIELLI J.-L., "Délocalisations, nouvelles tendances", *L'Expansion Management Review*, no. 133, pp. 34–41, 2009.

[MUL 88] MULDUR U., "Les chroniques de la revue d'Économie Financière : I. Le développement des fusions et acquisitions dans le secteur financier : causes et conséquences", *Revue d'économie financière*, vol. 4, no. 1, pp. 107–117, 1988.

[MUL 96] MÜLLER-STEWENS G., OSTERLOH M., "Kooperationsinvestitionen besser nutzen: Interorganisationales Lernen als Know-how-Transfer oder Kontext-Transfer?", *Zeitschrift Führung + Organisation*, vol. 65 no. 1, pp. 18–23, 1996.

[NAL 96] NALEBUFF B., BRANDENBURGER A., *La coopétition: une révolution dans la manière de jouer, concurrence et coopération,* Village Mondial, Paris, 1996.

[NEL 82] NELSON R.R., WINTER S., *An Evolutionary Theory of Economic Change*, Belknap Press, London, 1982.

[NEL 91] NELSON R., WINTER S., *An Evolutionary Theory of Economic Change* Belknap Press of Harvard University Press, Cambridge, 1991.

[NIO 91] NIOSI J., BERGERON M., SAWCHUCK M., "Les alliances technologiques stratégiques: de la théorie à la situation canadienne", *Etudes internationales*, vol. 22, no. 1, pp. 63–80, 1991.

[NON 95] NONAKA I., TAKEUCHI H., *The Knowledge-Creating Company: How Japanese* Companies *Create the Dynamics of Innovation*, Oxford University Press, 1995.

[NOR 71] NORTH D.-C., "Institutional change and economic growth", *The Journal of Economic History*, vol. 31, no. 1, pp. 118–112, 1971.

[NOR 86] NORTH D.-C., "The new institutional economics", *Journal of Institutional and Theoretical Economics*, vol. 142, no. l, pp. 230–237, 1986.

[NOR 88] NORTON S.W., "Franchising, brand name capital, and the entrepreneurial capacity problem", *Strategic Management Journal*, vol. 9, pp. 105–114, 1988.

[OEC 95] OECD, *Les communications par satellite: changements structurels et concurrences*, OCDE, Paris, 1995.

[OEC 01] OECD, *Innovative cluster: drivers of national innovation systems*, OCDE, Paris, 2001.

[OEC 08] OECD, *Innovation ouverte dans des réseaux mondiaux*, OCDE, Paris, December 2008.

[OEC 16] OECD, Familles de brevets triadiques, available at: http//data.oecd.org/fr/rd/familles-de-brevets-triadiqu.itm, consulted 31 December 2016, Paris, 2016.

[OES 11] OESTERLE M.-J., WOLF J., "50 Years of Management International Review and IB/IM Research: An inventory and some suggestions for the field's development", *Management International Review*, vol. 51, no. 6, pp. 735–754, 2011.

[OHM 85] OHMAE K., *La Triade: Emergence d'une stratégie mondiale de l'entreprise,* Flammarion, Paris, 1985.

[OMP 14] OMPI, Augmentation record des dépôts de demandes internationales de brevet en 2013 sous l'impulsion des Etats-Unis d'Amérique et la Chine, press release, PR/2014/755, Geneva, available at: http://www.wipo.int/press room/fr/articles/2014/article_0002.html, 13 March 2014.

[OMP 16] OMPI/WIPO, World Intellectual Property Indicators 2016, available at: http://www.wipo.int/pressroom/fr/articles/2016, 2016.

[OMS 05] OMS, Cinquante-Huitième Assemblée Mondiale de la Santé, Résolutions et Décisions, Report, World Health Organization, 16–25 May 2005.

[ORA 13] ORANGE, E-santé et systèmes de santé avancés?, available at: http://orange-business.com/fr, February 2013.

[OST 09] OSTERWALDER A., PIGNEUR Y., *Business Model Generation: A handbook for Visionaries, Game Changers, and Challengers*, self published, 2009.

[OUC 80] OUCHI W.-G., "Markets, bureaucraties and clans", *Administrative Science Quarterly*, vol. 25, no. 1, pp. 129–141, 1980.

[PAR 96] PARK S.-H., RUSSO M.-V., "When competition eclipses cooperation: an event history analysis of joint venture failure", *Management Science*, vol. 42, no. 6, pp. 875–890, 1996.

[PAV 05] PAVLOU A.-P., EL SAWY O.A., Understanding the 'Black Box' of dynamic capabilities: a missing link to the strategic role of IT in turbulent environments?, Working Papers, Anderson Graduate School of Management, University of California, Riverside, CA, 2005.

[PAV 11] PAVLOU A.-P., EL SAWY O.A., "Understanding the elusive 'Black Box' of dynamic capabilities", *Decision Sciences*, vol. 42, no. 1, pp. 239–273, 2011.

[PEC 87] PECQUEUR B., "Tissu économique local et systèmes industriels résiliaires", *Revue d'économie régionale et urbaine*, vol. 3, pp. 369–378, 1987.

