

**ECO-INNOVATION PRACTICES.
ACTIONS, ACTORS, RESOURCES AND VALUE**

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Abstract

This paper focuses on ICT business to understand eco-innovation practices as encompassing the efforts of project networks to fulfil environmental responsibilities. The research approach to ICT analysis extends beyond the more traditional issues of ecologically sound company operations and sustainable ICT use. The question posed by the research serves to frame eco-innovation practices within project networks. We identify four practices: cleaning the ICT landscape, saving energy, connecting life and work, and enhancing the efficiency of processes. Using a methodological framework based on the practice approach, we discuss the main elements of practices, including actions, actors, resources and value.

Keywords: Eco-innovation, Practices, Project Network.

Competitive paper

INTRODUCTION

Google revealed the extent of its global electricity consumption and greenhouse gas emissions: it uses approximately 2.26 bn kWh of electricity, roughly equivalent to 200,000 homes in the US (M & C 2011). Businesses consume increasing amounts of energy and emit large amounts of greenhouse gases. Recently, increasing numbers of corporations have addressed the issues associated with their carbon footprints. In all, 73% of the Global 500 now voluntarily provide figures on their greenhouse emissions (CDP 2010).

Ecology, the environment and sustainability are becoming key themes in the business and academic literature. Multiple perspectives are proposed to study sustainability. These perspectives include strategic management (Carroll, 1979, 2009; Porter & Kramer, 2002, 2006), business ethics (De George 1999), policy and economics (Drucker 1994), multinational business (Collier & Wanderley, 2005), supply chain management (Murphy & Poist; 2002; Carter & Jennings 2004), marketing and service (Edvardsson & Enquist, 2009; Belz & Peattie, 2009; Sheth et al. 2011) and many others. This literature demonstrates the increasing acceptance of the view that “sustainability” falls within the mainstream of innovation research, a view that has a substantial effect on the progress of academic and business debates (Shrivastava, 1995; Elkington, 1994, 1997; Robert et al., 1997, D’Amato & Roome, 2009; Russo-Spena & De Chiara, 2012). Sustainable innovation is proposed as a source for the next industrial revolution (Braungart & McDonough, 1998), suggesting a more compelling frontier within business studies as well as furnishing the main driver for the competitiveness and growth of companies (Rodriguez et al. 2002; Little 2006; Asongu 2007). Some studies in business research empirically investigate the links between performance, innovation and environmental issues (Borges & Kruglianskas, 2006), arguing that the improvement of a firm’s environmental stance is fundamental to fostering innovation and achieving superior financial returns and competitive positioning (Nidumolu et al. 2009). However, sustainability in innovation studies is a fuzzy concept (Arundel & Kemp 2009). Its emergence has involved terminology that oscillates among wide semantic definitions, including eco-innovation (Fussler & James, 1996), sustainable innovation (Nidumolu et al. 2009, van Kleef & Roome 2007), and CSR innovation (Macgregor et al. 2007; Fontrodona et al. 2008) as well as more detailed definitions that include eco-design, eco-preneurship, and clean-technology venturing (Hockerts & Morsing, 2000).

An analysis of the basis of sustainability in innovation shows that this concept was initially defined by addressing the development of environmental benefits, with a strict focus on pollution control, abatement activities, and waste minimisation (Fussler & James 1996; Hellström 2007). As Rennings (2000) indicates, the first approaches included a general and neutral definition of sustainable innovation, defined as *new idea behaviour, products, processes that contributed to a reduction in environmental burdens or to ecologically specified sustainability targets* (p. 322). To refine this definition, certain authors argue that eco-innovation research should not be limited to environmentally motivated innovations but should also include ‘unintended’ eco-effects of innovations (Arundel & Kemp 2009; UNU-MERIT 2011). According to this view, environmental benefits can be both the primary objective of the innovation and the result of activities associated with other innovation goals (Nill & Kemp 2009). Within this broader perspective, the area of environmental innovation is also strongly influenced by divergent views of the ideal nature of eco-innovation. The eco-efficiency approach is primarily focused on process efficiency as a key strategy to maximise resource efficiency, achieve significant reductions in the total use of natural resources, and improve environmental impacts (Robert 1998; Hendrik et al. 2000, Lehni 2002; Vollenbroek 2002). This perspective is related rather

narrowly to the concept of eco-innovation, in contrast to the notion of eco-innovation as a new way of achieving environmental value and sustainable performance (Hellström 2007). However, this distinction is often obscured by the formulation of a comprehensive concept that includes innovation oriented toward resource use, energy efficiency, waste minimisation, reuse and recycling, new materials (for example, nanotechnology-based materials) and eco-design (Smith et al. 2010).

Another distinction fuelling the eco-innovation debate contrasts the view that environmental innovation should include an incremental improvement of existing concepts with the view that environmental innovation should involve an entirely new concept. Some authors place a strong emphasis on the radical dimension of eco-innovation (Husemann 2003; Hellström 2007). These authors suggest that an industry will face decreasing marginal returns on its incremental eco-innovation efforts in terms of sustainability and financial improvements. Therefore, it is necessary to generate an ongoing process of radical eco-innovation to advance the technological system to a new equilibrium (Hellström 2007). According to this perspective, the environmental benefits of an innovation can be gained through the creative and thorough transformation of the innovation space, including new products, new technologies, new markets and new systems, rather than by merely replacing existing elements through an incremental process of innovation. An additional position, which also considers the social component of eco-innovations, goes beyond concepts of innovations that simply involve a product, resource or business. According to Freeman (1996), it is commonly held that eco-innovation in its different forms must be supported by the corresponding evolution of social arrangements and institutional support structures (Hellström 2007). The addition of this social pillar to the definition of eco-innovation is necessary because it determines the effectiveness of eco-innovations linked to a greater degree of social and cultural acceptance.

