Open Collaborative Innovation in Supply Chain: The Case of Open IPTV Forum

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Abstract
This research paper aims to discuss the use of open collaborative innovation as a resource to create value and increase competitiveness in supply chain. A case study of IPTV Forum was conducted based on documentary and secondary data. The analysis was based on Amit and Zott (2001) model as well as on Carayannis and Wang (2008) innovation networks and knowledge clusters model. The results indicate the feasibility of joining simultaneously several different actors of a supply chain to develop a new product/service.

Keywords: IPTV; open innovation; supply chain management.

Introduction
The challenge in the innovation process does not rely only on the creation of value. Companies create barriers in order to protect their ideas, innovations and consequently their competitive advantage. Fine (1998) explains that industries behave in different ways to keep themselves competitive in the market place and that differences are related to the industry’s clockspeed. Nevertheless, industries with high clockspeed will require different products and services, processes and value chain designs when compared to industries with low clockspeed. Thus, Porter (1985), Fine et al. (2002) and Christensen (2003) recognize that industries and markets evolve, creating new rules and business models as well as new ways to collaborate and cooperate (Hamel et al., 1989).

A company has its collaborative network, composed by its suppliers, distribution players and customers. It can be noted that a limited number of companies dedicate time to articulate relationship resources internally and externally, such as inter-organizational networks. In order to improve innovation and to leverage the business model, firms have invested more in co-development partnerships (Chesbrough and Schwartz, 2007).

Teece, Pisano and Shuen (2007) suggest that innovators can benefit weakening the intellectual property environment and opening the industry architecture, switching the scope of closed innovation to open innovation. From this perception emerges the research question of the present study: Is it feasible to join simultaneously several
different actors of a supply chain to develop a new product/service? There are few works studying the process of innovation and product development throughout all players of a supply chain simultaneously, so this approach seems to be relevant and timely.

The purpose of this research paper is to discuss the use of open collaborative innovation as a resource to create value and increase competitiveness into the IPTV value chain. IPTV (Internet Protocol Television) is the new wave of television service, delivered by Internet Protocol over a broadband network, providing a personalized and interactive environment. The Open IPTV Forum was launched in 2007 by seven players in order to provide an open E2E (end-to-end) specifications for IPTV technology. Now, 58 different members of its value chain (telecom, broadcasts, internet providers, electronic industry, etc) integrate the forum, contributing to provide next generation of IPTV in a massive way.

In order to attend the main objective of this study, it was addressed a case study of Open IPTV Forum based on a documentary research, which had sought to understand the company’s competitive differentials based on Amit and Zott (2001) model and on Carayannis and Wang (2008) innovation networks and knowledge clusters roles. The Amit and Zott (2001) model assessed how value was created within the theoretical view of the value chain framework (Porter, 1985), Schumpeter’s theory of creative destruction (Schumpeter, 1942), the resource-based view of the firm (e.g., Barney, 1991), strategic network theory (e.g., Dyer and Singh, 1998), and transaction costs economics (Williamson, 1975). This model discusses the sources of value creation in virtual chains. On the other hand, Carayannis and Wang (2008) referred to the role of the firm in innovation networks and knowledge clusters in order to increase their innovative capability and competitiveness. The effective knowledge sharing among the firms in different types of innovative alliance seems to be crucial, mainly in high clockspeed industry (Fine, 1998).

The analysis offered by this study contributes to the advance of current literature of the theme and should be assessed in three ways: (1) it is an alternative analysis from Bowman et al. (2008) that evaluated IPTV through STOF framework, and it provides evidence that IPTV Forum is a good alternative to explore the new generation of technology with the whole supply chain. It is a clear example of open collaborative innovation spread through Latin America, United States of America, Eastern Europe, Asia and the Middle East; (2) it offers support to Baldwin and von Hippel (2009) theory, presenting that open collaborative innovation projects can convert their various designs into a physical product that will be economically competitive with the products of mass producers; (3) there are practical implications of our findings for supply chains demanding for innovation, supporting the paradigm shift from producer innovation to user (Von Hippel and Oliveira, 2009) and open collaborative innovation (Baldwin and von Hippel, 2009) suggesting that it could speed up innovation and achieve higher performance levels to the value chain.

