

TYPES OF COOPETITION TO MANAGE EMERGING TECHNOLOGIES

Francesco Garraffo
University of Catania
Department of Business Economics & Management
C.so Italia, 55
95129 – Catania – Italy
Tel. (+39) 095 375344 ext. 268
Fax (+39) 095 370574
garraffo@unict.it

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ABSTRACT

The coopetition is a different way to behave in businesses affected by emerging technologies. To explain why coopetition is frequent in these businesses, the paper suggests the idea that competitors decide to cooperate because in emerging technologies there is a competition among “network of innovators” focused on the technology development and the access to the marketplace.

Based on the level of cooperation (high or low) among competitors on technology development and market creation, the paper organizes in a framework the following types of coopetition: a) exchanges of existing knowledge; b) collaborative research & development activities; c) market alliances either for setting new standards or integrating existing business. Each type of coopetition can depict either a specific choice of a firm to effectively compete in the marketplace or a portfolio of firm’s cooperative activities that evolves over time.

INTRODUCTION

The cooptation (Brandenburger & Nalebuff, 1996; Gomes-Casseres, 1996; Harbison & Pekar, 1998) is an alternative way to behave in the business. According to the general idea that competition is the rule, cooptation is an exception frequently undertaken by firms that have to manage emerging technologies (i.e. biotechnologies, information & communication technologies, electronics, semiconductors, etc.). The emerging technologies increase the level of uncertainty on market opportunities and technology developments and firms involved in businesses affected by these technologies can manage uncertainty by cooperating with competitors for sharing resources and spreading risk.

When cooptation is undertaken, it shows different configurations according to the level of commitment lavished by competitors on both cooperative technology developments and collaborative market actions. Specifically, the article analyses cases of cooptation concerning: a) exchanges of patents and knowledge; b) collaborative research & development activities; c) market alliances for setting new standards, and (d) collaborative agreements to integrate existing businesses.

Each type of cooptation can depict either a specific choice of a firm to effectively compete in the marketplace or a portfolio of firm's cooptative activities that evolves over time.

The inspiring idea used in analyzing these configurations is that cooptation among competitors in emerging technologies is given to the competition among different "networks of innovators". In businesses affected by radical innovations, new standards, new converging technologies, cooperation among competitors it is frequently related to competition among different "networks of innovators" that compete to seize market opportunities related to radical innovations, set new standards, and/or integrate existing businesses through converging technologies.

The first part of the paper focuses on why cooptation is undertaken by firms whose competitive position is affected by emerging technologies while the focus of the part that follows is on how cooptation is realized. According to this contents, the paper begins with the discussion of the idea of competition among different "networks of innovators", it continues with the discussion of different firm's cooptative activities organized in a framework - illustrated with empirical evidences regarding several industries – and it finishes with conclusions focused on implications of this framework for future theoretical and empirical research.

THE COOPETITION WITHIN COMPETING “NETWORKS OF INNOVATORS”

