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**Contract Innovation Organizations:
An Idiosyncratic Approach to Open Innovation**

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Contract Innovation Organizations: An Idiosyncratic Approach to Open Innovation

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The Open Innovation concept is recent, and related interest of both academic and professional communities has been increasing at rapid pace. In the related literature, focus has been given mainly to the need of opening up firms' frontiers to tackle external sources of innovation and to the best way to address the associated challenges (new management practices, strategic management approaches, governance alternatives, new organizational structures and architectures, knowledge integration, among others).

The perspective of the external provider of innovation services has been thus far neglected, except in scarce papers related to Open Source Software. Our study is one of the first to provide evidence in this area, as we explore a new, idiosyncratic approach: the Contract Innovation Organization (CIO). This type of organization has a specific way of collaborating with its clients, i.e. performing contract-based innovation/new product development services in close collaboration with the internal innovation teams of the contracting firms. Intense competency crossing and spill over occur between internal teams and CIO teams and partners, which develops the absorptive capacity of the internal teams and eases the technology transfer process.

Our paper focuses on how is new product development driven and motivated by CIOs, and on the strengths and weaknesses of such an approach. We use empirical data from an in-depth case study of a CIO, called Zoom Innovation, based in Portugal. We focus on this CIO's perspective over the innovation process of its clients, and we integrate perspectives of the multidisciplinary team of experts working in Zoom Innovation and of the innovation teams present in part of its clients.

We identify key advantages and weaknesses of the CIO approach, and we point good innovation management practices. We end with a down-to-earth discussion on the relevance and future of such an approach, within the Open Innovation / Open R&D paradigm.

1. Introduction

Doing innovation exclusively inside organizational borders, using internal resources only, no longer represents a sustainable competitive strategy. Most organizations tap external sources and use creative approaches to enhance their innovative capacity and reflect it efficiently in sellable products on the market place. The opening of the firm to innovative factors coming from outside is associated with the Open Innovation concept (Chesbrough, 2003a, Chesbrough, 2003b).

Open Innovation (i.e. doing innovation inside and

outside the firm frontiers, with external partnerships or outsourcing) is a recent topic in academic studies. A search on ISI Current Contents in the last ten years indicates only 42 articles that contained "Open Innovation" or related expressions in title or topic.

The concept proposed by Henry Chesbrough in 2003 (Chesbrough, 2003b, Chesbrough, 2003a), and followed after two years by other scholars (Christensen *et al.*, 2005, Kirschbaum, 2005, Cooke, 2005b) has earned the attention of a Special Issue of R&D Management journal in 2006 (Chesbrough and Crowther, 2006, Dodgson *et al.*, 2006, Lichtenthaler and Ernst, 2006, Piller and Walcher, 2006, Von Hippel and Von Krogh, 2006, West and Gallagher, 2006, Gassmann, 2006).

The approaches used so far in the related literature focus on a wide variety of topics, ranging from strategy, to organizational structure, human resources management, and regional innovation systems. One of the approaches, onto which we focus in this paper, is the management of open innovation/R&D.

In the introduction to the Special issue of R&D Management, Oliver Gassmann (2006) presents some possible approaches (e.g. outsourcing and collaborative R&D, supplier and customer innovation, technology commercialisation and licensing, open source). The list goes further and more hybrid solutions have emerged in the last years: e.g. the Wikinomics concept (i.e. benefiting from ideas, competencies and inputs from a wide community of possible innovators, located outside the firm), led to emergent approaches, like innovation portals (e.g. InnoCenter) (Tapscott and Williams, 2007). The so-called Research or Innovation Industry (Cooke, 2006, Cooke, 2005b) is self-organizing at world level to meet the challenges and benefit from the opportunities of open innovation.

The perspective of the external provider of innovation services has been neglected thus far (Chiesa et al., 2004), except in scarce papers related to Open Source Software (e.g. Gruber and Henkel, 2006, Henkel, 2006). Our study is one of the first to provide evidence in this area, after the study of Chiesa et.al. (2004). We explore a new approach: the Contract Innovation Organization (CIO).

Our paper looks to clarify the role of CIO in the innovation/new product development process, within the context of Open Innovation paradigm. We focus mainly on how is new product development driven and motivated by CIOs, and on the strengths and weaknesses of such an approach.

To support our discourse, we analyse a CIO, called Zoom Innovation, based in Aveiro – Portugal, which draws on own competencies and ones of a wide network of specialists from public and private organizations, including academia. We develop an in-depth instrumental case study in order to respond the research questions and better comprehend the context in which this organization operates. We focus on the CIO's perspective over the innovation process of the firms, and we integrate perspectives of the multidisciplinary team of experts working in Zoom Innovation and of the innovation teams present in some of its clients.

We structured our paper as follows. First, we elaborate on the methodology we used to perform our research. Second, we present the literature review on the Open Innovation concept and identify several approaches associated to it. Third, we draw the profile of CIO, and position it comparatively to the Open Innovation theory. Fourth, we show how this concept (i.e. CIO) is applied in practice, within the context of the in-depth case study of Zoom Innovation. Fifth, we discuss key insights from the case study and tentatively debate the future perspectives of the CIO approach. We end with conclusions.

2. Methodology

In order to propose the CIO concept as new organizational approach to respond to the Open Innovation challenges, we adopt a twofold strategy.

First, we perform an in-depth review of **Open Innovation (OI)** papers published in quoted scientific journals in the last ten years. We use as search equation the keywords suggested by Chesbrough and Crowther (2006) and we use ISI Current Contents as database. Our objective was to have a clear grasp of existing literature on OI in order to position properly the new CIO concept, relatively to the Open Innovation literature. We use as methodological instruments the academic software RefViz to comprehend and graphically represent the results.

Second, we perform a holistic in-depth case study in a CIO, and we confront the perspectives of its employees and leader with the perspectives of its clients. The empirical analysis and discussion are based on OI (management) literature and our main objective was to provide insightful rich data to better draw the CIO concept and understand the associated challenges and best practices. We use triangulation of information sources (ranging from different interviewees, to archival record, other public and internal documentation, to observation) to increase the case study validity. We perform the data analysis with NVivo software, to increase validity of the research.