**Conceptual Framework**

*Value creation in virtual chains*

Amit and Zott (2001) model was used to analyze value creation in the IPTV chain, based on four dimensions: (i) novelty, (ii) lock-in, (iii) complementarities, and (iv) efficiency. The authors argue that value generation in the virtual world goes beyond the value that can be created through the establishment of the value chain (Porter, 1985), the strategic network among companies (Dyer and Singh, 1998), or through exploring the
company resources (Barney, 1991). Such theories could not fully explain the value creation in virtual chains. However, each of them provides an important value creation proposition. Amit and Zott (2001) suggest an integration of the strategy and entrepreneurship models and their framework refers to the total value created in the virtual transaction; no matter it is the value appropriated by the company, the consumer, or any other participant involved in the business. The four dimensions presented in the model and the theories on which they were based are detailed as follows.

1 Efficiency
Amit and Zott (2001) suggest that it is one of the first dimensions able to generate value in virtual businesses, which is related to Transaction Cost Theory. This cost is associated with make-or-buy decision. According to Williamson (1975), transaction costs are defined by uncertainty levels, by the transaction frequency, and by the specific assets involved. One of the greatest effects of transactions on network environments (i.e. virtual networks) is their cost reduction (Dyer and Singh, 1998). It is evaluated by the time that managers and employees spend searching for consumers and suppliers, communicating with other company or people involved in the transaction, processing documents and the costs related to inventory.

2 Complementarities
Complementarity means that a set of resources provides more value working together than working separately (Amit and Zott; 2001). Thus, RBV highlights the role of complementarity among the strategic assets. The combination of resources and capabilities complementary and specialized (the ones that are heterogeneous, valuable, scarce, difficult to imitate, and have perfect mobility) can lead to value creation (Wernerfelt, 1989; Barney, 1991; Peteraf, 1993). In this context, Strategic Network Theory also can contribute attempting to the importance of complementarities between the participants in the network (Gulati, 1999). In addition, the authors propose the complementarities of the on-line and off-line assets and argue that the consumers want the complementarities of goods that are not directly related.

3 Lock-in
Amit and Zott (2001) state that the value creation in the virtual chain is directly related to motivate consumers to repeat the transaction and to the willingness of partners to maintain the partnership. Creating such attributes to generate value can be achieved by lock-in. It occurs when the cost of changing a brand or technology is considerable. Authors suggest three types of lock-in: (i) fidelity programs (bonus for purchase repetition); (ii) development of a dominant design in the market; and (iii) establishing a reliable relationship with the consumers. This approach is based on the Transaction Cost Theory (WILLIAMSON, 1975). In the light of RBV, it can be said that the company strategic resources such as the brand name and its relationship with the suppliers can contribute to the lock-in.

4 Novelty
The potential of innovation to create value was firstly discussed by Schumpeter (1934) while the introduction of new products or services, new methods of production, distribution or marketing, and the discovery of new markets have been reported as the traditional value creation sources. Amit and Zott (2001) suggest that innovation also occurs based on the way that transactions are structured, once companies create value connecting the chain agents that had been isolated, eliminating the inefficiencies in the
purchase and sale process through innovative transactions satisfying clients’ latent needs and/or by creating new markets.

Novelty and lock-in, two of the four dimensions of the Amit and Zott (2001) model, are related in two ways. Firstly, the innovative companies have the advantage of attracting and retaining customers, especially by building a strong brand. Secondly, being the first mover is an essential requirement to be successful in markets characterized by crescent return. The company that innovates can start the dynamics of positive feedback cycle which results from the positive network externalities (Shapiro and Varian, 1999). Novelty is also related to complementarities. The greatest innovation in virtual markets is the combination of complementary elements such as resources and capabilities (Schumpeter, 1934). Lastly, there is also the relationship between novelty and efficiency. Productive process innovations, such as in assets, can improve the exploration of resources in the company and thus create value in the virtual chain (Amit and Zott, 2001).