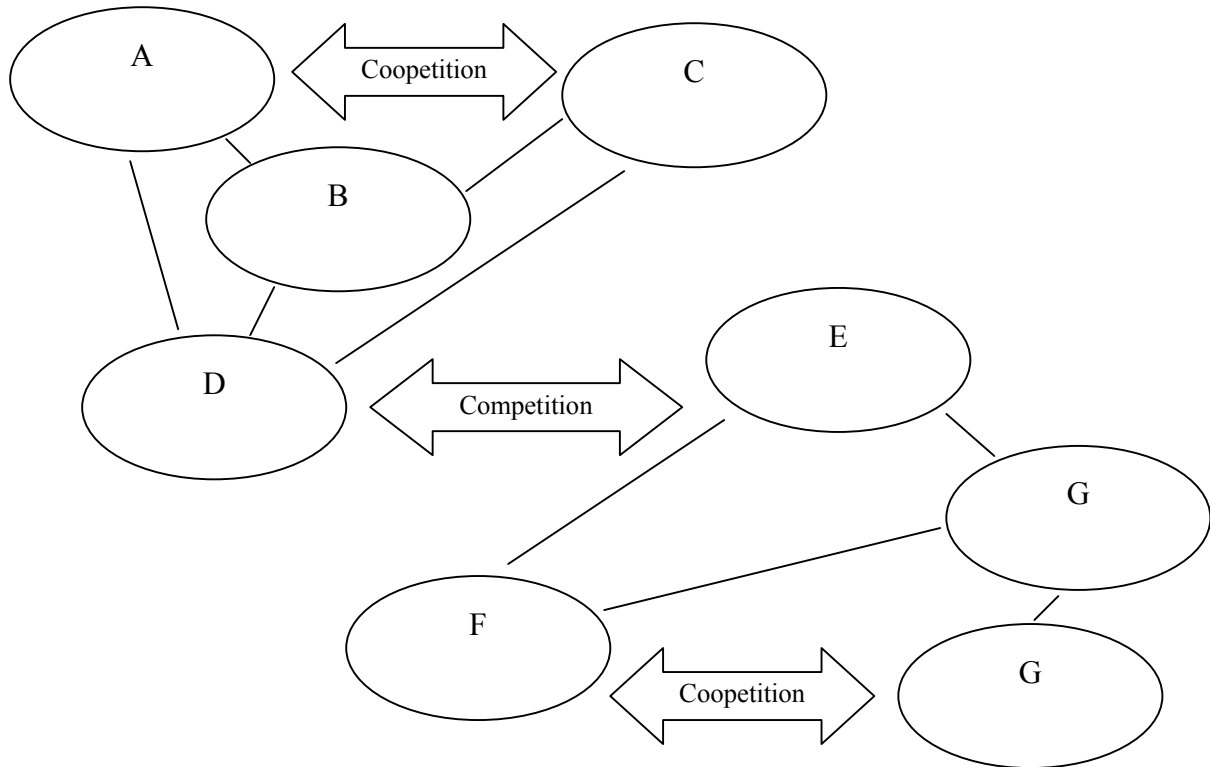
The decision to cooperate with competitors it is generally motivated by the following reasons: (a) to access and/or exchange new technologies and complementary knowledge, (b) to access and/or stimulate new markets, (c) to influence and/or even control technological standards.

In the competition stimulated by emerging technologies, each firm needs to share resources and/or spread risks related to the development and/or the launch in the marketplace of a technology. Apple Computer Inc’s alliance with Sony Corporation to manufacture Apple’s Powerbook computers is an example of resources shared between competitors. The alliance between Apple and Sony linked Apple’s capability at designing easy-to-use computer products with Sony’s miniaturization capability, including the manufacturing know-how necessary to make compact products. Neither firm had the capability to develop the Powerbook individually (Dyer & Singh, 2000). In another case, a study of global strategic alliances in biotechnology found that complementarity of firms, in R&D activities and market knowledge, and country specific resources, among domestic and foreign firms, is a key factor in the formation of cooperative agreements. The complementarity in this case consists of linkages between the strong basic research capabilities of U.S. firms with the unique local knowledge and distribution capabilities of their partners in overseas markets (Tushman & O’Reilly, 1997).

Even if these cases are joined by the need of resources to improve competitors’ position in the marketplace and/or in the technology edge, in businesses affected by emerging technologies the cooperation is usually pursued because it is frequent a competition among “networks of innovators”.

A network of innovators is a group of firms, consisting of competitors as well as suppliers and customers, which decide to cooperate because they are in competition with other networks of firms in developing new technologies and/or setting new standards in the marketplace (See Fig. 1).

Fig. 1
The cooperation within competing “networks of innovators”



Inside these networks, firms are embedded in a bundle of relationships (i.e. joint-ventures, alliances, equity sharing or exchanges, etc.) that influence each firm’s competitive behavior (Gnyawali & Madhavan, 2001), as well as the network’s behavior as a whole.