3. Open Innovation (OI) Solutions: Where Do We Stand?

As the OI concept is recent, we chose to perform an exhaustive review of the scientific papers published in quoted journals in the last ten years. Thus, on March 1, 2008, we looked in ISI Current Contents for any paper containing the following expressions in Social Sciences database, in title, abstract, topic or keywords: *open innovation, external innovation, sourcing innovation, innovation licensing, technology licensing, technology in-licensing, technology out-licensing* (Chesbrough and Crowther, 2006).

Results for each search expression are presented in Table 1. Combined results gave 42 papers (Appendix 1), which represented our base for analysis.

Table 1. Distribution of papers according to each search expression

Expression	N.º of papers
Open innovation	27
External innovation	7
Sourcing innovation	1
Innovation licensing	1
Technology licensing	7
Technology in-licensing	7
Technology out-licensing	7

We used the analysis function available in ISI Current Contents to perform descriptive statistics on the 42 papers. We present in Table 2 information on most frequent authors, in Table 3 information on disciplines that have most contributed to these papers (and consequently to the OI current theoretical framework), and in Table 4 information on journals that published these papers. In Figure 1, we present the yearly evolution of these papers.

Table 2. Top authors contributing to the OI theory

Authors	Records	% of 42
Chesbrough, H	6	14.2857 %
Lichtenthaler, U	4	9.5238 %
Ernst, H	3	7.1429 %
Cooke, P	2	4.7619 %
Henkel, J	2	4.7619 %
(70 Author value(s) outside display options.)		

There is presently a “leadership” in OI theory by Henry Chesbrough, who first proposed the concept, followed closely by Ulrich Lichtenthaler and Holger Ernst. There are, however, lot of authors who contributed with only one paper.

Table 3. Top disciplines contributing to the OI theory

Discipline	Records	% of 42
Management	33	78.5714 %
Management & Organization	17	40.4762 %
Technology R & D/Management	15	35.7143 %
Engineering Management/General	13	30.9524 %
Economics	8	19.0476 %
Business & Economics	2	4.7619 %
(1 Discipline value(s) outside display options.)		

There is thus a mostly management perspective in OI theory, with focus on organizational issues and technology and R&D management, and few insights from economics and business fields.

Table 4. Top journals contributing to the OI theory

Journals	Records	% of 42
R & D Management	9	21.4286 %
Research-Technology Management	6	14.2857 %
International Journal of Technology Management	3	7.1429 %
Research Policy	3	7.1429 %
Applied Economics Letters	2	4.7619 %
California Management Review	2	4.7619 %
MIT Sloan Management Review	2	4.7619 %
Organization Science	2	4.7619 %
Technovation	2	4.7619 %
(11 Source Title value(s) outside display options.)		

There is a clear leadership of R&D Management Journal in terms of contribution to the OI theory essentially due to the Special Issue on OI published in 2006. Second place goes to Research-Technology Management Journal. Various follow closely, yet there is some concentration in the presented journals.

Regarding the yearly distribution of the 42 papers, we notice a peak in 2006, due to the R&D Management Special Issue, with lower numbers last year.

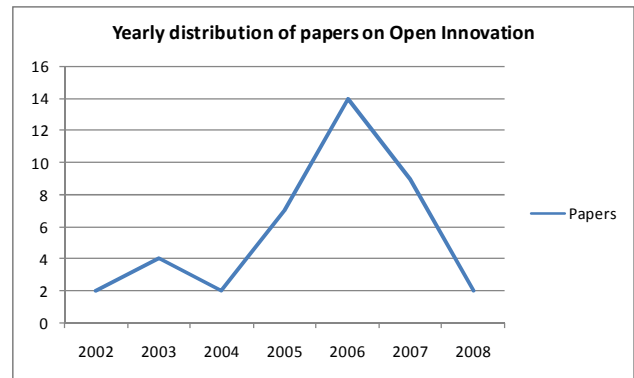


Figure 1. Yearly distribution of papers related to OI

We next analyzed the records with RefViz bibliographic software in order to comprehend the sample of 42 papers. The results are presented in Figure 2.

OI-related papers focus on six different types of topics, as follows:

- Group 1** (1 paper) focuses on *co-development partnerships*, specifically on the relationship between a company and a partner for the development of new technology/product.
- Group 2** (9 papers) focuses on *technology licensing* mostly from an academic technology licensing and spin-off perspectives.
- Group 3** (12 papers) focuses on *opening innovation and new product development* outside firm’s boundaries. This group includes the focus on user role in the innovation process.
- Group 4** (12 papers) focuses on getting *external technology for firm innovation* and on the *associated organizational adjustments* needed to make this process run smoothly.
- Group 5** (4 references) focuses on *new ventures and community role*, in a Open Source software logic.
- Group 6** (4 references) focuses on the importance of *external and internal knowledge management* to allow open innovation to function efficiently and aligned with organizational strategy.

Existing theoretical contributions focus though on various areas, ranging from partnerships and new governance approaches for open innovation to knowledge management and R&D/OI management, encompassing issues like organizational adjustments (e.g. new architectures, new culture) and strategic alignments.

More, these papers look mainly at the innovative firm’s perspective, with few analyses of OI-related new ventures (mostly linked to Open Source Software) and university role for technology transfer and licensing.

The key motivation of our research was to fill an existing gap: the perspective of entrepreneurial new product development (NPD) service providers. Papers related to this concept are linked to specific new Open Source ventures (e.g. Gruber and Henkel, 2006, Henkel, 2006) – a very distinct logic – and to co-development partnerships (Chesbrough and Schwartz, 2007). Chesbrough (2003b)’s paper helps conceptualizing modes of innovation associated to OI and possible actors.