The OECD attempts to include all of these aspects of eco-innovation within a broad definition:

“The creation of new, or significantly improved, products (goods and services), processes, marketing methods, organisational structures and institutional arrangements which - with or without intent - lead to environmental improvements compared to relevant alternatives” (OECD, 2008 p. 19).

Institutional innovations, such as changes in values, beliefs, knowledge, norms, and administrative acts, are also included, as are changes in management, organisation, laws and systems of governance that reduce environmental impacts (OECD, 2008).

The Oslo Manual’s definition of eco-innovation aims at the further expansion of the domain of eco-innovation (Arundel & Kemp 2009). This definition includes the implementation of novel technology that was originally developed by a different firm or institution:

The eco-innovation is “the production, assimilation or exploitation of a product, production process, service or management or business methods that is novel to the firm and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives” (Arundel & Kemp 2009 p. 5).

Beyond the definitional problems of eco-innovation, another aspect of the topic is the reframing of the conceptual landscape of sustainability in innovation by expanding traditional firm-centred views of innovation management to include interlinked group-centred interests, including customers, communities, and suppliers. From this perspective, the collaborative and network approach to eco-innovation within the IMP (International marketing and purchasing) tradition (Baraldi et al., 2009, 2011) provides an insightful perspective from which to analyse sustainable innovation by citing the multifaceted and complex interests that sustainability involves.

Since the seminal studies by Håkansson & Snehota (1989, 1995) were published, contributions of IMP scholars have described a firm as being embedded in a network of ongoing business and non-business relationships, which both enable and constrain performance (Ritter et al. 2004).

According to these studies, a network is shaped by the connectedness of actors, activities and resources embedded in an intricate and interconnected series of linkages (Håkansson & Snehota 1995; Möller & Halinen, 1999), which have positive or negative effects on each other (Möller et al. 2004). The focus of this study is on managing interrelated relationships as an intricate part of a firm's strategy by considering the network as the arena where strategic options (Håkansson and Snehota, 2006; Baraldi et al. 2007), innovations (Ritter and Gemünden 2003; Ojasalo 2008; Håkansson & Olsen 2011; Corsaro et al. 2012) and value creation (Ford & McDowell 1999; Ritter 1999) are manifested from direct and indirect links. Innovation is considered impossible without network mobilisation (Håkansson & Olsen 2011); this concept is based on findings that describe innovation as a product of a firm's change in relationships, activities and resources, thereby impacting the structure of its business network (Möller & Svahn 2005).

Based on the ARA framework, Baraldi et al. (2009; 2011) develop rich research on case studies to highlight the importance of the engagement and mobilisation of a network of actors for innovation with a specific application in eco-sustainability topics. Regardless of the network innovation advantage that results from inter-organisational collaboration, the eco-innovation network concept focuses on the argument that the multi-dimensional nature of eco-innovation hints at something larger, including the actors' connections, resource collection and mobilising actions and value-creating processes that emerge from the activities of relationships and networks. To combine several technical and organisational resources within corresponding social relationships, collective values and a mutual-value approach are the main factors necessary for eco-innovation.

Although some advances have been promoted in both the eco-innovation literature and IMP research studies, the interactive and social dimensions at the basis of eco-innovation appear to be in the exploratory phase, and a comprehensive and detailed description of the elements of eco-innovation is still lacking. To begin filling this gap, this paper proposes to apply a practice-based approach to eco-innovation by considering the phenomenon from a broad and multifaceted perspective. By adopting a practice lens and focusing on ICT business, we aim to address the following research question: How can we frame eco-innovation practices within networks?

In the remainder of the paper, we provide a review of the practice-based approach with a focus on the practice lens in innovation. We then present the case research and the findings. We end with a discussion of the findings and some implications.

THE PRACTICE-BASED APPROACH

In the social sciences, recent studies stress the contribution of a practice-based view by referring to a heterogeneous group of scholars, including Bourdieu (1977; 1990), Giddens (1979; 1984), Wittgenstein (1958), and Dreyfus (1991). Although there is no unified theory of practice but only an array of theoretical perspectives, the practice lens is an epistemological choice for seeing and understanding phenomena in organisations and in society.

The practice-based approach has been shaping studies within organisations (knowing-in-practice: Gherardi 2000), strategy (strategy as practice or the practice of strategizing: Jarzabkowski 2003; Whittington, 2003), leadership (leadership as practice: Carroll et al. 2008)

and design (design as practice: Kimbell, 2009). Within the marketing literature, a recent initiative has been launched to promote the application of practice theory (Skalen & Hackley 2011). 'Marketing as practice' aims to generate "insights into the ways in which marketing practice is constructed, produced and performed" (Hackley et al, 2009, p. 131). Other contributions emerge from studies of markets as practices (Kjellberg & Helgesson, 2007; Storbacka & Nenonen, 2011) and from consumer research (Warde, 2005; Schau et al., 2009). In industrial marketing, there is generally a lack of debate about the practice-based approach, with a few recent exceptions (Vargo & Lusch, 2001; Mason & Spring, 2011). We advocate a practice-based approach to industrial marketing.

In practice-based studies (PBS), the unit of analysis is the practice or, more correctly, the field of practices rather than the individual or the organisation. The practice lens joins the individual and collective dimensions and the human and technological elements, emphasising doing and knowing. The social is understood "as materially mediated nexus of activities" (Schatzi, 2001, p. 11) and social systems can be characterised "as ongoing self-producing arrays of shared practices" (Barnes, 2001, p. 17). In this view, companies and networks are bundles of practices defined by a set of activities, routines and material arrangements.

Notwithstanding this consistent view in PBS, there is no common definition of the term 'practice' (Gherardi 2009; Corradi et al. 2010). Table 1 highlights some definitions of practices.