[PEC 03] PECQUEUR B., TORRE A., VANDECANDELAERE E., Acteurs de la sphère des échanges et territoires: des scénarios pour l'agro-alimentaire, study for DATAR, Groupe de Prospective 10, Paris, March 2003.

[PEL 98] PELLINE J., "Co-opetition gaining acceptance", available at: www.news.cnet.com. 1998.

[PEL 04a] PELLEGRIN-BOUCHER E., GUEGUEN G., "Constitution d'un écosystème d'affaires sur la base des dynamiques de coopération et de coopétition: le cas de SAP, leader sur le marché des ERP", *13th AIMS Conference*, Vallée de Seine, Normandy, 2–3 and 4 June 2004.

[PEL 04b] PELTONIEMI M., "Cluster, value network and business ecosystem: knowledge and innovation approach", *Conference: Organisations, Innovation and Complexity: New Perspectives on the Knowledge Economy*, *The Complexity Society and CRIC Centre for Research on Innovation and Competition*, NEXSUS, University of Manchester, United Kingdom, 9–10 September, 2004.

[PEL 04c] PELTONIEMI M., VUORI E., "Business ecosystem as the new approach to complex adaptive business environments", *Proceedings of eBusiness Research Forum*, Tampere, Finland, 20–22 September 2004.

[PEN 59] PENROSE E.-G., *The Theory of the Growth of the Firm*, Wiley, New York, 1959.

[PEN 01] PENG M.W., "The resource-based view and international business", *Journal of Management*, vol. 27, no. 6, pp. 803–829, 2001.

[PEN 08] PENIN J., More open than open innovation? Rethinking the concept of openness in innovation studies, Working paper no. 2008–18, BETA, July 2008.

[PEN 12] PENTLAND B.-T., FELDMAN M.-S., BECKER M.-C. *et al.*, "Dynamics of organizational routines: a generative model", *Journal of Management Studies*, vol. 49, no. 8, pp. 1484–1508, 2012.

[PEN 13] PENIN J., "L'innovation ouverte est-elle vraiment ouverte?", *Les Echos*, 30 May 2013, available at: http://archives.lesechos.fr/archives/cercle/2013/05/30/cercle_ 73431.htm.

[PER 69] PERLMUTTER H.V., "The tortuous evolution of the multinational corporation", *Columbia Journal of World Business*, vol. 4, no. 1, pp. 9–18, 1969.

[PER 73] PERROUX F., *Pouvoir et économie*, Dunod, Paris, 1973; latest edition in *Pouvoir et économie généralisée*, Presses Universitaires de Grenoble, Grenoble, 1994.

[PER 88] PEREZ C., SOETE L., "Catching-up in technology: entry barriers and windows of opportunity", in DOSI G., FREEMAN C., NELSON R. *et al.* (eds), *Technical Change and Economic Theory*, Pinter Publishers, London, 1988.

[PET 93] PETERAF M.-A., "The cornerstones of competitive advantage: a resource-based view", *Strategic Management Journal*, vol. 14, no. 3, pp. 179–191, 1993.

[PHE 09] PHELPS M., KLINE D., *Burning the Ships: Intellectual Property and the Transformation of Microsoft*, John Wiley and Sons, Hoboken, 2009.

[PIC 92] PICORY C., "Du contrat au marché. Une critique coasienne de l'analyse néo-institutionnaliste", *Economies et sociétés*, vol. 26, no. 3, pp. 135–160, 1992.

[PIN 99] PINCH S., HENRY N., "Paul Krugman's geographical economics, industrial clustering and the British Motor Sport Industry", *Regional Studies*, vol. 33, no. 9, pp. 815–827, 1999.

[PIO 84] PIORE M.-J., SABEL C., *The Second Industrial Divide*, Rinehart and Winston, New York, 1984.

[PIP 16] PIPAME (Pôle interministériel de prospective et d'anticipation des mutations économiques), E-santé: faire émerger l'offre française en répondant aux besoins présents et futurs des acteurs de santé, Report, 2016.

[PIS 08] PISANO G.-P., VERGANTI R., "Which kind of collaboration is right for you?", *Harvard Business Review*, vol. 86, no. 12, pp. 79–86, 2008.

[PIS 16] PISANO G.-P., TEECE D.-J., "How to capture value from innovation: shaping intellectual property and industry architecture", *California Management Review*, vol. 50, no. 1, pp. 278–296, 2016.

[PIT 07] PITELIS C., "Edith Penrose and a learning-based perspective on the MNE and OLI", *Management International Review*, vol. 47, no. 2, pp. 207–219, 2007.

[POI 96] POISSON R., ZHAN S., "Recherche sur les stratégies d'internationalisation des P.M.E.: Etat de l'art et perspectives", *13ème colloque annuel de CCBE-CCPME*, Montréal. Quebec, 31 October–2 November, 1996.

[POR 79] PORTER M.-E., "How competitive forces shape strategy", *Harvard Business Review*, vol. 57, no. 2, pp. 137–145, 1979.

[POR 80] PORTER M.-E., *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, Free Press, New York, 1980.

[POR 82] PORTER M.-E., *Choix stratégiques et concurrence*, Economica, Paris, 1982.