At the firm level, the competitive behavior is affected by the structural embeddedness of the network that influences the likelihood of each firm’s action and response to competitive moves in the marketplace [1].

At the network level, the competitive behavior is affected by the competition stimulated by other networks’ moves.

The following is an example of cooperation within competing “networks of innovators” focused on setting a new standard in the wireless operating systems [2].

In the I&CT industry there is a joint-venture among Nokia, Ericsson, Motorola, and Psion called Symbian, which vision statement is “to set the standard for mobile wireless operating systems and to enable a mass market for Wireless Information Devices.”

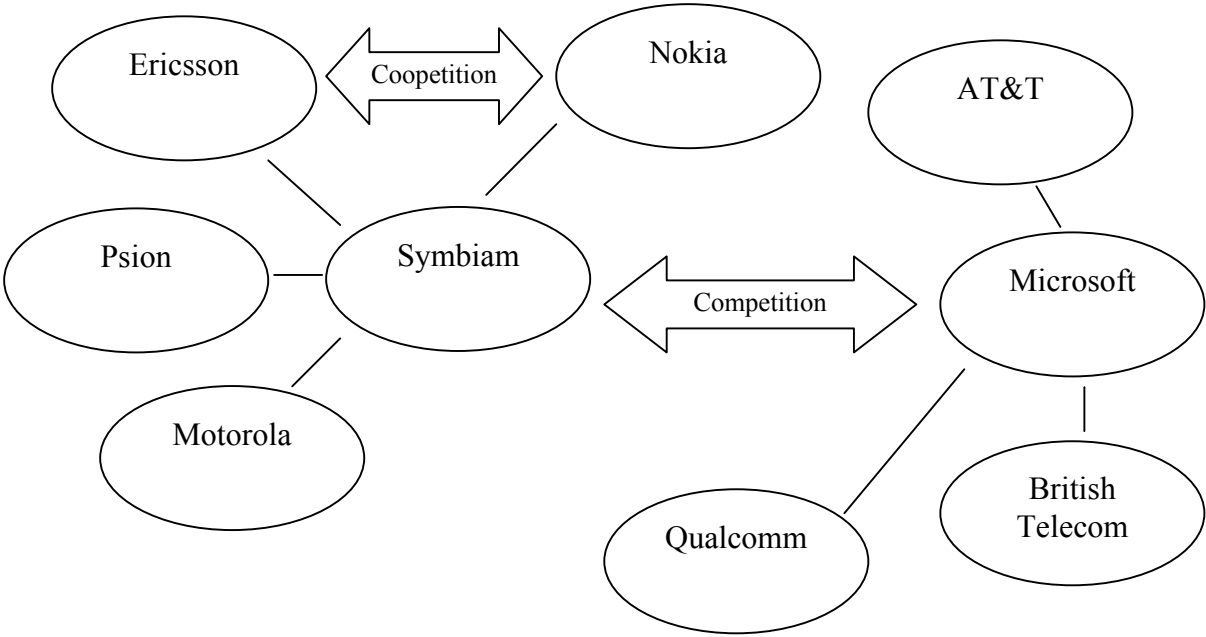
The Symbian joint-venture is among the main mobile wireless telephones manufacturers in the world, Nokia, Ericsson, and Motorola, and the leading company in the mobile digital computing, Psion.

According to the phenomenon of the coopetition within competing “networks of innovators”, the Symbian joint-venture has been competing with another network of firms consisting of Microsoft, AT&T, British Telecom, and Qualcomm, which goal is to set a standard for mobile wireless operating systems based on Windows (Ancarani, 2001). The Microsoft’s goal is to transfer the standard of Windows, Windows CE and Windows Pocket Pc even in the wireless multimedia applications.