Innovation networks and knowledge clusters
The effective exchange of knowledge between firms in different types of relationships focusing on innovation seems to be crucial, especially in industries with high clockspeed (Fine, 1998), with the premise that not all firms have access to all knowledge or the same capacity to acquire the knowledge. To such sectors, Carayannis and Wang (2008) point out the importance of companies to make use of and to integrate global innovative networks as well as knowledge clusters in order to respond to market pressures. Thus, it increases its capacity for innovation and competitiveness.

A knowledge cluster comprises a geographical area containing a number of large and/or small flexible and technologically sophisticated businesses, supported by intermediary agencies with a high degree of orientation and training for new innovative enterprises (OECD, 2005). A global innovative network refers to a number of companies, organizations and intermediary organizations, digitally connected and technologically sophisticated, with a high degree of orientation towards innovation. OECD argues that innovation networks are the rule rather than the exception, to stimulate and promote innovation, involving multiple actors.

The characteristics of a cluster are defined by the organizational structure of the cluster, geographic scope, density and depth, as well as the special characteristics of the population, culture and technology. Innovative networks differ from innovative clusters due to three significant ways: networks bypass many innovative clusters and sectors, the networks are more flexible and less limited, and the networks are less sensitive to density.

Research Method
In order to accomplish the objectives, an exploratory, descriptive case study was conducted. The case studied was IPTV Forum, the new wave of television service, delivered by Internet Protocol over a broadband network, which provides a personalized and interactive environment.

The techniques and data collection instruments were determined and used according to needs of each phase. At first, the researchers conducted a literature review on the main themes relevant to this study using scientific articles, books, newspaper and magazine articles, and other publications aiming to: (a) obtain relevant and updated data on the IPTV chain; and (b) search on the Operations Management and Strategy literature for theoretical models about competitiveness that could be used to guide the
an analysis of the case studied. Theories were applied to the study in agreement with the study of Gupta, Verma and Victorino (2006), considered a common practice nowadays.

After selecting the appropriate models for the study, a new literature review was conducted in order to deepen the knowledge about the theories used to develop them. A qualitative data analysis was performed to verify the adherence of the IPTV Forum to the theoretical models used in this study.

**The Case Study – IPTV Forum**

The Open IPTV Forum (OIPF) was founded in March 2007 by Ericsson, France Telecom, Nokia-Siemens, Panasonic, Philips, Samsung, Sony and Telecom Italia. Currently, the Forum has 65 members engaged in producing open specifications E2E (end-to-end) for IPTV, in order to lead the next generation of IPTV (www.oipf.tv) to mass. The Forum aims to define specifications that will ensure interoperability between equipment and services, meeting both network / cable as open Internet.

OIPF recognizes the existence of several areas within the E2E IPTV value chain that have different owners and management controls. Thus, the architecture proposed by the Forum supports the existence of multiple entities with different regions of control and distinct ownership interests. Behind these entities there are a variety of factors, including regulatory regimes, the competitiveness of business environments and strategies. The areas recognized by the IPTV architecture are:

a) **Consumer Domain**: where IPTV services are consumed.

b) **Provider Network Domain**: connects the platform of service to the customer. The delivery network is transparent to the IPTV content, although there may be problems with timing and packet loss for IPTV content transmitted over IP.

c) **Provider Platform Domain**: the domain of providing common services (eg, user authentication, billing, IPTV and personalized services for communication etc.).

d) **Service Provider Domain**: the domain providing IPTV services to the Consumer domain. The members of this field are those who buy licenses content from its suppliers and package them into a service, as required by the consumer.

e) **Content Provider Domain**: the domain that contains the content owners or those authorized to sell them. Specifications concerning the process of developing content from the content provider are not being considered in the current scope of the Forum.

The value chain for IPTV content was created by the Open Forum with the intention of specifying common and open architectures to provide the wide variety of multimedia services and the Internet to the IPTV equipment based on consumer retail. The two major IPTV services currently include: Scheduled Content (equivalent via IP to transmit conventional TV) and on-demand content. The value chain of content is composed of the following functions:

a) **Content Production**: to produce and to edit the actual content (movies, drama series, sports events, news, etc.)

b) **Content Aggregation**: aggregation of content in a catalog to offer the consumer;

c) **Content Delivery**: to carry aggregated content to consumers and;

d) **Content Reconstitution**: to convert the content into a format suitable for processing the electronic device the end user.

