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Corporate venture capital programs of European electric utilities: Motives, trends, strategies and challenges☆

Antonios D. Livieratos[a,*], Panagiotis Lepeniotis[b,c]

[a] University of Athens, Department of Economics, 1, Sofokleous str., 10559, Athens, Greece
[b] Business College of Athens, Business College of Athens, Greece
[c] Eaton Corporation plc, Eaton House, 30 Pembroke Road, Dublin 4, Ireland

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ABSTRACT

The forthcoming paradigmatic changes in the energy sector point to innovation as being one of the main drivers of growth for utilities. In search for their future business model, open innovation and, in particular the collaboration with startups, is recognized as a means to keep the leading position in a changing industry. In this respect, utilities deriving from the European market, which is considered as a reference case for many other regions in the world, follow the 4th wave of Corporate Venture Capital (CVC) by initiating relevant programs.The aim of the paper is to examine the state of CVC programs of the European electric utilities and, more broadly, to examine their motives, to identify trends and strategies and to discuss the associated challenges. As our current knowledge on the subject is limited, the purpose of the study is to investigate this evolving phenomenon. To this end, a multiple case-study methodology is used by examining the CVC programs of four major European utilities (E.ON, EDF, Enel and Iberdrola). Findings suggest that CVC programs are now integrated in an Open Innovation approach and thus complemented by numerous other initiatives. All CVCs conduct investments tightly linked to the parent's firm operations and the majority of them have more of a strategic (than financial) rationale in their investments. As a result, the cooperation between startups and the parent company is of great importance and poses a number of challenges related to the development of initiatives that would create linkages, achieve the alignment of the time frame and set up mutually beneficial commercial collaborations, including the 'if' and 'how' startups may work with competitors.

1. Introduction

Today, the electric utility industry is undergoing rapid and irreversible changes (Tayal, 2016; Fontana et al., 2013). The electricity supply chain is traditionally comprised of several components such as power generation, transmission, distribution, and retail supply. Prior to the 1990s, the entire electricity supply chain in Europe was a state monopoly, but a long period of gradual liberalization led to the disaggregation and privatization of most of its components (Newbury, 2013). In the "day after" the deregulation of electricity markets, electric utilities are facing paradigmatic challenges such as decarbonization, decentralization, and the smart grid, as well as changes related to a "new downstream" service model that is emerging (Honebein et al., 2012). At the same time, conventional generation is under pressure, facing a decline in its future value (Eurelectric, 2013; Nies, 2013; Starace, 2009). "We are witnessing the beginning of a new age in how electricity is produced and how customers buy it," as one commentator put it (Fontana et al., 2013, p.14). As a result, changing the business model has become urgent (PwC, 2014; Agüero and Khodaei, 2015).

These changes and pressures have propelled innovation to the fore in the power sector (Eurelectric, 2013). All participating parties – from equipment manufacturers to energy retailers – are called upon to find new ways to improve their products and manage their businesses while they also face the classic "trilemma" of security, affordability, and sustainability (PwC, 2015). According to Enel's head of innovation and sustainability, Ernesto Ciorra, the upcoming changes for electric utilities are so

☆ Facing paradigmatic changes in the energy sector, European-based utilities have been pursuing a so-called "fourth wave" of corporate venture capital, setting alliances with startups as a means of fostering innovation. A deep dive into activities at four major utilities – E.ON, EDF, Enel and Iberdrola – finds that these CVC programs are integrated within an Open Innovation approach complemented by numerous other initiatives.

* Corresponding author.
E-mail addresses: alivieratos@econ.uoa.gr (A.D. Livieratos), PanosLLepeniotis@Eaton.com (P. Lepeniotis).

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radical that those not innovating will go bankrupt (Shankleman, 2016).

In the EU, financing the power sector transformation has started putting pressure on companies and consumers, as well as on public budgets (Burger et al., 2015). To this end, European utilities are taking an increasingly active role in investing in innovation, in order to be part of the new future of electrical energy. This contradicts what was happening up until recently. In the mid-2000s, innovation was not a priority for European utilities, as one may observe by studying their decreasing R&D spending (Sterlacchini, 2006). However, during these last years almost all major European electric utilities have intensified their innovation efforts (Burger et al., 2015).