A practice can be defined in terms of what it is and what it is not. It is not simply an action, and it is more than a process. It is not an experience, and it is not the result of an action or the mental status of individuals. It is a way of doing that is embedded in the context of inwardly and outwardly interlinked elements (Korkman, 2006) that focus on performance. The practice lens posits the dimension of practices in the contexts in which actors perform them within a constantly evolving social-historical-cultural setting (Sole and Edmondson 2002). A systemic view, rather than linear descriptions of the work flows of actions, is needed to understand how actors in their contexts interact, integrate resources and develop relationships.

In sum, practices are not simply synonymous with 'routine' or 'commonalities among the activities of social groups' and are not a generic equivalent of 'what people do' (Gherardi, 2009). As Rouse (2002) and Østerlund & Carlile (2005) argue, a practice refers to the production of social relations as well as the result of the production process.

Practices are not only recurrent patterns of action (level of production) but also recurrent patterns of socially sustained action (production and reproduction).

What people produce in their situated practices is not only work, but also the (re)production of society. In this sense, practice is an analytic concept that enables interpretation of how people achieve active being-in-the-world (Rouse, 2002, p. 16).

PRACTICE-BASED APPROACHES TO INNOVATION

We adopt a practice-based view of innovation because we are interested in the practices that actors' networks use to co-create innovation. The idea of practices is not unknown to the innovation literature, which has described innovation processes in terms of a company's best practices (Griffin, 1997). However, we advance the traditional vision of practices as well-codified internal routines to adopt a wider meaning of the term "practice", according to the practice-based studies (Corradi et al. 2010).

Table 1. Definitions of practices

Schatzki et al. (2001, p. 2)	Practices as embodied materially mediated array of human activity centrally organized around shared understanding
Reckwitz (2002, p. 249)	A routinized type of behaviour which consists of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge
Araujo, Kjellberg, Spencer, (2008, p.7)	A focus on practice involve consideration of the links between material devices, embodied skills and mental representation and the configurations in which they come together
Korkman, (2006, p. 27).	Practices can be defined as ‘more or less routinized actions, which are orchestrated by tools, know-how, images, physical space and a subject who is carrying out the practice
Kimbell (2009, p. 7)	Practices involve bodies, minds, things, knowledge, discourse, structure/process and agency and, importantly, cannot be considered by taking one of these elements in isolation.
Nicolini, Gherardi, Yanow. (2003 p.7)	Practice is a system of activities in which knowing is not separable from doing and learning is a social and not merely cognitive activity.
Carlile (2002 p.447)	In a practice-based research approach, it is crucial to be able to observe what people do, what their work is like and what effort it takes to problem solve their respective combinations of objects and ends’
Sole and Edmondson (2002, p. 18)	Practice connotes doing and involves awareness and application of both explicit (language, tools, concepts, roles, procedures) and tacit (rules of thumb, embodied capabilities, shared worldviews) elements. Central to the practice perspective is acknowledgement of the social, historical and structural contexts in which actions take place. Contextual elements are thus seen to shape how individuals learn and how they acquire knowledge and competence.
Storbacka, Nenonen, (2011 p. 241)	The concept of practice refers to ‘a way of doing’ which is embedded in a context of interlinked subjective and objective elements. It is important to note that practice is not synonymous with action, but it enlarges the unit of analysis to the system that fosters action.
Schau et al. (2009 p.31)	Practices as linked and implicit ways of understanding, saying and doing things - that include practical activities, performances and representations or talk.

The practice-based approach is still in its infancy in innovation studies that focus on practice-based knowledge (Orlikowski 2002; Dougherty 2004) or on the relationships between objects, knowledge, work practices, social groups and social contexts (Swan et al. 2007). Recently, Russo-Spena & Mele (2012a, 2012b) have addressed the role of practices in the co-creation of innovation. The main insight emerging from these works is that the practice lens allows the analysis of *innovating* as a process involving an array of factors, namely, actors, actions and resources, rather than the mere innovation seen as an output. Actors are seen as carriers of practices who perform actions through the use of resources (symbolic, linguistic and material: Hackley et al., 2009). To these factors, we add an understanding of value creation within practices. We refer to Schau, Muniz and Arnould (2009) as they point out that “*practices create*

value” (p. 39) in the sense that engaging in practices is *a process of collective value creation* (p. 35). Furthermore, we draw from Korkman et al. (2010) because their practice-based approach is derived from practice theory and Service Dominant logic (S-d logic) literature (Vargo & Lusch, 2008; Vargo, Lusch and Mele, 2012), as their assumptions show:

- Practices are fundamental units of value creation.
- Practices are resource integrators.
- Firms are extensions of customer practices.
- Value propositions are resource integration promises.

The practice-based approach advocates a contextual and process-oriented view of co-creation and innovation. Innovation can be conceptualised not as the simple result of a company’s processes but rather as being formed in practical constellations (Schatzki et al., 2001), in which actions are performed and resources, such as tools, images, spaces and competences, are used and integrated. Focusing on practices enables us to analyse the social connections among individuals, collectives, organisations, institutions and the situated contexts in which these connections take specific form and the intermediaries are utilised. As Barnes (2001, p.17) affirms, “Practice is all there is to study and describe”, and innovating can be studied through the reconstitution of the system of developed and shared practices.

CASE RESEARCH

Industrial marketing literature identifies case research as a suitable investigation method; however, a nuanced debate has recently emerged concerning the strengths and weaknesses of this method. We followed the advices of scholars who address the need to adopt innovative patterns in case research (Piekkari, Plakoyiannaki and Welch, 2010), leading us to a practice-based methodology. Through a case research we conducted an intensive study of innovation practices within project networks, using multiple sources of evidence to develop an understanding that serves to inform scholars and practitioners (Halinen and Tornroos 2005). The practices became the locus of our study of the practitioners. Analysing practices allowed us to empirically investigate how contextual elements shaped the social construction of eco-innovation. Our method is similar to what Jarvensivu and Tornroos (2010) define as moderate constructionism, which provides a way to take “better into account the multiple constructed community-bounded realities (p. 100)” of the case. We conducted conversations and analysed documentary materials. We aimed for a “multi-voiced rather than convergent understanding of the case under study” (Piekkary et al., 2010: 111). The conversations were seen as social encounters in which active parties (i.e., by the researchers and practitioners) constructed collaboratively knowledge. We also viewed documents as communal constructions of the actors’ experiences—a written form of storytelling.