To get this result, during the last two years (1998-2000), Microsoft made alliances with AT&T and British Telecom to transform the Windows Operating System in a standard platform for a new generation of *web based* services available for both ADSL and wireless communications. Moreover, in the 1998 Microsoft concluded an alliance with Qualcomm called “Wireless Knowledge”.

See Fig. 2 to have a “picture” of the competition between Symbian and Microsoft in the mobile wireless operating systems.

Fig. 2
The competition between Symbian Network and Microsoft Network in the mobile wireless operating systems

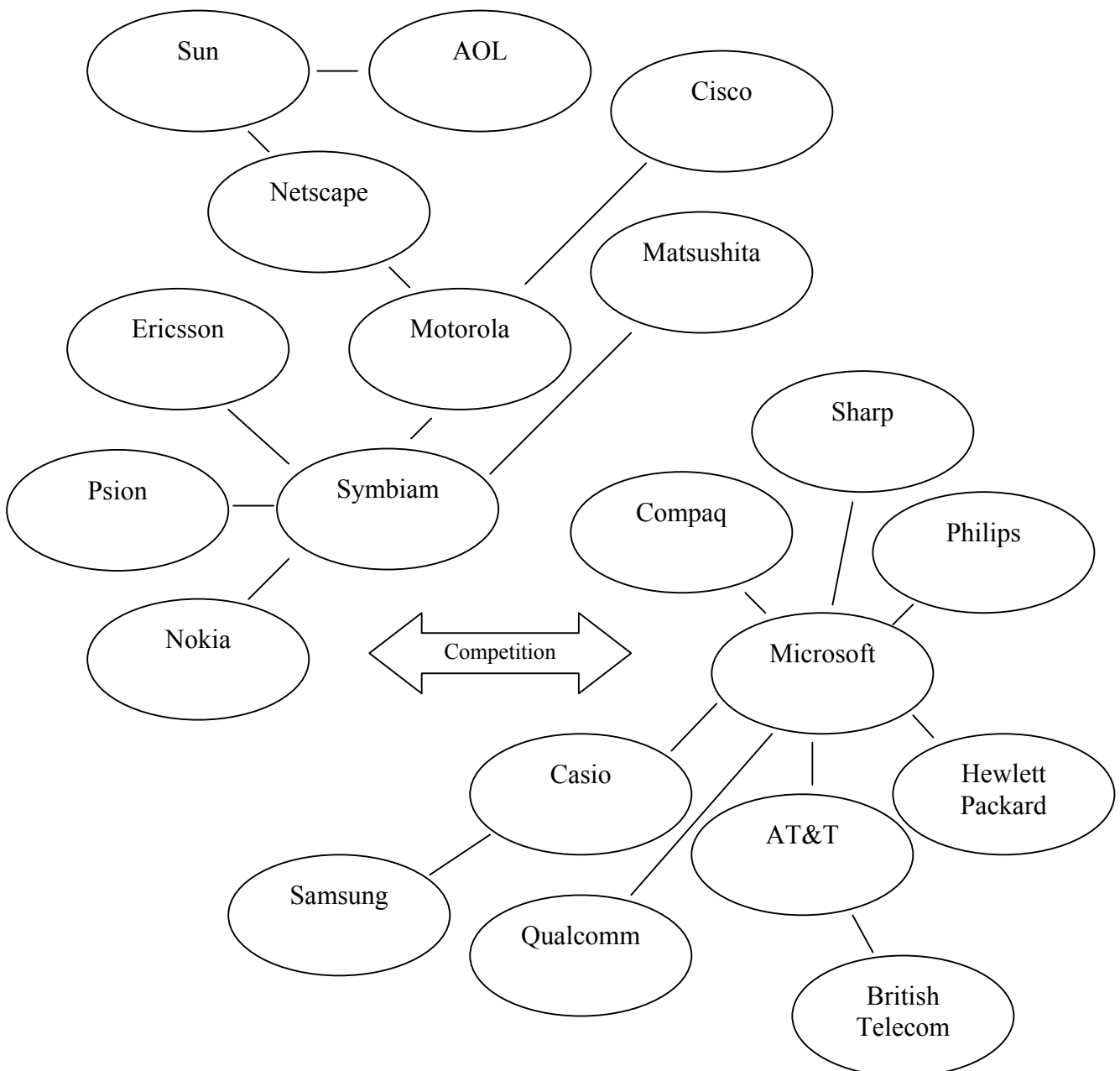


As a result of the competition on technology development and market creation, during the last years, both of the networks included new firms.

Microsoft has been expanding the network with *handheld device* manufacturers, all Windows Operating System licensers, like Casio, Philips, Compaq, Sharp, Hewlett Packard, and Samsung.

Symbian has been responding by new alliances with Cisco and Netscape, through Motorola, Matsushita, and America on-line and Sun, through Netscape (See Fig. 3).

Fig. 3
*The growth of Symbian and Microsoft's network
 in the competition for the standard in the mobile wireless operating systems*



While Microsoft's alliances improve the market power of its network, the purpose of Symbian's new alliances is to make stronger its capability to clash the Microsoft's technology development strength.

In several industries affected by emerging technologies the phenomenon of co-opetition within competing "networks of innovators" is frequent. In the Information & Communication Technologies (I&CT) there are networks of innovators in competition either in integrating existing businesses (i.e. banking, finance and e-marketplace) or setting new standards (as the previous example shown in the wireless telecommunications) by using the I&CT technologies. At the same time, in the pharmaceutical industry, and in the related biotechnology industry, there are competing networks of innovators focused on the development of new pharmaceutical-based health care solutions (i.e. cancer, cardiovascular diseases, endocrinology, infectious diseases, neuroscience, and so on). Even in more "traditional" industries, such as chemistry, automotive, semiconductor, hardware & software, there are several networks of firms in competition focused either in developing new technologies/standards or accessing new markets.