Innovation in electricity carries high stakes for both the European economies and the electric utilities (that are state-controlled to a large extent). Innovation in these areas could be worth 70 billion euros to the EU economy in increased GDP by the year 2030. Electricity cost reductions and energy savings would have a combined value of 60 billion euros in the year 2030. The benefits could prove to be even larger when wider macro-economic effects are considered, including improved competitiveness (Eurelectric, 2013). There is no doubt that innovation "will be the primary route for utilities to achieve growth." However, that involves "grasping a very tricky nettle: ensuring that business model innovation, security and reliability all keep pace with technology innovation. This has been hard for utilities, and it's clearly not going to get any easier" (Laclau, 2016, p.2). To respond to these challenges, European utilities in recent years have increased spending on R&D while, at the same time, opening up their innovation models (Burger et al., 2015).

For those pursuing the innovation route, open innovation is a key trend. Large companies, as well as smaller innovative companies and even startups, implement open innovation practices in order to speed up the innovation process, reduce development costs, and increase the impact of innovation (Chesbrough, 2003, 2006). Utilities, and especially the European utilities that are the focus of this article, are no exception to this trend. Eight of the 10 biggest European electric utilities state that open innovation is part of their overall strategy.[1] Following this general trend toward a more open approach to innovation, "large companies seem to see increasing value in external corporate venturing as a strategic tool for enhancing innovation processes" (Napp and Minshall, 2011, p.27). Along these lines, these last years the largest European utilities have created (or in some cases revitalized) corporate venture capital (CVC) programs. Nine of the 10 biggest European electric utilities are operating CVC funds (or startup support schemes that also provide capital to startups) and all but one (Spain's Iberdrola) started these programs in the 2010s.[2]

As they navigate the current radical transformation, European electric utilities are opening up their innovation model by investing in innovative startups through the development of relevant programs. In this respect, the aim of this article is to examine the state of CVC programs of European electric utilities and, more broadly, to examine their motives, identify trends and strategies, and discuss the associated challenges. To this end, through a multiple case study approach, this article examines the CVC programs of four major European utilities: E.On, EdF, Enel, and Iberdrola.

[1] This derives from searching on relevant information from the websites of the 10 biggest European utilities based on power sales of 2014 (in billion kilowatt-hours, Statista, 2016).

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The rest of the article is organized as follows. In the next section, we review the open innovation and CVC literature including previous work that aims to link these streams of literature. The following section presents the research objectives and methodology. On the basis of the literature review findings, the four selected case studies are discussed individually. Finally, the findings of the four case studies are discussed horizontally, identifying in parallel the motives, trends, strategies, and major challenges. We conclude our study with a brief discussion of the limitations of our study and present directions for future research.

2. Literature review

2.1. Open innovation

Open innovation is defined as "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model" (Chesbrough and Bogers, 2014). Initially a theoretical model deriving from sporadic best practices, open innovation has become a dominant trend among most large companies aiming at innovation (Chesbrough and Brunswicker, 2013) and the subject of numerous academic publications building a solid theoretical foundation (Chesbrough and Bogers, 2014).

Knowledge is the center of this non-linear model and the firm's capacity to form knowledge networks within the company, as well as across the firm's boundaries, constitutes a valuable capability for an innovative firm that aims to create new, difficult-to-imitate competitive advantages that are now rooted in mutually beneficial relationships (Livieratos, 2009). In open innovation, knowledge flows across the boundaries of the firms and may take the form of three types of processes: (1) the outside-in, (2) the inside-out, and (3) the coupled process that links the outside-in and the outside-out processes by working in alliances with complementary companies during which "give and take" is crucial for success (Gassmann and Enkel, 2004).

The adoption of the open innovation practices, and especially those implicating coupled processes, have created porous boundaries between the firm and its surrounding environment, thus changing the inter- and intra-organizational modes of coordination and triggering a new answer to Coase's classic question as to what "determines the boundaries of the organization" (1937). As a result, in the framework of the open innovation model, (1) the process of innovation becomes more complex and fragmented, (2) the actors are increasingly heterogeneous, as well as more interdependent, and (3) the period from conceptualization to commercialization is shorter (Livieratos et al., 2012).

It should be noted that the open innovation model expands more and more from upstream activities such as R&D to downstream activities emphasizing the importance of business model innovation. In other words, creating and capturing value extends across the whole value chain from the "idea to the market" (Chesbrough and Bogers, 2014; Bogers and Lhuillery, 2011; Chesbrough, 2006). However, implementing open innovation, especially for large multinationals, is far from a straightforward process (Mortara and Minshall, 2014). By opening up the innovation model, firms experiment with a wide variety of new as well as long-existing practices. Although we do not believe that open innovation is "old wine in a new bottle" (Trott and Hartmann, 2009), many of the practices recognized as open innovation practices have been long used by numerous companies. As these long-used practices are not "standalone" any more but are now integrated in the wider context of open innovation, the expectations regarding their leverage effect are greater. One such practice initially implemented more than 50 years ago and now set in the