We adopted an emergent, flexible and abductive process by oscillating between theoretical insights and empirical work.

RESEARCH DESIGN

The study is based on a leading global IT firm that sells integrated and customised solutions for information and communication technology (ICT) problems. The case offered access to the firm's practices, providing an opportunity for an in-depth analysis of eco-innovation development (Siggelkow, 2007). Managers at the headquarters of a company in Germany and at a company in Italy were contacted. Table 2 displays four stages of the research design.

In Stage 1, we contacted the Project Manager Head in Italy and had some conversations to let him tell his story about the company. The goal was to understand how the company develops projects and leads project networks. We also talked with the marketing manager in Italy and the Green ICT managers in both Italy and Germany to understand the Green ICT strategy and stakeholder involvement. These managers supplied us with company documents, reports and other materials that we used for our analysis.

Table 2. Research design

	Method	Content	Time	Output
Stage 1: Pre-understanding	Conversations: - 5 with Project Manager Head - 2 with Marketing manager Head - 2 with Green ICT manager Observations within some projects	With reference to the focal company: - corporate and business strategy - methods of developing projects - methods of leading projects - innovation and sustainability	4 months	Pre-understanding of projects, networks and innovation in the focal company
Stage 2: Eco-innovation projects	Analysis of documents, reports, magazine, etc.	Company's projects on eco-innovation (Green ICT)	4 months	Selection of 8 projects on Green ICT
Stage 3: Eco-innovation practices	Focus on the selected project, Conversations with team members, Analysis of each project network, Analysis of some partners, Intra-case and inter-case analysis, Comparison among cases	Focal company's practices, Project networks' practices: actors, actions, resources and value	5 months	Identification of eco-innovation practices
Stage 4 Final report	Check member	Reading the paper for internal consistency (of findings and discussion)	1 month	Comments on the paper, Discussion of implications

In Stage 2, we focused on the company's documents, reports, materials, and magazines. The company has highly formalised documentation processes; therefore, we discovered valuable written information on the lessons learned and best practices conducted within the company (as a sort of written storytelling). We also identified and analysed several Green ICT projects.

In Stage 3, we focused on eight eco-innovation projects and the relative project networks. We talked with team members of each innovation project and provided an analysis; we also analysed some partners within these networks.

The data were collected based on the approach of Jarvensivu & Tornroos (2010). The practices of eco-innovation, as constructed by the focal company and its networks, as well as the data to code the practices, were identified, and the elements relating to the practices were

analysed. The categories of analysis, such as the set of actors, actions, resources, and value outcomes, were considered to be the research output. We reviewed the findings to determine what further data collection was required to provide a full description of the practices. The iterative process continued until the description of the practices was accurate.

In Stage 4, we utilised a “member check” procedure (Lincoln & Guba, 1985) with a senior manager of the focal company, who read the draft and final case descriptions and discussed the principal implications. This data validation step increased the quality (construct validity) of the study.

Research credibility and reliability were enhanced in each stage by the techniques used for data collection and analysis (Denzin & Lincoln, 1998). The validity was enhanced in accordance with the suggestions of Richardson (2000) and Maxwell (2005).

THE PRACTICES OF ECO-INNOVATION

The ICT company examined in this case study (the focal firm) is increasing its engagement in eco-innovation by developing and implementing green ICT solutions that help to preserve natural resources and reduce carbon emissions. “Green ICT” is the term used by analysts, manufacturers and providers to identify ICT solutions that offer contributions to sustainability, including hardware, software and services. Although ICT is responsible for approximately 2% of global CO₂ emissions, the intelligent use of ICT solutions can support the greening of business processes (Gartner, 2011).

The environmental strategy of the focal firm in this case study focuses not only on the use of greener ICT technology but also on instilling cultural change in favour of environmental sustainability. Therefore, through its Green ICT endeavour, the focal firm aims to spread awareness of Green ICT and to change individuals’ and organisations’ behaviours in favour of *Green ICT practices*. The focal firm’s use of Green ICT reduces the impact and costs of energy consumption and controls the damage caused by the disposal of hazardous materials found in electronic equipment. Green ICT at the focal ICT company is a four-pronged initiative. Paper usage is reduced through innovative solutions, lower energy consumption is obtained, travel and traffic are reduced, and less hardware is used. These four approaches share the common goal of helping enterprises dramatically reduce their carbon footprint. Each solution has been deployed through several actions and actors involving projects performed by ad hoc networks. The Green ICT portfolio is compounded by a collection of solutions, projects and networks applied through what can be called “practices of eco-innovation”.

In the following section of the paper, we analyse the practices of eco-innovation from the focal firm's point of view. We categorise four main practices: cleaning the ICT landscape, saving energy, connecting life and work, and enhancing the efficiency of processes. We apply a methodological framework based on the practice approach to discuss the main elements of practices, including, actions, actors, resources and value. Table 3 summarizes the practices and their elements.

PRACTICES: ACTIONS AND ACTORS

Actions in the actors’ network are accomplished by the firm’s eco-innovation practices through advanced projects that the focal firm develops as highly integrated and tailored ICT solutions. Practitioners share activities in the situated context of each project; the actions are performed as a participative social process.