In these industries, firms use a set of co-opetitive activities that can be organized in a framework that explains how this alternative way to behave in the business is undertaken by competitors in emerging technologies.

A FRAMEWORK ON TYPES OF COOPETITIVE AGREEMENTS TO MANAGE EMERGING TECHNOLOGIES

The framework on types of co-opetition is based on the idea that cooperative agreements among competitors can vary widely according to the level of commitment lavished by firms on technology developments and market creation.

The level of commitment on the technology developments concerns firms' cooperative efforts to improve technology performance and reliability, while the level of commitment on market creation concerns firms' cooperative efforts to change customer preferences.

To measure the competitors' commitment on technology developments and market creation it is useful to consider both the purpose of the co-opetitive agreement and the level of competitors' investments devoted to it. Given the purpose of co-opetitive agreement (i.e. exchanges of patents, joint-ventures in R&D projects, alliances for setting new standards in the marketplace, collaborative agreements to integrate existing businesses in a new business

through emerging technologies), competitors' investments can be absorbed more in collaborative projects focused on technology developments activities or collaborative efforts on market creation.

According to the purpose of cooperative agreement and the level, high or low, of investments lavished by competitors in the agreement, it is possible to have the following four types of coopetition:

- a) exchanges of existing knowledge (low commitment in both cooperative technology developments and collaborative efforts on market creation);
- b) cooperative Research & Development activities (high commitment in cooperative technology developments and low commitment in collaborative efforts to access the marketplace);
- c) alliances for setting new standards in the market (high commitment in collaborative efforts on market creation and low commitment in cooperative technology developments);
- d) collaborative agreements to integrate existing businesses (high commitment in both cooperative technology development and collaborative efforts to access the marketplace).

Figure 4 shows the four types of coopetition organized in a framework according to the purpose of the cooperative agreement and the level of commitment on technology developments and market creation lavished by competitors.