[POR 85] PORTER M.-E., *Competitive Advantage*, Free Press, New York, 1985.

[POR 86a] PORTER M.-E., FULLER M.-B., "Coalitions and global strategy", in PORTER M. (ed.), *Competition in Global Industries*, Harvard Business School Press, Boston, 1986.

[POR 86b] PORTER M.-E., *L'avantage concurrentiel: comment devancer ses concurrents et maintenir son avance*, InterEditions, Paris, 1986.

[POR 90] PORTER M.-E., *The Competitive Advantage of Nations*, Free Press, New York, 1990.

[POR 91] PORTER M.-E., "Towards a dynamic theory of strategy", *Strategic Management Journal*, vol. 12, pp. 95–117, 1991.

[POR 98a] PORTER M.-E., "Clusters and the new economics of competition", *Harvard Business Review*, vol. 76, no. 6, pp. 77–90, November-December 1998.

[POR 98b] PORTER M.-E., "Clusters and competition: new agendas for companies, governments, and institutions", in PORTER M. (ed.), *On Competition*, Harvard Business Review Book, Boston, 1998.

[POR 00] PORTER M.-E., "Location, competition, and economic development: local clusters in a global economy", *Economic Development Quarterly*, vol. 14, no. 1, February 2000.

[POR 11] PORTER M.-E., KRAMER M.R., "Creating Shared Value: How to reinvent capitalism —and unleash a wave of innovation and growth— and unleash a wave of innovation and growth," *Harvard Business Review*, vol. 89, no. 1, pp. 1–17, 2011.

[POW 98] POWELL W.W., "Learning from collaboration: knowledge and networks in the biotechnology and pharmaceutical industries", *California Management Review*, vol. 40, no. 3, pp. 228–240, 1998.

[PRA 85] PRATT J.-W., ZECKAUSER R.-J. (eds), *Principals and Agents: the Structure of Business*, Harvard Business School Press, Boston, 1985.

[PRA 90] PRAHALAD C.-K., HAMEL G., "The core competence of the organization", *Harvard Business Review*, vol. 68, no. 3, pp. 79–91, 1990.

[PRA 04] PRAHALAD C.-K., RAMASWAMY V., "Cocreation experience: the next practice in value creation", *Journal of Interactive Marketing*, vol. 18, no. 3, pp. 5–14, 2004.

[PRE 10] PREVOT F., BRULHART F., GUIEU G., "Perspectives fondées sur les ressources. Proposition de synthèse", *Revue française de gestion*, vol. 5, no. 204, pp. 87–103, 2010.

[PRO 12] PROCACCIA C., SIDO B., Les enjeux et perspectives de la politique spatiale européenne, Report, Assemblée nationale (no. 348) and the Sénat (no. 114), 2012.

[QUE 87] QUELENNEC M., "La sous-traitance industrielle gagne du terrain", *Economie et Statistique,* vol. 199, no. 1, pp. 27–42, 1987.

[QUE 02] QUELIN B., "L'industrie mondiale des jeux vidéo: 1980-2001", *Cas pédagogique*, CCMP (Centrale de cas et de médias pédagogiques), Paris, 2002.

[RAI 92] RAINELLI M., *Economie industrielle*, 2nd ed., Dalloz, Paris, 1992.

[RAV 85] RAVIV A., "Management compensation and the managerial labour market: an overview", *Journal of Accounting and Economics*, vol. 7, nos. 1–3, pp. 239–245, 1985.

[REE 90] REED D., DEFILLIPPI R., "Causal ambiguity, barriers to imitation, and sustainable competitive advantage", *The Academy of Management Review*, vol. 15, no. 1, pp. 88–102, 1990.

[REI 81] REID S., "The Decision Maker and Export Entry and Expansion", *Journal of International Business Studies*, vol. 12, no. 2, pp. 101–112, 1981.

[REI 83] REINGANUM J., "Uncertain Innovation and the Persistence of Monopoly", *American Economic Review*, vol. 73, no. 4, pp. 741–748, 1983.

[REI 86] REICH R.-B., MANKIN E.-D., "Joint venture with Japan give away your future", *Harvard Business Review*, vol. 64, no. 2, pp. 78–86, March 1986.

[REV 90] REVE T., "The firm as a nexus of internal and external contracts", in AOKI M., GUSTAFSSON B., WILLIAMSON O.-E. (eds), *The Firm as a Nexus of Treaties*, Sage Publications, London, 1990.

[REY 91] REY P., The economics of franchising, Working paper, Institut des mathématiques économiques LATEC (Laboratoire d'analyse et des techniques économiques), CNRS, University of Burgundy, Dijon, 1991.

[RIC 72] RICHARDSON G.-B., "The organisation of industry", *The Economic Journal*, vol. 82, no. 327, pp. 883–896, 1972.

[RIE 11] RIES E., The *Lean Startup: How Constant Innovation Creates Radically Successful Businesses*, Portfolio Penguin, London, 2011.

[ROB 06] ROBINSON D.-T., STUART T.-E., "Network effects in the governance of strategic alliances", *The Journal of Law, Economics, & Organization*, vol. 23, no. 1, pp. 242–263, 2006.