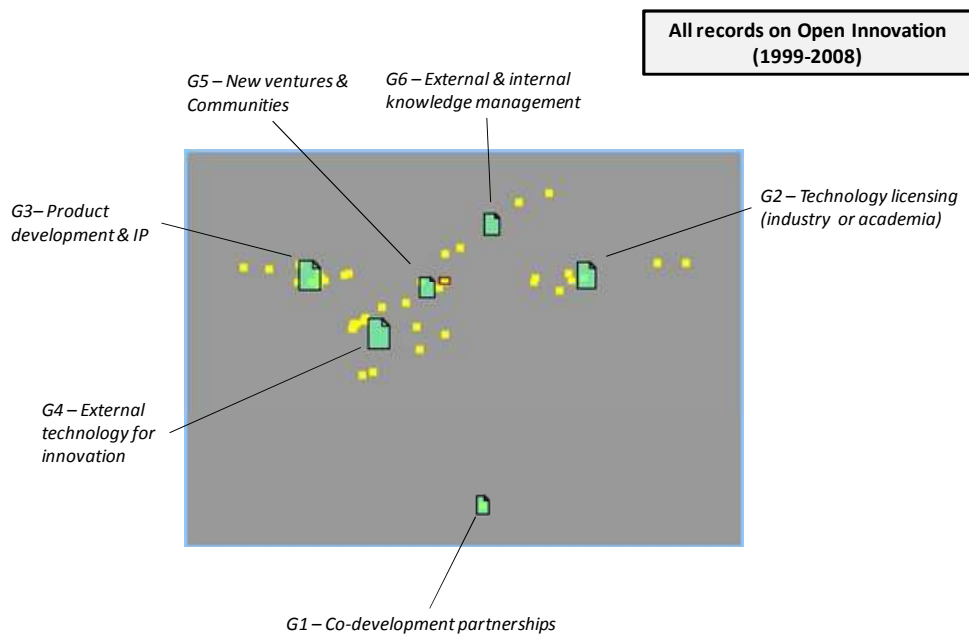


Figure 2. Distribution of papers related to OI using RefViz (based on conceptual proximity)

In our research, we present the perspective of entrepreneurial innovation/new product development (NPD) service providers associated to Group 1, by exploring and defining a new hybrid approach of such private actors: the Contract Innovation Organization (CIO), which we introduce in the next section.

4. Contract Innovation Organizations (CIO): The Concept

As previously demonstrated, research related to OI neglects the perspective of entrepreneurial providers of services for NPD. Except for two papers written by Henry Chesbrough (Chesbrough, 2003a, Chesbrough and Schwartz, 2007), there is little in the OI-related literature to help us drawing the profile of entrepreneurial innovation/NPD service providers, which we baptized Contract Innovation Organizations (CIO)¹.

In our understanding, **a CIO is a company that performs contract-based innovation/NPD services in collaboration with the internal innovation teams of the contracting firms.** In terms of mode of innovation it fits under *Generating Innovation* (Chesbrough, 2003b), yet as a hybrid organization between the four types of organizations thereby mentioned, called e.g. *Full Service Innovators* - a fifth type - as it goes beyond the technological focus.

The CIO implies a partnership similar to the one described by Chesbrough and Schwartz for co-development: *“a mutual working relationship [...] aiming at creating and delivering a new product, technology or service”* (Chesbrough and Schwartz, 2007).

In this type of organization, there is intense competency crossing and spillover between internal teams and CIO teams and partners, which may develop the absorptive

capacity of the internal teams (Cohen and Levinthal, 1990) and ease the technology transfer process. One may say that a temporary knowledge network would be created to respond to a specific, contract-based challenge, and this network is led by the CIO.

We considered the CIO a formal R&D/NPD cooperation arrangement and a formal temporary innovation network, and looked for additional contributions that could assist in drawing CIO's profile. We identified some relevant authors (Arranz and De Arroyabe, 2008, Bönte and Keilbach, 2005, Calantone and Stanko, 2007, Chiesa *et al.*, 2004, Pisano, 1990, Tether, 2002).

Arranz and de Arroyabe (2008) help us distinguishing the CIO approach as a *“complementariness with partners”*, outside the supply chain approach, a so-called *“synergical agreement”*, in the same category as cooperation with universities and consultancy. However, authors do not explore duly this type of cooperation.

A gap filled by Tether (2002), which helps us to better comprehend the *“beyond the supply-chain”* type of cooperation for innovation, where the CIO falls. Private sector organizations of this type are more responsive and faster than the public institutions (e.g. universities). They provide *“fresh ideas”* and *“more opportunity to build valuable contextual knowledge”*. These may be valuable attributes for a CIO.

Calantone e Stanko (2007) briefly touch onto the perspective of contract innovation service providers, pointing the importance of communication to the customers, and a possibly segmentation of possible clients to high-margin segments.

Authors also point to the importance of three types of transaction costs (Williamson, 1975, Williamson, 1985): adaptation, i.e. difficulty in modifying existing contracts (Ulset, 1996), safeguarding, i.e. cost of an opportunistic behaviour from partners, related e.g. to IP protection

(Pisano, 1990), and measurement, i.e. cost of verifying finalized contracts (Calantone and Stanko, 2007). The CIO, when asserting their promotion strategy, should consider these costs.

Bönte and Keilbach (2005) include in their paper a reflection over the characteristics of formal cooperation for innovation, which allows us to draw the following elements relevant for CIO's activities:

- Knowledge tends to be internalized when firms cooperate in formal ways, and may generate less spillovers.
- Firms take into account appropriability conditions when entering a formal cooperation.
- There is a high degree of organizational effort/cost needed to manage formal cooperation.

Pisano (1990) focuses on biotechnology firms, which may be seen as a *within supply chain* type of cooperation, yet points two good practices: small-numbers bargaining, i.e. periodical reimbursement of expenses and contract negotiation at specific milestones, and appropriability concerns, i.e. clear delineation of relevant intellectual property protection. We argue that these may apply in the case of CIO, too.

Ultimately, Chiesa et.al's work is seminal for our approach, as it focuses on *"the point of view of the supplier of services for new product development"* (Chiesa et al., 2004), which we directly associate to the CIO concept we propose in this paper.

Those authors focused on a specific type of supplier, which had the capacity to support the whole process of NPD, and describe the case of an Italian company, the MR&D-Institute. They point several conclusions (Chiesa et al., 2004):

- The market for these suppliers (CIO – using our terminology) has focused on industrial design, and is located in US and Europe (UK has half of European market).