In each part of the framework are indicated examples of industries where the specific type of coopetition is frequently undertaken.

Figure 4
A framework on types of cooperation to manage emerging technologies

Level of commitment on market creation	High	<p align="center">Standard setting</p> <p align="center"><i>I&CT</i> <i>Electronics</i></p>	<p align="center">Business integration</p> <p align="center"><i>I&CT</i> <i>Banking, Finance & e.Marketplace</i></p>
	Low	<p align="center">Knowledge exchange</p> <p align="center"><i>Chemistry</i> <i>Automotive</i> <i>Semiconductor</i></p>	<p align="center">Cooperative R&D</p> <p align="center"><i>Pharmaceutical</i> <i>Biotechnology</i> <i>Automotive</i></p>
		Low	High
		Level of commitment on technology developments	

This framework can depict either the track of a specific cooperative agreement or the evolution of different cooperative agreements carried out by a group of competitors over time. In the first circumstance, competitors decide to change the purpose of a specific cooperative agreement because of the evolution in the marketplace while, in the second, firms decide to repeat cooperative agreements with other specific competitors because of the trust experienced with them over time.

If competitors decide to change the purpose of a specific cooperative agreement, consequently it will change their commitment on technology development and market creation. According to the nature of the emerging technology, the evolution of a specific cooperative agreement is depicted in Fig. 5 and 6.

Figure 5
A possible truck of a specific coopetitive agreement

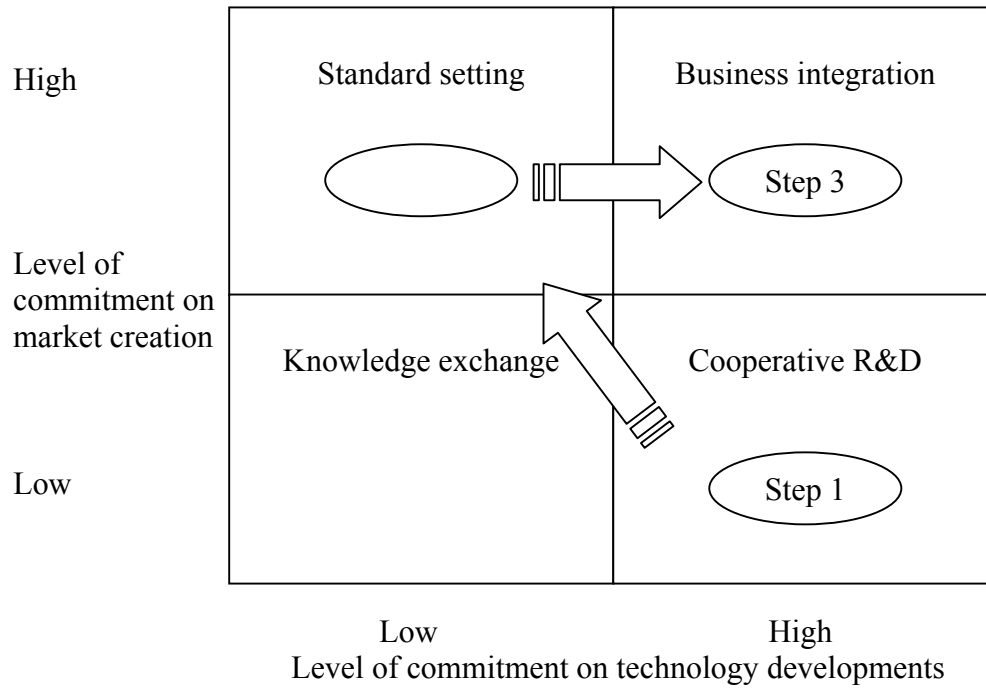
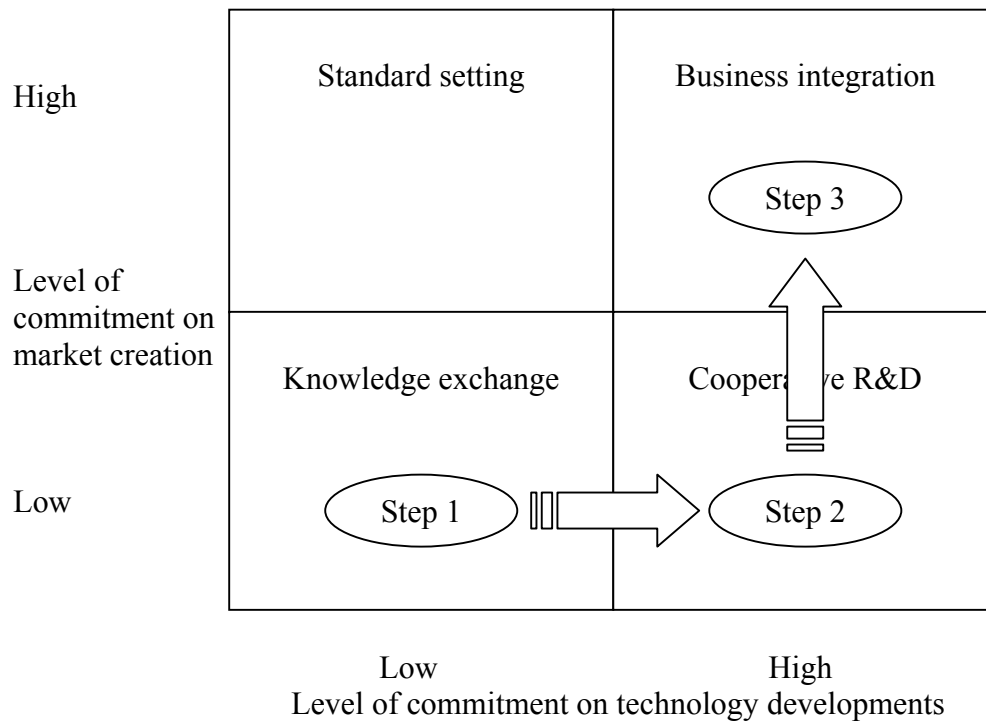