[ROC 92] ROCCHIA S., Le rôle des organisations dans la création de ressources, PhD Thesis in Economics, LATAPSES, University of Nice, 1992.

[ROC 04] ROCHET J.-C., TIROLE J., *Two-Sided Markets: An Overview*, Mimeo, IDEI, University of Toulouse, Toulouse, 2004.

[ROC 06] ROCHET J.-C., TIROLE J., "Two-sided markets: a progress report", *The RAND Journal of Economics*, vol. 35, no. 3, pp. 645–667, 2006.

[ROM 02] ROMIJN H., ALBU M., "Innovation, networking and proximity: lessons from small high technology firms in the UK", *Regional Studies*, vol. 36, no. 1, pp. 81–86, 2002.

[ROO 88] ROOT F.-R., "Some taxonomies of international cooperative agreements", in CONTRACTOR F.-J., LORANGE P. (eds), *Cooperative Strategies in International Business*, Lexington Books, M.A. Rowan & Littlefield, Lanham, 1988.

[ROS 73] ROSS S.A., "The economic theory of agency: the principal's problem", *American Economic Review*, vol. 63, no. 2, pp. 134–139, May 1973.

[ROS 03] ROSENKOPF L., ALMEIDA P., "Overcoming local search through alliances and mobility", *Manage. Sci.*, vol. 49, pp. 751–766, 2003.

[ROT 90] ROTHWELL P., "External networking and innovation in small and medium-sized manufacturing firms in Europe", in PLANQUE B. (ed.), *Revue d'économie régionale et urbaine*, HEC Montréal, nos. 3–4, pp. 295–320, 1990.

[RUF 91] RUFFIEUX B., "Microsystème d'innovation et formes spatiales de développement industriel", in ARENA R. *et al.* (eds), *Traité d'économie industrielle*, Economica, Paris, 1991.

[RUG 86] RUGMAN A.M., VERBEKE Q., NGUYEN T.-K., "Fifty years of international business theory and beyond", *Management International Review*, vol. 51, no. 6, pp. 755–786, 1986.

[SAI 00] SAIAS M., MÉTAIS E., "La stratégie d'entreprise: évolution des pratiques et de la pensée", *Etudes et Documents, Série Recherche*, AE, WP, no. 566, Université de Droit, d'Economie et des Sciences d'Aix-Marseille, 2000.

[SAX 94] SAXENIAN A., *Regional Advantage. Culture and Competition in Silicon Valley and Route 128*, Harvard University Press, Cambridge, 1994.

[SCH 84] SCHERER F.-M., *Innovation and Growth*: *Schumpeterian Perspectives*, MIT Press, Cambridge, 1984.

[SCH 86] SCHMALENSEE R., "Inter-industry studies of structure and performance", in SCHMALENSEE R., WILLIG R. (eds), *Handbook of Industrial Organization*, Elsevier, Amsterdam, 1986.

[SCH 90] SCHERER F.-M., ROSS D., *Industrial Market Structure and Economic Performance,* Houghton Miftin Company, Boston, 1990.

[SCH 15] SCHILTZ A., "La chaîne de valeur des objets connectés santé", available at: http://orange-business.com/fr/blogs/e-sante/sante-mobile-0/la-chaine -de-valeur-des-objets-connectes-sante, 7 May 2015.

[SCO 86] SCOTT A.J., STORPER M. (eds), *Production, Work, Territory*, Unwin Hyman, London, 1986.

[SCO 88] SCOTT A.J., *New Industrial Spaces*, Pion, London, 1988.

[SCO 95] SCOTT R., *Institutions and Organisations*, Sage Publications, Thousand Oaks, 1995.

[SHA 79] SHAVELL S., "On moral hazard and insurance", *Quarterly Journal of Economics*, vol. 93, no. 4, pp. 541–562, 1979.

[SHA 91] SHAN W., HAMILTON W., "Country-specific advantages and international cooperation", *Strategic Management Journal*, vol. 12, no. 6, pp. 419–432, 1991.

[SHE 79] SHEPHERD W.G., *The Economics of Industrial Organization*, Prentice-Hall, Englewood Cliffs, 1979.

[SIL 91] SILVERBERG G.-P., "Adoption and diffusion of technology as a collective evolutionary process", in NAKICENOVIC N., GRÜBLER A. (eds), *Diffusion of Technologies and Social Behavior*, Springer-Verlag, Berlin, 1991.

[SIM 78] SIMON H., "Rationality as process and as product of thought", *American Economic Association*, vol. 68, no. 2, pp. 1–16, May 1978.

[SIM 82] SIMON H., *Models of Bounded Rationality: Behavioural Economics and Business Organization*, vol. 2, MIT Press, Cambridge, 1982.

[SIM 99] SIMONIN B.-L., "Ambiguity and the process of knowledge transfer in strategic alliances", *Strategic Management Journal*, vol. 20, no. 7, pp. 595–623, 1999.

[SIN 05] SINGH K., MITCHELL W., "Growth dynamics: The relationship between interfirm collaboration and business sales in entrant and incumbent alliances", *Strategic Management Journal*, vol. 26, no. 6, pp. 497–521, 2005.