- There is little knowledge on how this market operates.
- There are problems associated to this approach (low success rate of marketing contacts – below 3%; wide set of competencies required to offer these services and need to build/maintain an external network of expertise; interaction with clients and NIH syndrome, internal resistance, costs, IP etc.)
- Project management techniques are indispensable, combined with the matrix-like organizational structures, yet more insights are needed on how to manage and organize such a service supplier.

From Chiesa et.al. (2004) work, we can draw the characteristics of MR&D Institute, a specific case of CIO:

- Relationship with the customer involves an integrated approach, ranging from marketing, research, industrial design and product design;
- Various technologies are used for design and rapid prototyping;
- Consumer and industrial markets, with clients covering a wide range of industrial sectors, and of different sizes;
- Multisectoral and multidisciplinary internal competencies and linkages with external knowledge partners (e.g. universities or specific technology providers);
- Project-oriented organizational structure;
- Personalized approach close to the customers, involving various hierarchical levels in the innovating firms (top management, project leader, technical personnel);
- Intense communication in the beginning of the process, followed by weekly progress reports and milestones (effective project management).

We present in Table 4 a summary of the key characteristics of the CIO, in Table 5 its advantages and disadvantages, and in Table 6 the critical concerns in terms of business model.

Table 4. Contract Innovation Organization: Characteristics

DEFINITION
CIO is a company that performs contract-based innovation/NPD services together with the internal innovation teams of contracting firms
KEY CHARACTERISTICS OF CIO
<ul style="list-style-type: none"> • full service innovators, based on partnership for development • multisectoral and multidisciplinary internal competencies and linkages with external knowledge partners (universities or specific technology providers) • personalized approach, close to the customers, involving various hierarchical levels (top management, project leader, technical personnel) • integrated approach in the relationship with customer, that may include marketing, research, industrial design and product design • may serve various industrial sectors with different size customers from consumer and industrial markets • intense communication in the beginning of the process, followed by weekly progress reports and milestones • creation and leadership of a temporary knowledge/innovation network to respond to a specific, contract-based challenge • various technologies for design and rapid prototyping • project-oriented organizational structure

Table 5. Contract Innovation Organization: Advantages and Disadvantages

ADVANTAGES & EFFECTS	DISADVANTAGES
<ul style="list-style-type: none"> • intense competency crossing and spillover between internal teams and CIO teams and partners • development of absorptive capacity of clients, • easy technology transfer and knowledge internalization • more responsive and faster than the public institutions (e.g. universities) • fresh ideas and more opportunity to build valuable contextual knowledge • integrated approach in the relationship with customer, involving marketing, research, industrial design and product design • personalized approach, close to the customers 	<ul style="list-style-type: none"> • higher transaction costs and related organizational effort/cost needed to manage formal cooperation • knowledge appropriability concerns • formal cooperation may generate less spillovers • wide set of competencies required to offer services • need to build/maintain an external network of expertise • not-invented-here syndrome • internal resistance

Table 6. Contract Innovation Organization: Critical Issues and Good Practices

CRITICAL CONCERNS	GOOD PRACTICES
<ul style="list-style-type: none"> • clear delineation of relevant intellectual property protection • create and maintain an external network of expertise • clarification of appropriability conditions • low success rate of marketing contacts → importance of intense marketing and segmentation to high-margin segments 	<ul style="list-style-type: none"> • small-numbers bargaining • periodical contract renegotiation • clear delineation of relevant intellectual property protection • extensive use of project management techniques • usage of intense communication in the beginning of the process, followed by weekly progress reports and milestones

5. CIO in Action: The Case of Zoom Innovation

The single case we analyze is the CIO Zoom Innovation. It is a Portuguese start-up, with “incubation experience” in a formal innovation network composed of firms acting in different industrial sectors, all linked to dwelling (see Saur et al., 2005 for background). The dimension of the multidisciplinary team representing Zoom Innovation has varied, and is currently of four members.

We looked in the context of a temporal horizon of three years, from April 2005 until March 2008, combining the retrospective approach with a contemporary one. We focused more on the last year, which covers the real incubation experience and the start-up.

The case study is single, holistic, instrumental and crucial, in the meaning given by Tashakkori and Teddlie (1998) and Yin (2003). It is built on the theoretical framework associated to Open Innovation and serves to inform this theory. It is also an idiosyncratic case as a new hybrid approach fit into the open innovation paradigm and brings interesting insights on a new and possibly relevant type of firm, the so-called CIO. We used a case study protocol and a research diary, to increase validity of results.

We used the following types of information sources, all compiled and managed with NVivo 7:

- Semi-structured interviews with CIO team and Clients’ top management and technical team, specifically designed for each type of actor;
- Various documentation, ranging from internal reports

to presentations and debriefings, both public and not public (as long as not confidential);

- Archival records, e.g. hierarchical structures, statistical data, personal records of the researchers.
- Observation (of people, sites, environment etc.).

We looked to gather information both from the CIO itself and its clients.

Two of the clients accepted to talk to us, one operating in Lightning (LITE), another in Aluminium Profiles (ALU) markets. Both were part of the innovation network that served as incubator.

5.1. CIO and CIO’s clients: Characteristics

Zoom Innovation

Zoom Innovation is our CIO. Its business model has been drawn between 2005 and 2007 and started to be put into practice in June 2007, at first among members of the network, and then outside the network.

It is made of a small multidisciplinary team, currently with the following competencies: mechanical engineering, industrial design, electronics engineering and industrial engineering (management).

The name Zoom Innovation started to be used in January 2008.

Its targeted clients fall in several industrial sectors, have available funds to contract innovation services, and look to bring a fresh view onto the development processes.

The service provided involves the following approach:

1. contact with clients' top management and/or innovation director, identification of clients' needs in terms of new product development, draw-up and negotiation of a service proposal;
2. identification of a project leader in the client organization and establishment of communication channels;
3. close contact with clients' technical team and

- periodical stage-gates to allow progress evaluation;
4. final report presentation with clients' technical teams and top management.