Table 3. Focal firm's practices and elements

Practices	Projects	Actions	Main Actors	Resources	Multifaceted Value Dimensions
Cleaning the landscape	Madaus	Changing habit, Promoting outsourcing, Reducing operating resources	- Focal company - Rottapharm-Madaus	New devices, New solutions, New know-how, Routines, Information	Cost Saving, Device harmonisation, Idle resources reduction, Customer service improvement, Environmental impact reduction
	Paper, Pen and Phone		- Focal company - Deutsche Telekom - Deutsche Telekom' customers		
Saving energy	HBPO	Harmonising resource infrastructure,	- Focal company - HBPO - HBPO's employees	New devices, New solutions, New know-how, Routines, Information	Energy usage reduction, Quality service improvement, Processing data reduction, Environmental impact reduction
	T City	Monitoring resources consumption	- Focal company - TWF - TWF's partner (ABB)		
Connecting life	My Access Key	Connecting dispersed actors, Virtualising working environment	- Focal company - Users	New devices, New solutions, New know-how, Routines, Information	Time saving, Cost Saving, Customer contact improvements, Connection extensions, Environmental impact reduction
	Unified Communication and collaboration		- Focal company - T-Mobile - Areva NP - Consulting services		
Boosting processes efficiency	Inventory management system	Better use of resources,	- Focal company - Brau union - Customer's logistic partners	New devices, New solutions, New know-how, Routines, Information	Cost Saving, Resources use improvement, Logistics and transportation cost reduction, Environmental impact reduction
	Parcel collection and drop-off points	Implementing green logistics	- Focal company - DHL - DHL customers		

Cleaning the ICT landscape

By challenging current employees' habits and ways of fulfilling customer needs, innovation may have significant potential for improving the sustainability effect. The focal ICT firm develops alternative and innovative solutions to customer demands, helping the business to drastically reduce and eliminate idle resources. Cleaning the ICT landscape is a compelling practice facilitated by smart ICT solutions. This practice provides the opportunity for actors within a project network to outsource their applications and provides access to ICT resources of the ICT company, such as processing power, storage software and bandwidth, on demand from pooled resources at data centres. The resources, the customers integrate by interaction, can be scaled up or down according to its changing needs, and the customers pay only for what is made available to them; there is no upfront investment in hardware infrastructure and no need for idle assets.

The Madaus project demonstrates the advantages to the customer company of reducing operating resources. The key business of Rottapharm Madaus is the production and global distribution of pharmaceutical drugs, cosmetics, food supplements and medical devices. For years, the customer company has managed its business data and controlled its production and logistics processes using the corporate software SAP. As the service provider, the ICT company offers better and more flexible use of the required IT infrastructure with “Dynamic Services for SAP Solutions”. The customer company obtains all of its server and storage capacities for SAP applications from the ICT firm’s data centre as required, thus reducing costs. The economies of scale that the ICT firm determines and passes on to the customer have reduced Madaus’ ongoing operating costs by as much as 15 percent and have contributed significantly to the use of environmentally friendly business processes.

According to the focal firm, reducing the use of devices also involves the deployment and adoption of energy-efficient products, processes and solutions. The practice of replacing conventional means of communication with ICT solutions (e.g., e-mail, texting) is an increasingly positive component of the office environment. Further potential savings can be found in the diffusion of digitalisation practices that allow the management of the entire document process, from digitisation to archiving, distribution by email or post, or the generation of website content, to be changed to an entirely paperless workflow. The focal firm developed an innovative solution for Deutsche Telekom in the “Paper, Pen and Phone Project”. Implemented in the high-street stores of Deutsche Telekom, the project represents a prime example of how innovative technology can save postage and paper while reducing environmental impacts. The innovative pen has a built-in camera that allows the capture and subsequent processing of handwriting and signatures, such as on contracts. In this way, the customers of the shops retain the original signed document. The digital copy is transmitted wirelessly to a central server, where it is archived. There is no need for documents to be sent by post, reducing the amount of printed papers by half. Reducing the cost of processes, improving customer service, and preventing information loss are the main advantages for Deutsche Telekom and its customers. There are also additional benefits, including the reduction of carbon emissions corresponding to the reduction or termination of the manufacturing, printing and mailing of paper.

Saving energy

Promoting the intelligent management of resources by sharing devices is also a strong contribution of the focal ICT firm. This contribution yields energy savings and reduces the firm’s impact on the environment. In the words of a manager of the focal firm:

The companies are still deploying too many and not-harmonised resources and devices to operate, and this complex landscape often leads to a lack of transparency. The ratio of users to devices can be significantly improved by analysing the current infrastructure and actual user requirements; then, changes can be made to the type, number and position of devices, ensuring better utilisation of available assets, and reducing stand-by and idle times. The ability to intelligently assign and administer resources is a key function within any ICT solution, ensuring maximum flexibility in resource allocation.

This solution has been successfully implemented at HBPO, a leading specialist in front-end automotive modules. The ICT firm has harmonised and updated the Lippstadt-based HBPO’s global infrastructure without interrupting the company’s tightly synchronised production and supply chain. Standardised service processes and clearly defined service levels guarantee the stable operation of all applications. As a result, the quality of service at HBPO has reached a high level. This development benefits all employees in the company. The employees profit, for

example, from a central helpdesk that offers competent and rapid help in all matters regarding telecommunications, network and office topics.

The energy-efficiency view of the focal firm moves towards a more integrated vision of energy management, including considerations of operative and cultural efforts. As the ICT firm's document reports:

The energy-saving practice should be a key consideration for firms that must be managed within a widely integrated, effective approach that includes hard and soft technologies and infrastructures. Ideally, this practice should be a key consideration at the outset, such as when planning and designing new offices and production facilities, giving rise to the "smart building approach". However, innovative energy management systems can also be retrofitted at reasonable expense in existing buildings by effectively monitoring and adjusting energy consumption. The time is ripe for businesses to focus on gaining enterprise-wide transparency for energy and resource consumption and carbon emissions.