[SLY 88] SLYWOTZKY A.J., MORRISON D.J., *The Profit Zone*, Crown Business, New York, 1988.

[SNR 09] SNRI, Défis transverses du système de recherche et d'innovation, Ecosystème de l'innovation, Working paper, 10 March 2009.

[SPE 71] SPENCE M.-A., ZECKAUSER R., "Insurance, information and individual action", *American Economic Review*, vol. 61, no. 2, pp. 119–132, 1971.

[SPE 77] SPENCE M.-A., "Entry, capacity, investment and oligopolistic pricing", *Bell Journal of Economics*, vol. 8, no. 2, pp. 534–544, 1977.

[SPE 79] SPENCE A.-M., "Investment strategy and growth in a new market", *Bell Journal of Economics*, vol. 10, no. 1, pp. 1–19, 1979.

[STA 99] STANLEY G., "Management and complex adaptation – a research note", *Management International*, vol. 3, no. 2, pp. 69–79, 1999.

[STA 01] STABER U., "The structure of networks in industrial districts", *International Journal of Urban and Regional Research,* vol. 25, no. 3, pp. 537–552, 2001.

[STE 09] STEVENS E., "Cocréation de valeur et communautés d'utilisateurs: vers un renouvellement des modèles de chaîne de valeur et d'innovation", *Management & Avenir*, no. 28, pp. 230–244, 2009.

[STO 89a] STORPER M., WALKER R., *The Capitalist Imperative Territory, Technology, and Industrial Growth*, Basil Blackwell, New York, 1989.

[STO 89b] STORPER M., "Regional context and global trade", *Economic Geography*, vol. 85, no. 1, pp. 1–21, 2009.

[STO 95] STORPER M., SCOTT A., "The wealth of regions", *Futures*, vol. 27, no. 5, pp. 505–526, 1995.

[STO 97] STORPER M., *The Regional World: Territorial Development in a Global Economy*, Guilford Press, New York, 1997.

[SUZ 92] SUZUMURA K., "Cooperative and noncooperative R&D in an oligopoly with spillovers", *American Economic Review*, vol. 82, pp. 1307–1320, 1992.

[SVE 82] SVEJNAR J., SMITH S., "The economics of joint ventures in centrally planned and labor-managed economies", *Journal of Comparative Economics*, vol. 6, no. 2, pp. 148–172, June, 1982.

[SVE 84] SVEJNAR J., SMITH S., "The Economics of Joint Ventures in Less Developed Countries", *The Quarterly Journal of Economics*, vol. 99, no. 1, 1984.

[SYN 13] SYNTEC NUMERIQUE AND SNITEM, Télémédecine 2020 – Modèles économiques pour le télésuivi des maladies chroniques, White paper, April 2013, available at: http://www.syntecnumerique.fr/sites/default/files/related_docs/livre_blanc_telemedecine_avril2013.pdf.

[TAL 02] TALLMAN S., FLADMOE-LINDQUIST K., "Internationalization, globalization, and capability-based strategy", *California Management Review*, vol. 45, no. 1, pp. 116–35, 2002.

[TEE 81] TEECE D.-J., "The mulinational enterprise: market failures and market power considerations", *Sloan Management Review*, vol. 22, no. 3, pp. 7–10, 1981.

[TEE 86] TEECE D.-J., "Profiting from technological innovation: implications for integration, collaboration, licensing and public policy", *Research Policy*, vol. 15, no. 6, pp. 285–305, 1986.

[TEE 92] TEECE D.-J., "Competition, co-operation, and innovation", *Journal of Economic Behavior and Organisation*, vol. 18, no. 1, pp. 1–25, 1992.

[TEE 97] TEECE D.-J., PISANO G., SHUEN A., "Dynamic capabilities and strategic management", *Strategic Management Journal*, vol. 18, no. 7, pp. 509–533, 1997.

[TEE 07] TEECE D.-J., "Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance", *Strategic Management Journal*, vol. 28, no. 13, pp. 1319–1350, 2007.

[THI 87] THIETART R.-A, KŒNIG C., "Programmes aérospatiaux: la stratégie de l'organisation mutuelle", *Revue française de gestion*, no. 62, pp. 42–53, March 1987.

[THI 90] THIETART R.-A., *Stratégie d'entreprise,* McGraw-Hill, Paris, 1990.

[TIE 56] TIEBOUT C.M. "Exports and Regional Economic Growth", *Journal of Political Economy*, vol. 64, pp. 160–164, 1956.

[TIE 97] TIEMESSEN I., LANE H.W., CROSSAN M.M. *et al.*, "Knowledge management in international joint ventures", in BEAMISH P., KILLINGS J. (eds), *Cooperative Strategies, North American Perspectives*, New Lexington Press, San Francisco, 1997.

[TIM 98] TIMMERS P., "Business Models for Electronic Markets", *Journal on Electronic Markets*, vol. 8, no. 2, pp. 3–8, 1998.

[TIR 85] TIROLE J., *Concurrence imparfaite*, Economica, Paris, 1985.

[TIR 86] TIROLE J., "Procurement and renegociation", *Journal of Political Economy*, vol. 94, no. 2, pp. 235–259, 1986.