The approach over the provided service is integrated and intensive in the sense that Zoom Innovation performs "bits" of the development process, drawing strongly on the involvement of clients' technical teams to help in specific technical issues related to clients' markets and production specificities.

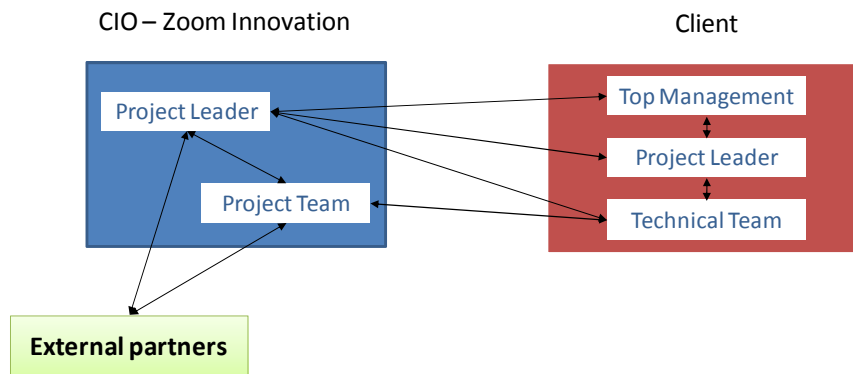


Figure 3. Knowledge Network Created by Zoom Innovation in the Relationships with Its Clients

Zoom Innovation team uses a network of external partners to tackle knowledge relevant for their clients, and by so doing serves as knowledge network manager and intermediary (see Figure 3).

We interviewed the entire team of Zoom Innovation (as of Feb 2008): HM (Electrical engineering), JC (Mechanical Engineering), MP (Industrial Design) and PA (Industrial Engineering and Management).

LITE

LITE is a Portuguese SME with about 125 employees, created in 1977. Leader in technical lightning in the national market, it also sells about 40% of production on international markets. Its strategy and culture is bound to innovation, quality and up-to-date technological approaches, spotted with an environmental-friendly attitude.

LITE sells directly to big distribution chains, and this choice helps drawing clear work practices, improves service and increases the business focus. The relationship is open, friendly, empathetic, and focused on developing customer loyalty. Promotional initiatives focus on "prescribers" of lightning solutions, e.g. project offices, architects, electro-technicians, designers, decorators, and there is a direct contact with final clients/users in terms of technical issues and after-sales service.

Innovation in LITE is reflected at various levels. First, at process level. Here, there is a constant search for improvement of production, material usage, packaging, fitting instructions and other supply chain processes, and contacts with suppliers. Second, at product level. Here, either at the level of customization of standard products because of clients' specific requests (the so-called special products), either at the level of new product development

motivated by clients, fashions (trade fairs), internal or external ideas, or new lightning technologies. The constant search for innovation is balanced with a down-to-earth approach implying evaluation of costs (here costs of materials are critical) and possible market opportunities. And third, reflected in yearly financial investment dedicated exclusively to innovation.

There is an internal R&D department, which is now migrating towards dedicated functions/people in new product development. Contact with external innovation service providers is used when there is a clear definition of needs/requirements for the provider and when there is no internal capacity to develop the product. In this relationship, there is close monitoring of evolution and results (intermediate and final) and focus on applicability to LITE's production and market needs.

We interviewed two key elements in LITE that were involved in collaboration with Zoom Innovation: MF (Commercial and Technical Manager) and MP (Operations Director, Founder and Member of the Board).

ALU

ALU is a Portuguese medium-sized company born in 1972 specialized in the extrusion of aluminum profiles for application in architectural construction and in industry in general (latest is 60% of its sales).

One of the first companies of the kind in Portugal, ALU has grown at a steady rate, always focused on high quality products and constant modernization of technical and human resources. It is an international company sales-wise: about 50% of industrial products are exported, and in terms of aluminum window/door frames, there are some exports in Portuguese-speaking countries.

Its clients are retailers, industry or construction players, and product distribution is also ensured in its own warehouses scattered on national territory.

Innovation at process and product level has been a constant focus since the company was born, reflected in product quality, new window/door frame systems, and in process improvements (layout, flow and technology). Process innovation is responsibility of heads of function, whilst product innovation has been addressed by a specific group of people, which now is about to be formalized in a new product development function.

Ideas for innovation come both from inside the company and from the outside, and in the latest case there is a close tackling of clients' needs and suppliers (within supply-chain innovation). External innovation service providers are typically avoided, as they are seen as *outsiders*, non-specialists, which hinders the collaborative work. It is top management understanding that external service providers can be more useful at methodological level.

We interviewed three key elements in ALU: CB (Member of the Board), JM (Designer, responsible for new product development) and FP (responsible for logistics and accessories for mould systems).

5.2. Data collection and analysis: Key issues

Data collection was performed separately, with different interview scripts, to obtain the perspectives of CIO, Clients' top management and Clients' technical teams.

We next present key insights from our data analysis, comparing the perspective of all informants. We reference interviewees by the acronym of their names.

Differentiation (CIO versus alternatives)

Both LITE and ALU were formally creating a dedicated internal R&D department, focused exclusively on new product development. Product innovation is motivated in both firms by internal ideas and client feedback (LITE – MP, ALU – CB, JM) and usage of external service providers for new product development is not a first choice.

In LITE, experience with other CIO-like companies exists, though with firms with specialized technological knowledge in lightning technologies (LITE – MF) and only when the process cannot be done internally due to insufficient capacity or competence, and with clear definition of parameters and desired end result (LITE – MP).

ALU has limited experience with external service providers and few not so positive results from this type of collaboration (ALU – CB, JM, FP), and sees the CIOs as "outsiders" with difficulties in working with them. The role of a CIO would be more focused on methodological coaching, consulting-like (ALU – CB).