Each task in the value chain has been historically linked to a type of partner or technical function. Content production, for example, is linked to TV production companies and teams for TV. The value chain dynamic is shown in Figure 1.
The IPTV technology introduces a number of technical changes to the content chain that includes, above all, content aggregation and reconstitution delivery. OIPF aims to specify the technology that brings these three elements into a fine tuned supply chain, both in a managed and unmanaged model. The management mode is related to IPTV content access and provision. The former has guaranteed quality of service and the latter has required the use of different links of the platform provider and service provider network.

The Forum currently has five working groups: requirements, architecture, and interoperability testing, specification of solutions and marketing. The working groups of the Forum work interactively in order to ensure that the specifications are generated over time in a continuous and integrated way, and the releases are often released. In general the requirements are created, then a functional architecture and network service is provided, and finally, the specifications that describe how to implement the various interfaces are defined by the architecture. Once necessary, the Forum specifies one or more profiles for equipment that implement the specifications and also tests to verify the interoperability of equipment built to these profiles.

There are many organizations that work with the definition of development standards (Standards Development Organization, SDOs), focusing on the IPTV industry and related areas. Some of them have already finished its work or are working on specific parts of the overall solution and relevance to the Forum. They often focus on specific items (home network, for example, content protection technologies browser) or pre-defined scenarios of deployment (for example, managed networks). In these cases the OIPF combines appropriate specifications for such bodies to their overall solution.
The years of combined action of OIPF has enabled not only to generate concrete results, but also has gained market recognition, expanding the number of members, increasing partnerships with regulators and promoting events in the field. In Figure 2, the companies indicated by a circle, which are identified as leaders in their segments and those with a green star, are also companies that have sponsored and attended the Global Forum on IPTV, whose sixth event occurred in March 2010.

Discussion

The IPTV innovative cluster is framed by the firms and organizations connected among a geographic area, considering that the boundary of IPTV innovative network should be measured by the across-country connection of firms and organizations, regardless of the types of such relationships (Carayannis and Wang, 2008).

In this context, the IPTV World Forum which had its first edition in 2005, is held annually in London. In addition to that, there are events that occur in five different areas: Latin America, North America, Europe, Middle East and Asia. The event consists of a large exhibition area (products, technology providers and services), lectures, panels and case discussions. It integrates developed countries and emerging economies, building effectively an innovative cluster.

The way these forums are structured encourages the discussion of regional issues and needs, announces the clusters of knowledge and innovation networks in operation. Moreover, it has also the function of serving as a venue to disseminate and to discuss the technological advances, collecting themes that can be discussed within a broader scope - the World Forum. To the members of the value chain, it is a space for emerging economy firms to show their potential, to meet and to interact with other companies, seeking additional powers. In addition to that, it is an opportunity to access issues and to meet different players active in the sector. These forums, OIPF - World Forum and the Continent, are spaces that allow the formation of the partnerships mentioned by Carayannis and Wang (2008) to occur, which can have innovation as a result.

In examining OPIF regarding the dimensions offered by Amit and Zott (2001), the perceived value for all members and the gains by standardizing clearly reduces the risk of technological uncertainty, while it extends the social network, increasing the
possibilities of maximizing value to all its members. The dynamics of functioning as working groups OIPF and how the integration aspects are addressed and promoted in partnership with IPTV Forums creates value in each of the four dimensions, described below:

a) **Efficiency:** With the broad participation of all members of the chain and regulatory bodies, the OIPF is the information center, drastically reducing the cost of information search, a crucial sector of high clockspeed (Fine, 1998). The reduction of technological uncertainty and knowledge development of the members reduce information asymmetry and the cost to make or buy decision.

b) **Complementarity:** the familiarity and performance of a working group with its competitors and other members of the chain creates possibilities for action and knowledge exchange. The maturity of these relationships makes possible the emergence of innovation networks with greater opportunity for success, since the restrictions outlined by Wang and Carayannis (2008) were reduced to living in OIPF.