[TOR 00] TORRES-BLAY O., *Economie d'entreprise, Organisation et stratégie à l'aube de la nouvelle économie*, Economica, Paris, 2000.

[TOR 03] TORRES-BLAY O., GUEGUEN G., "Linux contre Microsoft: la guerre des écosystèmes d'affaires", *Cahier de recherche*, E.M. Lyon, Ecully, 2003.

[TUR 85] TURCQ D., "La tunique de Nessus, les stratégies d'accords internationaux des entreprises japonaises", ESCP, *Cahiers d'études*, no. 85–47, 1985.

[UNC 16] UNCTAD, World Investment Report 2016, Investor nationality: Policy challenges, ONU, New York, 2016, available at: http://unctad.org/en/PublicationsLibrary/wir 2016_en.pdf.

[VAN 83] VAN DUIJN J., *The Long Wave in Economic Life*, George Allen & Unwin, London, 1983.

[VAN 03] VAN DER LINDE C., "The demography of clusters. findings from the cluster meta-study", in BRÖCKER J., DOHSE D., SOLTWEDEL R. (eds), *Innovation Clusters and Interregional Competition*, Springer, New York, 2003.

[VAN 08] VANHAVERBEKE W., VAN DE VRANDE V.J.A., CHESBROUGH H.W., "Understanding the advantages of open innovation practices in corporate venturing in terms of real options", *Creativity and Innovation Management*, vol. 17, no. 4, pp. 251–258, 2008.

[VAN 16] VAN ALSTYNE M.-V., PARKER G.G., CHOUDARY S.-P., "Pipelines, platforms, and the new rules of strategy", *Harvard Business Review*, vol. 94, no. 4, pp. 54–60, 2016.

[VAR 04] VARGO R.-F., LUSCH S.L., "Evolving for a new dominant logic for marketing", *Journal of Marketing*, vol. 68, no. 1, pp. 1–17, 2004.

[VER 66] VERNON J.-M., "International investment and international trade in the product cycle", *Quarterly Journal of Economics*, vol. 80, no. 2, pp. 190–115, 1966.

[VER 71] VERNON R., *Sovereignty At Bay: the Multinational Spread of US Enterprises*, Basic Books, New York, 1971.

[VER 77] VERNON R., *Storm Over the Multinationals: the Real Issues*, Harvard University Press, Cambridge, 1977.

[VER 12] VERNEFTE E., TISSIER-DESBORDES E., "La participation du client, la coproduction, la cocréation, un nouvel eldorado pour le marketing?", *Décisions Marketing*, no. 65, pp. 5–8, January-March 2012.

[VER 13] VERDIER H., "Non, les données ne sont pas du pétrole...", available at: http://www.henriverdier.com/2013/03/non-les-donnees-ne-sont-pas-du-petrole.html, 19 March 2013.

[VIC 85] VICKERS J., "Strategic competition among the few-some recent developments in the economics of industry", *Oxford Review of Economic Policy*, vol. 1, no. 3, pp. 39–62, 1985.

[VON 03] VON HIPPEL, VON KROGH, "Open source software and the "Private-Collective" innovation model", *Organization Science*, vol. 14, no. 2, pp. 209–223, 2003.

[VRA 09] VAN DE VRANDE V.J.A., DE JONG J.P.J., VANHAVERBEKE W. *et al.*, "Open Innovation in SMEs: Trends, Motives and Management Challenges", *Technovation*, vol. 29, nos. 6/7, pp. 423–437, 2009.

[WAL 84] WALKER G., WEBER D, "A transaction cost approach to make-or-buy decision", *Administrative Science Quarterly*, vol. 29, no. 3, pp. 137–391, 1984.

[WAL 91] WALKER G., POPPO L., "Profit Centers, Single-Source Suppliers, and Transaction Costs", *Administrative Science Quarterly*, vol. 36, pp. 66–87, March, 1991.

[WAL 07] WALLEY K., "Coopetition. An introduction to the subject and agenda for research", *International Studies of Management and Organization*, vol. 37, no. 2, pp. 11–31, 2007.

[WAV 91] WAVERMAN L., "Strategic policy trade and 1992", in BÜRGENMEIER B., MUCCHIELLI J.-L. (eds), *Multinationals and Europe 92, Strategies for the Future*, Routledge, London, 1991.

[WEL 72] WELLS L.T. Jr., *A Product Life Cycle for International Trade?*, Harvard Business School, Division of Research, Boston, 1972.

[WER 84] WERNERFELT B., "A resource-based view of the firm", *Strategic Management Journal*, vol. 5, no. 10, pp. 171–80, 1984.

[WER 89] WERNERFELT B., "From critical resources to corporate strategy", *Journal of General Management*, vol. 14, no. 3, pp. 4–12, 1989.

[WES 03] WEST J., "How open is open enough? Melding proprietary and open source platform strategies", *Research Policy*, vol. 32, no. 7, pp. 1259–1285, 2003.

[WIG 05] WIGGINS G., RUEFLI T.-W., "Schumpeter's Ghost: is hypercompetition making the best of times shorter?", *Strategic Management Journal*, available at: http://documents.worldbank.org/curated/en/517231468762935046/World-development-indicators-2004, vol. 26, pp. 887–911, 2005.