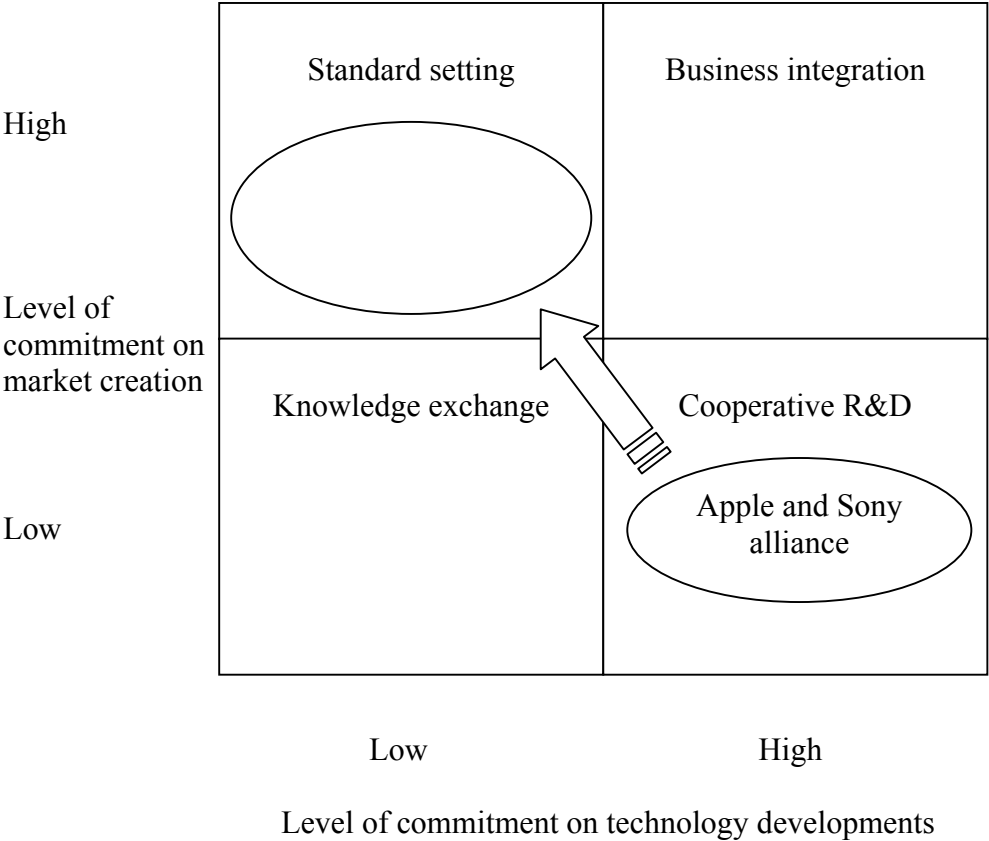
Figure 6
A possible truck of a specific coopetitive agreement