To address the many challenges of efficient enterprise-wide energy management, the ICT company is investing heavily in applications and partnerships that emphasise two main fields. The first emphasis is on supporting actors in project networks to provide complete transparency regarding current consumption at different levels of aggregation within the organisation. The second emphasis is on improving the energy effectiveness of the organisation, in line with highly targeted and statistical reference data. The T-City project joined forces with the local German utility society (TWF), the ICT Company and another leading technology firm (ABB) to explore new ways to deliver power as part of the T-City initiative. The project addresses all facets of smart energy, including smart metering, smart grids and home automation. In two suburbs in the south of Germany, all households have been equipped with smart meters for electricity, gas and water. The focal firm developed a modular solution to separate the electricity, gas and water meters from the central data communication units. Data from each meter are transferred to TWF reliably and in real time. As a result, TWF can allow households to decide how often the meters are read. This approach also minimises the amount of data that require processing. The data are transferred only in the amounts necessary. Thanks to the steady stream of information about consumption, TWF can stay abreast of peaks in demand. In addition, consumers can proactively reduce their usage due to the visibility of their energy consumption and the availability of flexible tariffs.

Improving a firm's environmental impact through energy saving makes considerable demands on both management skills and ICT-related skills. Furthermore, the use of environmentally friendly ICT processes and their application requires a minimum of awareness of the environmental implications of personal behaviour. The ICT firm is engaged in increasing knowledge about ICT and its effects on energy saving and the environment. In addition, the firm is involved in supporting environment-related ICT skills and education (see resources section).

Connecting life and work within virtual environments

Reducing and optimising the number of devices is a highly compelling challenge that involves the ICT firm and other actors within the project networks. From the ICT firm's perspective, however, it is not sufficient to achieve this goal; instead, it is necessary to envision new landscapes for life and work to create low-carbon workstations in the future. As a manager of the ICT firm says:

Nowadays, teamwork and collaboration spanning the globe are commonplace, which often makes long-distance travel necessary for many more employees than before. Instead of collecting air miles, most of them could be scoring points at their desks as a whole new generation of communication and collaboration tools allows individuals to work together across multiple locations without any loss of quality.

The focal ICT firm's solution works hand-in-hand with customers and partners in project networks to spur the practice of connecting life and work within virtual environments. The focal firm's telework solution, introduced in 2009, enables actors in project networks to work simply, intuitively, securely and reliably while on the move. The project My Access Key provides users with secure access to their desktop environment from anywhere in the world through the use of a USB stick. My Access Keys give employees the opportunity to work from home and allows companies to contribute significantly to greater reductions in emissions. The ICT firm estimates that by working from home for just one day a week, an employee with a daily commute of 40 kilometres in each direction would reduce his or her carbon emissions by as much as 295 kilogrammes a year. In the fixed-network segment, the focal ICT firm has produced value-added services for audio and data conferences that enable virtual connection within human and non-human networks. These activities contribute significantly to the reduction of the use and environmental waste of resources by firms. By combining all of the key communication channels via a single interface, the "Unified Communication and Collaboration" project allows companies to coordinate projects worldwide and in real time, connecting the companies' networks from any site. At T-Mobile, for example, leveraging the ICT company's solution enabled approximately 40,000 video-conferences to be conducted over two years, and more than 3,000 employees benefited from this option. The ICT investment was profitable after only four months because of the air travel that was avoided. This solution also produced a reduction in carbon emissions of approximately 7,000 metric tonnes. Similarly, with a network infrastructure and a freely programmable operating interface, the ICT firm provides an end-to-end operating solution that has helped Areva NP GmbH, the German-French nuclear technology company, to communicate effectively internationally and to further develop its regional business in Germany in an economically and ecologically focused manner. Collaboration between different locations is an everyday event in the work of Areva NP. Modern videoconferencing technology supports the work of project teams, accelerating important decision processes, strengthening collaboration in international project teams and increasing productivity because expert knowledge is rapidly transferred to the site where it is needed. This high utilisation of the virtual work environment is beneficial because it avoids the increasing travel expenses that result from further expansion. Moreover, this development has improved the corporate environmental balance.

In addition, virtual-environment solutions are identified as meaningful solutions to improve customer contact, particularly in industries that require extensive consulting services. Virtual consulting allows service providers to provide real-time consulting services to their customers in every context, including customers' homes, the main office or branch offices. The solution for the focal company offers great potential in its applications because it facilitates contact with customers, saves time and reduces travel costs as well as carbon emissions.

Boosting the efficiency of inbound and outbound processes

ICT solutions are also used to support the efficiency of business processes, both within and outside the firm's boundaries. As the ICT firm's document reports:

When effectively and comprehensively applied Green ICT can improve business processes that are not directly involved in ICT, and dramatically lower CO₂ emissions throughout the entire process chain (firm's document).

The ICT solutions can streamline processes, and they have enormous potential for reducing CO₂ emissions because they improve the utilisation and sharing of resources. ICT also facilitates the in-depth monitoring of energy consumption and CO₂ emissions throughout the value chain. Accordingly, processes and organisational structures can be enhanced. The potential savings are

particularly great in industries with extensive, complex logistic and supply chains. An example involves the leading Austrian beer producer Brau Union. The focal ICT firm develops a solution that integrates the inventory management system and forklift control system with an interface to the brewer's ERP system. This system helps the company keep its warehouses well stocked with a wide variety of goods, in line with demand. Through the use of sensors and WLAN, resources can be located anywhere in the facility. With the aid of a screen built into their vehicles, the forklift drivers can navigate quickly and directly to their destination. Brau Union has obtained better use of resources and implemented a green logistics format by increasing inventory turnover and reducing the gas consumption of the 14 forklifts. Shortening the routes travelled by the vehicles has cut CO₂ emissions by almost 15%. This is a lighthouse project for the global Heineken company, which owns Brau Union.

In industries with complex supply chains, the greatest efforts focus on reducing transportation. As a manager of the ICT firm states:

Intelligent logistic systems combine the more effective organisation with an array of applications able to cut fuel consumption in conjunction with much lower CO₂ emissions – but with no loss in service quality.