[WIL 75] WILLIAMSON O.E., *Markets and Hierarchies: Analysis and Antitrust Implications*, Free Press, New York, 1975.

[WIL 81] WILLIAMSON O.E, "The Economics of Organization: The Transaction Cost Approach", *American Journal of Sociology*, vol. 87, no. 3, pp. 548–577, 1981.

[WIL 85] WILLIAMSON O.-E., *The Economic Institutions of Capitalism. Firms, Markets, Relational Contracting*, The Free Press, New York, 1985.

[WIL 91] WILLIAMSON O.E., "Strategizing, Economizing, and Economic Organization", *Strategic Management Journal*, no. 12, pp. 75–94, 1991.

[WOR 04] WORLD BANK, World Development Indicators, Report, Washington, DC, 2004.

[ZAH 95] ZAHEER S., "Overcoming the liability of foreignness", *Academy of Management Journal*, vol. 38, no. 2, pp. 341–363, 1995.

[ZAH 97] ZAHEER S., MOSAKOWSKI E., "The dynamics of the liability of foreignness: a global study of survival in financial services", *Strategic Management Journal*, vol. 18, no. 6, pp. 439–464, 1997.

Space/satellite references

[AGW 99] AGWA, *National Policy Framework for E-Health*, Australian Government Web Archive, available at: http://www.archive.dcita.gov.au/1999/09/rise, 1999.

[FRE 16] FRENCH GOVERNMENT, "Prime Minister's office, report by Geneviève Fioraso on the French space sector", available at: http://www.gouvernement.fr/partage/7791-rapport-de-genevieve-fioraso-sur-la-filiere-spatiale-francaise, 2016.

[GAR 16] GARTNER, "Gartner's 2016 Hype cycle for emerging technologies identifies three key trends that organizations must track to gain competitive advantage" *Hype Cycle Special Report Distills Insight From More Than 2 000 Technologies*, available at: http://www.gartner.com/newsroom/id/3412017, 2016.

[ORA 13] ORANGE, "Orange and the European policy", available at: http://www.orange.com/en/about/European-Union/Orange-and-the-European-policy, 2013.

E-health references

[BNP 13] BNP PARIBAS ATELIER, "Les objets connectés, au centre d'un nouvel écosystème de santé?", Survey carried out by IFOP, December, p. 9, 2013.

[BRA 14] LE BRAS P.-L., LOTH A., Report on governance and the use of health data, September 2013, published 14 January 2014, available at: http://www.drees.sante.gouv.fr/rapport-sur-la-gouvernance-et-l-utilisation-des-donnees-de_11202.

[DAI 17] DAIDJ N., "Uberization (or uberification) of the economy", *Encyclopedia of Information Science and Technology*, 4th ed., IGI Global, Hershey 2017.

[EYS 01] EYSENBACH G., "Editorial", *Journal of Medical Internet Research*, vol. 3, no. 2, p. e20, published online 6 June 2001. available at: http://www.jmir.org.

[MIT 99] MITCHELL J., *From Telehealth to E-health: The Unstoppable Rise of E-health*, National Office for the Information Technology, Canberra, Australia, available at: http://www.archive.dcita.gov.au/1999/09/rise, 1999.

[OMS 05] OMS, *58e Assemblée mondiale de la Santé, Résolutions et décisions*, 16–25 May 2005.

[ORA 13] ORANGE, "E-santé et systèmes de santé avancés?" February 2013, available at: http://www.orange.com/en/about/European-Union/Orange-and-the-European-policy.

[PIP 16] PIPAME, Pôle interministériel de prospective et d'anticipation des mutations économiques, ministère de l'Economie, des Finances et de l'Industrie, E-santé: faire émerger l'offre française en répondant aux besoins présents et futurs des acteurs de santé, Report, 2016, available at: http://www.entreprises.gouv.fr/files/files/directions_services/etudes-et-statistiques/prospective/Numerique/2016-02-Pipame-e-sante.pdf.

[SCH 15] SCHILTZ A., "La chaîne de valeur des objets connectés santé", 7 May 2015, available at: http://www.orange-business.com/fr/blogs/e-sante/sante-mobile-0/la-chaine-de-valeur-des-objets-connectes-sante.

[SYN 13] SYNTEC NUMERIQUE ET SNITEM, Télémédecine 2020 – Modèles économiques pour le télésuivi des maladies chroniques, Livre blanc, April 2013 available at: http://www.syntec-numerique.fr/sites/default/files/related_docs/livre_blanc_telemedecine_ avril2013.pdf.

[VER 13] VERDIER H., "Non, les données ne sont pas du pétrole...", 19 March 2013, available at: http://www.henriverdier.com/2013/03/non-les-donnees-ne-sont-pas-du-petrole. html.

[XER 13] XERFI-PRECEPTA, "Les marchés de l'E-santé à l'horizon 2017 – Télémédecine, télésanté et systèmes d'information de santé: positionnement des acteurs et enjeux stratégiques à moyen terme", 15 February 2013, available at: http://www.xerfi. com/communication/espace_presse/E-Sante2013.pdf.