Our CIO's approach (i.e. Zoom Innovation) in terms of differentiation focused on:

- Knowledge transfer (ZI – HM);
- Controlled costs and time (ZI – HM, JC);
- Multidisciplinary leading to different visions and action capacity in various areas (ZI – JC, MP);

- Integrated approach over the development, facilitated by ZI (ZI – MP, PA);
- Partnership/constant interaction with clients (ZI – MP, PA);
- Capacity to get a challenge and help the client to develop it (ZI – PA);
- Linkages with other external partners (ZI – PA);
- Complete final product information/report (ZI – PA)

However, clients saw only part of these elements. LITE would only mention more opening in terms of solution range (LITE – MP), whilst ALU identified the multidisciplinary (ALU – CB).

The choice of Zoom Innovation by LITE and ALU was indeed motivated by:

- curiosity to experience the type of service they offered (LITE – MF, MP),
- supporting the start-up (LITE – MP, ALU – CB, FP),
- being accustomed to the team and its way of working (ALU – CB).

Zoom Innovation's perspective coincides and complements clients' perspectives:

- supporting the start-up, giving an opportunity (ZI – HM, MP)
- getting rid of some projects that were on the shelf for sometimes (ZI – HM)
- insufficient internal competencies (ZI – JC, PA)
- being accustomed to the team and its way of working, trusting it (ZI – JC, MP, PA)
- being in the right place at the right time (ZI – MP, PA)
- reasonable price and competences (ZI – PA)

For LITE, if there had not been Zoom Innovation, they would have outsourced to another CIO (LITE – MF), whilst for ALU the alternative was less obvious, ranging from letting the product in internal development, freeze it, or getting help from a design firm to advance the process (ALU – CB, FP).

Partnership process

We analyzed the partnership process according to eight dimensions: proposal, confidentiality, planning & deadlines, costs, results, dedication, communication and knowledge transfer & absorption. We next present key insight of each dimension.

Proposal

The proposal process was seen as quite straightforward and effective, by both clients and our CIO. A first contact was made with top management by CIO project leader (PA), where was drawn the profile of the product/project to develop, a second contact with clients' technical team would bring more details. Next, a research phase followed in Zoom Innovation, with intense communication within the whole team. Planning and budget/costs were then drafted and the proposal was send to client, subject to revision and approval.

With a mix of face-to-face and asynchronous work, the process functioned quite well (LITE – MF, MP; ALU – CB; ZI – HM, JC, MP, PA).

Confidentiality

As clients and CIO had prior record of collaboration, confidentiality was assumed, enforced at the beginning (LITE – MF) and respected by CIO (LITE – MF; ALU – CB; ZI – HM, JC, MP, PA).

Planning & Deadlines

Regarding planning and deadlines, there was also agreement between clients and CIO. All functioned smoothly, initial plan was reasonable and clients' deadlines were all respected (LITE – MF, MP; ALU – CB; ZI – HM, JC, MP, PA).

One note only: inside the CIO, time management was not the best, and some additional focus onto this might have avoided some speeding up the days before just to meet the deadlines (ZI – HM, MP, PA). This was however not visible on clients' side.

Costs

On CIO side, the price was seen as reasonable, but pushed to the limit:

"Price was acceptable, allowed to cover costs, yet not to make money" (ZI – HM, JC, MP, PA)

On clients' side, costs were considered reasonable in one project, as there was also "a happy coincidence" which allowed to reuse some wasted material for the project (LITE – MF).

In ALU, as the project had cost a lot during internal development, comparatively, the costs were seen as reasonable, yet:

"It all depends on how much we spent on one product till there" (ALU – CB).

Results

On CIO's side, there were some doubts regarding clients' satisfaction and results quality. One might say they wanted to do more and better:

"I think they were satisfied, but maybe they wanted us to go a bit further" (ZI – HM).

"I think we could have done more...but we also did not promise more. Maybe it's just me being perfectionist and wanting more..." (ZI – MP).

And there was satisfaction:

"I think we managed to surprise them with innovative solutions with quality at level of esthetics, functionalities and technology" (ZI – JC)

"I am quite sure we responded to what was asked and we went a lot further in many cases" (ZI – MP)

Clients saw results as good, acceptable, according to what was in the initial proposal (LITE – MF, MP, ALU – CB):

"They did a good, systematic work, from beginning to end" (ALU – CB).

Dedication

CIO team was perceived by its clients as very dedicated and dynamic, with interesting ideas (LITE – MF, ALU – CB, JM, FP). On clients' side, there was dedication of internal technical teams in LITE (LITE – MF) yet in ALU opinions diverge: less dedicated (ALU – CB) and very dedicated (ALU – FP).

CIO team shares similar perceptions: full dedication in LITE and divided opinions in case of ALU, and in latest case they explain it by the specific nature of the project (ZI – HM, MP, JC, PA).

Communication

Communication flows between the CIO and its clients were fluid and efficient. There was agreement on this issue among all (LITE – MF, MP; ALU – CB, JM, FP; ZI – HM, JC, MP, PA):

"It worked very well! With the tools we have today (e-mail, phone)...and they are people we knew and these eases the process" (LITE – MF)

"They managed to understand what we needed and they satisfied our need" (LITE – MP)

"Communication was quite easy [...], contact was straightforward, they knew us. With top management is always more difficult, and this is natural. [...] You know how it works on the other side, you understand what they say. With new clients, it can be a black box, you do not know always to whom to speak..." (ZI – PA)

Knowledge transfer & absorption

Clients showed particular enthusiasm regarding the way knowledge created during the process was transferred and absorbed (LITE – MF, MP; ALU – CB, FP, JM):

"It was awesome. All the digital information they gave us in the end was very complete, no doubt about it" (LITE – MF).

On CIO side, there was similar understanding (ZI – HM, MP, JC, PA):

"I think they understood how things were done...all information was compiled and included in the final report" (ZI – JC)

"I believe we gave them sufficient material [...]. I think they are able to continue the development from where we took it. I also know they are perfectly ok to pick up the phone and call us if they want to clarify anything!" (ZI – MP)

"Even when there was no close monitoring from client, we tried to pass knowledge periodically, using frequent stage-gates, every 2-3 weeks. We informed the client, clarified the reasons for some decisions we had taken and double-checked if we were synchronized, if we were following the right path"(ZI – PA)

"...to some extent there are some advantages in having an external work. If on one hand the work is not present 100% in people's mind, on the other

hand there is a report a lot more complete to document the development process than it would have been if developed internally” (ZI – PA).