The DHL parcel collection and drop-off points project effectively demonstrates this aspect of business process efficiency. All 2,500 of DHL's planned automated parcel collection and drop-off points in Germany have been in operation since the end of 2009. For DHL customers, this development means less driving and lower costs. The project also helps to reduce the amount of road traffic. The ICT firm is responsible for the smooth, reliable operation of the self-service units, which are fully automated, equipped with cutting-edge technology and connected to a sophisticated, failsafe network infrastructure. The collection points transmit information on customers' orders to a central service centre, where employees monitor the processes. Emails or text messages are sent to customers to notify them of shipments that are ready for collection. As a result, DHL has been able to reduce the total distance driven by its trucks and vans by approximately 600,000 kilometres per year. Its customers will drive 3.3 km less, and the 2,500 collection points reduce carbon emissions by almost 1,000 metric tonnes.

The use of telematic systems based on detailed, up-to-the-minute traffic information captured by an extensive network of IT devices and transmitted by telecommunications equipment has a variety of possible applications. These opportunities are also supported by the development of satellite and RFID-assisted positioning solutions. These technologies not only allow the improvement of fleet management and capacity utilisation but can also be applied to water and air transportation or used to improve smart road-pricing systems, thus contributing significantly to climate protection.

PRACTICES: RESOURCES

In the four practices of eco-innovation, actors within project networks interact with and use an array of resources (tools, know-how, artefacts). A particular value proposition of the ICT company is seen a set of possible resources for its customers and partners. These resources include not only Green ICT solutions but also traditional ICT solutions for the greening of customers' business processes. Other types of resources are firms' competences and relational assets. These resources are codified in the best practices series, which, together with information on lessons learned, provide a form of explicit knowledge available on the company website to employees and external partners.

Furthermore, the ICT company and actors within project networks can rely on two specific forms of resources, or codified routines, that contribute to the efficient development of processes

with reference to eco-innovation. One of these *practical ways of doing* is the ‘Action Plan’ (figure 1), a precise set of actions performed by the ICT company in addition to the specific actions linked to the solution produced by each project. The Action Plan allows the network of actors to coordinate, manage and harmonise Green ICT activities as a whole. A manager stated the advantage of a codified set of activities:

An effective action plan gives all stakeholders – executive management, employees and customers – a framework of reference. It also makes it easier to realistically assess all potential savings, both environmental and economic.

Figure 1. The Green ICT Action Plan



Source: Focal ICT company

The individual activities are aligned with the general goals and implemented in logical order. The first step is to evaluate the diverse goals and expectations for implementing a Green ICT solution (i.e., commitment to environmental protection, lower energy costs) to develop a common understanding and shared acceptance. The second step is to analyse the current state of Green ICT implementation by asking which activities have already been initiated or by determining what processes are involved in selecting hardware and suppliers. In this analysis, the company attempts to understand how Green ICT can be incorporated into the overall corporate social responsibility (CSR) strategy and what obstacles must be overcome. The focal company then identifies and reaps what it calls “low-hanging fruit”. This step is facilitated by attracting employees and other actors (within the project network and outside, i.e., the general public) to Green ICT efforts.

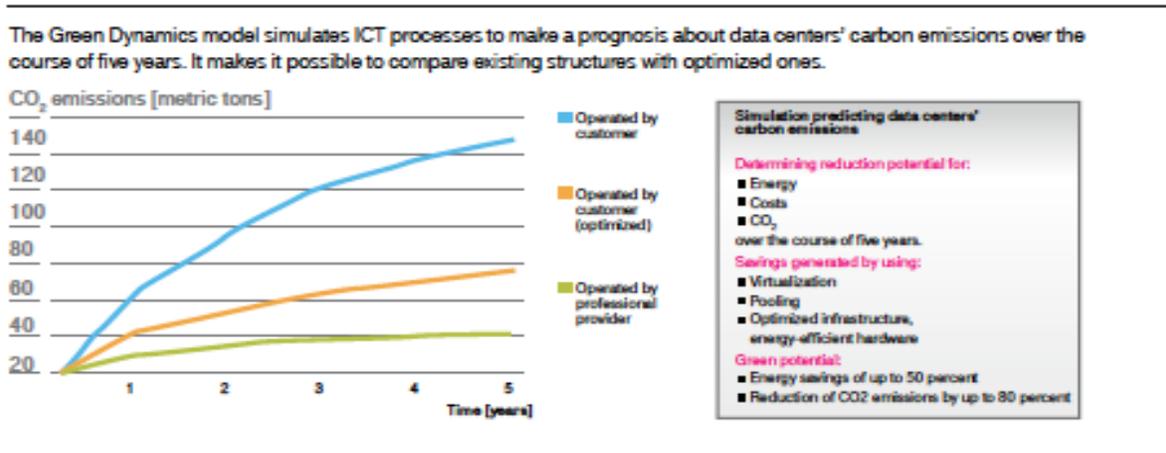
The company works on building acceptance among employees, and heightening their interest and willingness to play an active role, even before the actual project gets under way. This can be achieved by, for example, disposing of obsolete legacy hardware, implementing an enterprise-wide power management system or joining an environmental protection organisation (company’s document).

With the commitment of several actors, the ICT company proceeds to tackle the action plan on a broad front. The company reviews measurement methods, selection processes and technical support methods. It optimises the utilisation of the existing ICT environment. It conducts staff training and raises employee awareness. It transforms and upgrades its infrastructure. Finally, it leverages ICT in core business processes. The greening of ICT requires two more things: ongoing monitoring – sustainability reporting that increases transparency and makes it easier to

identify further possible levers - and feedback into the process of the continuous improvement of the findings and insight gained.

The second routine used in the practices of eco-innovation is the Green Dynamics model (figure 2), which allows companies to simulate how various ICT components work together and to use this information to make the most effective ICT decisions in specific settings, such as data centres.