The case of coepetition between Apple Computer Inc. and Sony Corporation to manufacture Apple’s Powerbook computers is an example of alliance between competitors (both of them manufacture computers) that decides to coopete because they have been competing with other innovators (i.e. Hewlett Packard, Compaq, Ibm, Texas Instruments, Dell, etc.) focused on the development of new and powerful desktops and laptops.

So far, the purpose of Apple alliance with Sony is to carry out cooperative research and development activities to manufacture the Apple’s Powerbook, but the evolution of the competition in the computer market it could evolve this coopetitive agreement to collaborative efforts in the product launch in the marketplace (See Fig. 7).

Figure 7
A possible evolution of the coopetitive agreement between Apple and Sony in the Powerbook computer



CONCLUSION

This short paper discussed on: (a) why firms decide to cooperate with competitors and (b) how the cooperation is undertaken. Concerning the first issue it was proposed the thesis that cooperation in emerging technology is motivated by the competition among “networks of innovators”. The second issue was depicted with a framework on types of cooperation based on the level of commitment lavished by competitors in cooperative agreements.

Of course, it is necessary to better understand and explain, theoretically and empirically, this phenomenon even in comparison with other well-known research streams like cooperative and collaborative activities among competitors, even in network contexts. To get this result, it is useful to carry out empirical research on different competitive environments, both traditional and innovative industries, to verify how the cooperation is frequent and which configurations it assumes.

According to this need of knowledge, this paper opens some insights useful for future research. For example, questions that arise from it are: a) do competitors in emerging technologies repeat over time cooperative agreements with same firms given the trust experienced with them? b) are networks of innovators a step to implement cooperative strategies during the long term? c) which type of cooperation is more frequent in emerging technologies? and d) which track of cooperative agreements is undertaken in emerging technologies?

Notes

[1] The structural embeddedness is composed by: a) centrality, which refers to the position of an individual actor in the network, that denotes the extent to which the focal actor occupies a strategic position in the network by virtue of being involved in many significant ties, b) structural autonomy, that concerns the structural holes between an actor and the other ones, c) structural equivalence, that is a pair-level measure of how similar the actors' network patterns are, and d) network density, that refers to the extent of interconnection among the actors of the network. A multilevel conceptual model related to key network structural embeddedness is developed by D.R. Gnyawali and R. Madhavan "Cooperative networks and competitive dynamics: a structural embeddedness perspective", *Academy of Management Review* 2001, Vol. 26, No. 3, 431-445.

[2] For a fuller discussion of this case, see F. Ancarani "Il metamerco digitale e la telefonia cellulare di terza generazione: il caso Symbian" in "Convergenza. Nuove traiettorie per la competizione" edited by E. Valdani, F. Ancarani, S. Castaldo, Egea 2001, 137-160.

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