Console and video game references

[AUT 15] AUTORITÉ DE LA CONCURRENCE, Décision no 15, D18 du 1er décembre 2015 relative à des pratiques mises en œuvre dans le secteur des jeux vidéo, 2015, available at: http://www.autoritedelaconcurrence.fr /pdf/avis/15d18.pdf.

[CAR 14] CARPENTER M., DAIDJ N., MORENO C., "Game Console Manufacturers: the end of sustainable competitive advantage?", *Digiworld Economic Journal*, vol. 1, no. 94, pp. 39–60, 2014.

[DAI 05] DAIDJ N., QUELIN B., "Le leadership de Sony dans le secteur des jeux vidéo", *Cas pédagogique no G1381*, published by CCMP (Centrale de cas et de médias pédagogiques), Paris, 2005.

[DAI 07] DAIDJ N., "L'évolution des chaînes de valeur dans le secteur des jeux vidéo", in VIALLE P. (ed.), *Mutation des STIC. Acteurs, ressources et activités*, Hermes-Lavoisier, Paris, 2007.

[DAI 08a] DAIDJ N., "How does coopetition change according to industry evolution? The case of video games consoles sector", *European Institute for Advanced Studies in Management* (EIASM), *3rd Workshop on "Coopetition" Strategy – Stretching the Boundaries of "Coopetition*", Madrid, 7–8 February 2008.

[DAI 08b] DAIDJ N., *2007: le triomphe de la Wii", L'année des TIC 2007: télécom, électronique, informatique, médias, Internet, Observatoire des stratégies et technologies de l'information et de la communication (OSTIC)*, Télécom & Management SudParis, 2008.

[DAI 09] DAIDJ N., ISCKIA T., "Entering the Economic Models of Game Console Manu-facturers", *Communications & Strategies*, vol. 73, pp. 23–42, 1st quarter 2009.

[DAI 10] DAIDJ N., ISCKIA T., "Rattrape-moi si tu peux: Xbox *versus* PlayStation", *Revue des cas en gestion*, no. 3, pp. 35–51, October 2010.

[DAI 17] DAIDJ N., "Quel positionnement pour Microsoft dans le secteur en pleine mutation des consoles de jeux vidéo?", in BOULOCHER V., RUAUD S. (eds.), *Analyse de marché. De la définition au diagnostic*, 5th ed., Vuibert, Paris, 2017.

[DAN 13] D'ANGELO W., "2013 Year on Year Sales and Market Share Update to November 2nd", 16 December 2013, available at: http://www.vgchartz.com/ article/ 251383/ 2013-year-on-year-sales-and-market-share-update-to-november-2nd.

[DIK 11] DIKMEN L., HAMOUTI R., LE ROY F., "Quand la coopération est créatrice de la rivalité: le cas Sony-Nintendo", *presented at the 20th AIMS Conference*, Nantes, 6-8 June 2011.

[GAN 11] GANDIA R., BRION S., MOTHE C., "Innovation ouverte et management de la propriété intellectuelle: quelles stratégies dans le secteur du jeu vidéo?", *Revue française de gestion*, vol. 1, no. 210, pp. 117–131, Paris, 2011.

[GAN 12] GANDIA R., GARDET E., "Source de dépendance et stratégies pour innover. Application aux studios de jeu vidéo français", *Management & Avenir*, 2012/6, no. 56, pp. 75–93, 2012.

[GAR 11] GARTNER, "Gartner Predicts Over 70 Percent of Global 2000 Organisations Will Have at Least One Gamified Application by 2014", press release, 9 November 2011, available at: http://www.gartner.com/newsroom/id/ 1844115.

[GAR 13] GARTNER, "Worldwide Video Game Market to Total $93 Billion in 2013", 29 October 2013, available at: http://www.gartner.com/newsroom/ id/2614915.

[IDA 07] IDATE, R&D et innovation dans l'industrie française du jeu vidéo. Study for the Ministry of Economy, Finance and Industry – Directorate General for Enterprise, 2007, available at: http://ja.games.free.fr/GameConsort/Rapports/R&D-Innovation%20dans%20le%20jeu.pdf.

[JOH 05] JOHNS J., "Interactions between actors in the video games software production network", *Journal of Economic Geography*, vol. 6, no. 2, pp. 151–180, 2005.

[PAR 09] PARMENTIER G., MANGEMATIN V., "Innovation et création dans le jeu vidéo. Comment concilier exploration et exploitation?", *Revue française de gestion*, vol. 35, no. 191, pp. 77–87, 2009.

Other references

[AGE] Agence française pour le jeu vidéo, available at: www.afjv.com.

[GAM] Game Industry (website on the gaming industry), available at: www.gamesindustry.biz.

[GFK] GFK, Institut d'études et recherches marketing spécialisé (*Custom Research, Retail and Technology, Media*), available at: http://www.gfk.com or http://www.gfkms.com.

[MIN] Ministère de la Culture et de la Communication, Direction du développement des médias, ministère de la Culture et de la Communication, available at: www.ddm.gouv.fr.

[SCR] Screen Digest (website specializing in the media industry), available at: www.screendigest.com.

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