Some difficulties in understanding specific technologies or approaches were pointed, both by clients (LITE – MF) and by CIO (ZI – HM, JC), though they all agreed they were overcome easily:

“Strangely, this was not a major problem. I would have expected it to be a hurdle...” (ZI – PA).

Effects on clients’ innovation process

The collaboration with our CIO had limited effect onto its clients’ innovation processes. In LITE, there was none:

“it is not the first time we have the experience to

collaborate with an external team” (LITE – MP).

In ALU, in terms of actual way to do new product development, there was no perceived direct effect (ALU – JM), however in terms of indirect ones:

“it was created a certain innovation rhythm” and “parallel things were developed” (ALU – CB).

CIO’s business practices analysis

As shown in Figure 4, there was a difference in perception between the CIO and its clients regarding strengths and weaknesses. Clients’ opinion on good and bad practices is limited; one might say nothing went really well or really wrong. And there is a natural concern of CIO on issues to avoid or to repeat, with maybe some extra criticism on their work.

Strengths			Weaknesses		
ZI	LITE	ALU	ZI	LITE	ALU
Transmitting knowledge to the client (HM) Task performed with controlled costs and deadline (HM, MP) Getting an external perspective into their products (overcome lock-in) (HM) Team composition and competence (JC) Image/branding (JC) NPD experience (JC) Start with a project, manage the process to the end, deal with all stakeholders (PA) Integrated approach over parts of NPD process (PA)	Interpretive capacity (MP) Presentation capacity (MP) Interdisciplinarity (MP)	Interdisciplinarity (CB) Method/approach (CB) Stage-Gate approach (JM) Competence (JM) Capacity to bring new ideas and different approaches (overcome firm lock-in) (JM) Prototyping (JM) External linkages (JM) Dedication and will (FP)	Late feedback to clients, occasionally (HM, MP) No specialized salesman in the team (JC) Externalization of innovation is a new concept (JC) Small client portfolio (JC) Time management (MP, HM) Slow decision-making and making things happen, occasionally (MP) Client concerns regarding confidentiality (PA) Clients’ perception of higher knowledge dispersion (PA)	Lack of advanced knowledge over the technologies, raw materials and production process (MF, MP) Lack of specialization (MF)	Price (CB)
Good practices			To avoid		
ZI	LITE	ALU	ZI	LITE	ALU
Stage-Gate (HM) Good team spirit and trust (JC) Proposal discussion with client done face-to-face (MP) Getting client feedback (MP) Look for bigger clients with higher R&D funds (PA) Good clarification of project scope with client, in early stage (PA) Careful draw of times and costs in proposal (PA) Constant feedback from client (PA) Structure the work early to get input for final report (PA) Good project management practices (PA)	-	Stage-Gate (JM)	Broken information flows in clients (between top management and technical teams) (MP) Bad time management (MP) Not being professional, being too informal, occasionally (MP) Not having agreed conduct/rules in ZI team (MP) Do a lot more than what is asked by client for personal satisfaction (PA) Late contact with clients if development hurdles appear (PA) Not doing a formal project close-up with all intervenients (PA) Not doing what has been agreed (PA)	-	-

Figure 4. CIO’s business practices analysis: perspectives of CIO and its clients

CIO’s future

Opinions on Zoom Innovation’s future opportunities are divided.

In ALU there was doubt.

“It’s not all of a sudden that you can overcome the cooperation barriers between external and internal teams” (ALU – CB)

”I do not know if there are enough companies to use such a multidisciplinary team [...] and allow it

to survive and grow” (ALU – CB)

“Time plays against them [...] and overcoming firms’ resistance to outsource innovation is not easy” (ALU – CB)

“It’s a nice idea, but I don’t know, it is not easy” (ALU – CB)

“With an external partner it can go right or wrong. As it is not too tight to our internal needs, can explore other issues [...] but it may lead to a

product which is not linked to our reality...It may depend on firm's capacity to ask and monitor..." (ALU – JM).

The doubt was occasionally reflected in the CIO:

"It is fun and dynamic type of work, good for anyone found of constant learning. Yet I wonder if there is potential market for our business" (ZI – JC).

"I am afraid it can be seen like a playful business, which falls out of firms' day-to-day reality" (ZI – MP).

LITE acknowledged the importance to use external collaborations and points the importance of CIO's drive to create the future (LITE – MF).

6. Discussion

LITE has prior experience with CIOs, a clear grasp on the project and close monitoring of CIO's progress and results. Communication was fluid and fast, and process was naturally motivated by LITE. We call this client, an Experienced Client (CIO collaboration wise).

ALU was less used to external partnerships, having suffered some less positive experiences, which affected the openness of internal technical teams to such kind of collaborations. In this case, the process was mostly motivated by Zoom Innovation. We call this client, a Less Experienced Client (CIO collaboration wise).

Our CIO was perceived to have done a good work, within deadlines and agreed objectives, with lots of dedication. Interdisciplinarity appeared important to ALU, so as to reach to a broader range of solutions, yet in LITE the difference to other CIOs was far from obvious. Zoom Innovation's perspective over the process differed in specific points from its clients. The differentiation elements perceived by the team were not really drivers of customers' choice, as those contracted them to "give them a hand" and to experience their services. This might allow us to support previous insights by Calantone and Stanko (2007) enforcing the importance of communication with clients. The message does not appear to have passed to the clients, which may play against the CIO in further contacts with its clients.

Regarding the partnership process, care was taken to negotiate properly the proposal and adapt it to clients' needs, as well as to maintain confidentiality and respect deadlines. In this sense, our CIO managed to overcome some key issues referred in the literature: appropriability / safeguarding concerns (Pisano, 1990) and it proved to be a good practice, as it did not represent a barrier to the collaboration.