c) **Lock-in:** this dimension is probably the great motivator for the members to conceive, to articulate and to sponsor OIPF. The IPTV technology brings together the content providers end user customers, the device vendors and the network operators, where large companies reside in that value chain, as shown in Figure 2. The launching of a service below the currently available can produce an effect contrary to the Lock-in, promoting the escape of customers to competitors. Most of the actors had difficulty with the negative exposure of its products in the early stages of maturation of the internet and to avoid unnecessary technological blunders, the big players can act in an integrated manner with the aim of providing a more mature entry, in an era of user-driven innovation (von Hippel and Oliveira, 2008). Thus, this dimension has many opportunities for future developments.

d) **Novelty:** this dimension benefit of positive feedback from past actions, therefore, the success of forum events and products generated by OIPF attract more participants by increasing access to new knowledge clusters and promoting the formation of different innovation networks.

From the above analysis, two studies were analyzed. The first was conducted by Bowman et al. (2008) who evaluated the IPTV model using STOF framework (Service, Technology, Organization and Financial) and the second was conducted by Baldwin and von Hippel (2009), who analyzed the feasibility of the paradigm shift from closed innovation to open and collaborative innovation.

Bowman et al. (2008) argue that the competing visions of future developments could help reduce uncertainties about the future viability and reliability of business models available for IPTV. According to this study, we observed that the OIPF, incipient at the time the paper was written (2006-2007), was the way that the industry found to reduce at least the technological uncertainties, ensuring the integration and interoperability between products and services generated by the various links in the chain. Thus, the solution was the formation of networks of collaborative innovation opened with the participation of all links in the chain, which has proved effective in dealing with areas of high clockspeed and high-risk technology, where innovations have exploratory approach.

Based on the study of Baldwin and von Hippel (2009), OIPF IPTV Forum seems to be an interesting example of collaborative open innovation, once projects can convert their various designs into a physical product that will be economically competitive with
the products of mass producers. Then, this study suggests that open collaborative innovation can be feasible.

Conclusions, Limitations and Directions for Future Research

In the present paper we sought to understand the feasibility of bringing together the different actors of a supply chain to develop a common goal. To this purpose, we presented the dynamics of OIPF and IPTV World Forum, showing how efforts have been conducted to generate value through innovation. This study contributes to the literature on service innovation by providing in-depth analysis of the implications of innovative clusters and networks to the productivity of innovative firms.

The joint sponsorship and initial OIPF was conducted by large multinational telecommunications and generation of content (TV stations). The frame allowed the active participation of firms, including smaller firms. It could be noticed that the association of OIPF with IPTV World Forum provided the disclosure, international exposure and visibility, enabling them to display their innovative products and seeking alliances to generate value and to expand the options of innovation, both for complementarity and for novelty.

This study shows evidences that open and collaborative innovation can be considered as a strategic competitive advantage, when adopted systematically. If it is a high clockspeed sector with high technological risk, this approach may be considered relevant, because there is no way to work alone in R&D. Besides the prohibitive cost there is also a need to leverage a global platform solution, which is not trivial and not viable both in a competitive marketplace and in a closed context of innovation. This paper also highlights the possible integration of developed countries and emerging economies, building effectively an innovative network.

There are practical implications of our findings for supply chains demanding for innovation, supporting the paradigm shift from producer innovation to user (von Hippel and Oliveira, 2009) and open collaborative innovation (Baldwin and von Hippel, 2009) suggesting that it could speed up innovation and achieve higher performance levels to the value chain.

The results also suggest that open collaboration between supply chain actors may have much to contribute to a firm’s outcomes and strategy. Open collaboration may hamper the ability of a firm to change courses and keep competitiveness. Likewise this raises questions about the maintenance of relationships considering the fact that it is unknown how long the network will cope and if would decay over time.

This study presents as limitation the fact of being based on secondary data and the exploration of primary data could be a precious recommendation for further studies, which might attempt to identify contingencies not contemplated on this research. Another avenue for future research is the exploration of a longitudinal analysis of the outcomes evolution on products and services launched by OIPF Forum, as well as the partnerships, alliances and ties generated during these five years.

References


Open IPTV Forum oficial site: www.oipf.tv