The cost issue appears to be a sensible one, depending on clients' expectations and varying from product to product even with the same interlocutor: *"with that product I had spent a lot of money, so the price was reasonable. Now with others, where costs were few, that price looks absurd"* (ALU – CB). This may difficult estimating the price and there may be a risk to affect good

partnerships if an "absurd price" is asked in spite of good intentions and reasonable costs from CIO. It would be interesting to evaluate whether this happens other CIOs (Chiesa et al., 2004 mention it briefly, too).

Results evaluation proved to be a tricky issue for the CIO team. In spite of periodical contacts with clients and maybe generated by the fact that contact with top management occurred less frequently than with the technical teams, there was high divergence over clients' satisfaction perception, sometimes even in the discourse of the same interviewee. Some emotional volatility associated with creative teams and other contextual factors might have influenced that in this direction, and possibly the low success rate of marketing contacts (Chiesa et al., 2004) aggravated by the start-up situation.

Communication functioned nicely as there was previous experience of collaboration between actors. However, one issue was raised by CIO's project leader: things are different with new clients. And there might be delays and hurdles in the partnership process, with efforts and costs on all sides. Up to some extent, this confirms Bonte and Keilbach (2005) findings, yet points out that this may be less present when there is prior experience of formal cooperation between partners.

The close cooperation and interaction with clients, complemented by a very detailed final product/project report led to high levels of knowledge transfer and absorption, and this was highly valued by clients. And in spite of not being seen as a competitive factor, it seemed to have worked as one. This might represent an important element to motivate collaboration with CIOs, especially when there is little habit inside the firm to fully and duly document the development process and use systematic methods. This is another issue for further research, with a note that none of the theoretical contributions we identified for this paper refers this topic as important.

Now coming to the effects onto clients' innovation processes, i.e. spillovers of methods and approaches from CIO to clients, this was not visible in LITE, the Experienced Client, and only indirectly contaminated ALU, the Less Experienced Client. This may point the importance of different approaches, both management wise and academic study wise, according to the degree of prior experience with CIOs.

The CIO's business practices analysis reflects, among others, differences in perspective between clients and CIO, which points to the insufficient understanding of CIO's role and benefits. This may justify more studies in which CIO's and CIO's clients' perspectives can be compared. More, as various elements differ from the ones referred in the literature, they could point clues/paths relevant for future empirical validation.

This CIO's future is unclear. There is doubt on most sides about the capacity of Portuguese firms to open up their innovation processes outside their supply chains (i.e. complement their typical collaboration with suppliers and clients) to service providers like CIOs, pay for it, benefit from higher speed to market and more holistic knowledge, and manage effectively this collaboration. It is also unclear what is the profile of the clients that would contract such integrated development services, which corroborates Chiesa et al (2004)'s finding on insufficient

knowledge of this market. Further studies in drawing this profile would help both managers of CIOs and CIOs' clients to understand and draw more benefits out of this type of partnership.

Ultimately, we saw that ALU and LITE had different perceptions and exigency on Zoom Innovation services. So, another interesting insight of our research is that there may be different drivers of collaboration with CIOs according to clients' experience with this type of service provider. It would not be surprising for this to happen, as there is a learning effect in collaborating with same partners and with different partners. This would be an interesting issue to validate in future empirical study.

And if what said before is true, it also may signify that CIOs should carefully select their clients and apply distinct marketing strategies and collaboration practices to fit clients' degree of experience. Another issue worth of future research.

7. Conclusions

Case studies have shortcomings, like any other research method. Even when performed with rigour, grounded on theory, using several tools to increase internal and external validity (Tashakkori and Teddlie, 1998), like we did, there is not enough data to support generalizations. In our opinion, the main value added of this type of research strategy is the capacity to look into detail in a given topic and identify new issues, pointing uncovered territory, and validate existing ones. It serves thus more like a confirmatory approach with the "bonus" of exploring and indicating new research paths (Saur-Amaral and Borges Gouveia, 2007, Amaral, 2005, Amaral, 2006).

Having said that, we believe our research brings value-added as follows.

For **academic scholars** looking to further explore the Open Innovation theory:

- It provides a systematic and exhaustive literature review of papers included in ISI Current Contents, covering the period from the "birth" of the concept till March 1, 2008. This literature review allows identifying the main topics studied thus far, and serves as a map to explore the most interesting lines of existing research or to quest unexplored space.
- It introduces a new concept, with a clear defined profile, of a specific type of external innovation service provider called CIO, building on Chiesa et al. (2004). This type of innovation stakeholders was scarcely present in the Open Innovation literature thus far, and is worth of further study.
- It is the first study, to our knowledge, to introduce empirically the perspective of the external innovation service provider (CIO). More, it is the first study to compare perspectives of CIO and its clients, emphasizing differences. We believe this is an important benefit, therefore an worth-pursuing path for future research in OI literature.
- It allows identifying new issues worth of studying, not mentioned so far in the existing Open Innovation literature, as well as confirming and complementing

previous findings. In this sense, it draws and enriches insights of other scholars, pointing new paths for future validation.

For **managers linked to R&D in innovative companies**, our study allows further insight and comprehension on the benefits and shortcomings in using external innovation service providers and specifically CIOs. Hopefully, this paper will allow them to get a grasp on the dynamics and hurdles of this type of external partnership for innovation.

For **managers working in CIOs**, it allows obtaining a more defined understanding as to barriers of collaboration, strengths and weaknesses present in a specific CIO, and more insights on clients' perception of their services. Unfortunately, it assists only very little in better drawing the profile of their clients and in the respective market segmentation. Yet, it might ring some bells as to differentiated strategies according to their clients' degree of experience in working with CIOs.

Finally, for **soon-to-be CIO entrepreneurs**, it illustrates some hurdles of a CIO start-up and desirable allow them to find ways to overcome them, by adopting some of the good practices hereby mentioned or by using other creative partnership strategies.

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¹ We inspired in the name given to innovation service outsourcers in the pharmaceutical industry. In the third phase of the drug development process are performed clinical trials on real condition patients. This phase is usually outsourced to the so-called Contract Research Organizations (CRO), which act globally and perform this type of trials for a wide variety of pharmaceutical firms and by so doing they reduce costs and increase efficiency (Saur-Amaral and Borges Gouveia, 2007).