Figure 2. The Green Dynamics Model



Source: Focal ICT company

The Green Dynamics model facilitates the identification and measurement of the ways in which different technological measures increase efficiency and reduce energy consumption. Specifically, the Green Dynamics model makes Green ICT more transparent and raises the awareness of Green ICT issues within the project networks by showing how ICT contributes to decreases in global CO₂ emissions. The method of simulating dynamic systems sheds light on the complexities of ICT energy efficiency. These include different degrees of virtualisation, pooling, and improvement of the PUE (power usage effectiveness) metric. The physical resources considered include computing power, CPUs, data storage and other assets. The model avoids excessive complexity for the sake of transparency and ease of comprehension, and it enables decision-makers to rapidly and effectively evaluate the current situation and to identify opportunities for improvement. The model therefore facilitates Green ICT decision-making without omitting important factors and reveals the potential for lowering CO₂ emissions. The following example demonstrates the model's value as a decision-making tool.

The findings of these simulations confirm the dynamic behaviour of ICT infrastructures and how this influences energy consumption. An overview of the results (five-year simulation): energy consumption reduced by 618,589 kWh; costs reduced by € 43,301; CO₂ emissions reduced by 108.25 metric tonnes (an equivalent of a car travelling over 676,000 kilometres).

These savings can be achieved by reducing the total amount of hardware (by up to 80%, with the aid of virtualisation), lowering the number of servers (by up to 50 % by pooling and by raising utilisation from 15 to 70 %) and optimising operation of the infrastructure (a PUE value of 1.5 is feasible; data centres typically have a value of 2.5). (Focal company's document)

PRACTICES: VALUE

Through the deployment of practices of eco-innovation, value arises as a process of multiple benefits experienced by multiple stakeholders. We report the principal benefits arising within the practices.

In cleaning the ICT landscape, the reduction and the harmonisation of devices permit the participating companies to cut operating costs and to make significant contributions to environmentally friendly processes. Moreover, the “Paper, Pen and Phone Project” introduces standardisation and virtualisation that allow the customer company to save postage and paper while improving customer service and lowering costs and environmental impact because there is no need for documents to be mailed, scanned and printed.

In saving energy resources, the implementation of intelligent management of resources supports HBPO to reach a visibly higher quality of services that benefit all employees in the company. Because of the T-city project, two local government areas can benefit from smart meters. Moreover, consumers can reduce their energy usage because they can monitor their energy consumption and are aware of the availability of flexible tariffs.

By connecting life and work, videoconferencing reduces the need for travel, saving time and money for the customer company and its partners. Moreover, the lower CO₂ emissions produced represent a benefit for the environment.

The enhancement of process efficiency reduces the length of the journeys to company facilities made by DHL customers. Moreover, this DHL program reduces traffic and reduces carbon emissions by almost 1,000 metric tonnes. In the Braun Union project, shorter routes allow reductions of CO₂ emissions. Moreover, the customer company experiences an improved use of resources, as a manager reported:

Better use of resources come from two aspects: 1) by increasing inventory turnover while deploying the same number of employees and forklifts and 2) by increasing the area used to store goods because warehouse space can be used flexibly for any and all products.

The specific benefits arising from the solutions furnished by different projects represent the multifaceted aspect of the total value created in the practices of eco-innovation. These benefits are added to the most obvious benefits of Green ICT including reduced environmental impacts and cost savings. The focal company adopts a wider perspective:

The ecological impact of a business or product is frequently measured and expressed in terms of its “carbon footprint” – and companies are increasingly expected, and willing, to take steps to reduce it within the scope of their commitment to corporate social responsibility. The main motivation for implementing Green ICT seems to lie in the reduction of costs. But a comprehensive Green ICT strategy offers many other benefits, appealing to all stakeholder groups: employee satisfaction increases, the company’s standing with capital markets and with society as a whole improves, and the business can attract new customer groups (source: ICT firm’s report).

By adopting a holistic perspective, the focal company has synthesised the multifaceted benefits obtained by multiple stakeholders so that value is created collaboratively with the actors (figure 3).

The focal ICT company examines the key aspects of a comprehensive environmental strategy. From this perspective, the company fulfils its environmental responsibilities by not only addressing customer target groups’ needs but also assuring sound business operations and sustainable ICT usage. These factors are important for increasing brand value and enhancing the company’s public image. The focal company also examines the impact of a Green ICT strategy on capital markets because many rating agencies are attaching greater importance to CSR

activities. Practicing Green ICT positively influences both the share price and the company value. The public image of the company is also improved by eco-compatible collaborations with non governmental organisations (NGOs).

Figure 3. How different stakeholder benefits from Green ICT

Environment/society			
<ul style="list-style-type: none"> + Lower CO₂ emissions + Reduced resource consumption + Compliance with legal requirements (in the future) 			
Companies			
<ul style="list-style-type: none"> + Reduced energy costs + Reduced operating costs of data centers + Less hardware needed 			
Employees	Capital market	Customers	Public
<ul style="list-style-type: none"> + Increased employee satisfaction + Greater loyalty + Easier recruitment 	<ul style="list-style-type: none"> + Improved ratings + Higher share price + Greater company value 	<ul style="list-style-type: none"> + Greater customer loyalty + Appeal to new customer groups + Greater customer satisfaction 	<ul style="list-style-type: none"> + Improved image + Rounded-out CSR strategy + Greater brand value

Source: Focal ICT company

The impact of an effective Green ICT strategy is not only external. An effective strategy also has internal repercussions. The focal company reduced costs, broadened its portfolio of value propositions and improved its image. The details of the improvement of the company’s image include the receipt of two prizes. First, the focal ICT company received the prize for data-centre energy efficiency (Green IDC, 2008) for its Green Dynamics model “as being a highly innovative project that contributed significantly to the reduction of CO₂ emissions” (explanatory statement by the award’s jury of experts). Second, in 2011, for the third year, the focal company received the Top Employer Award of the CRF. This award is given to companies judged to be outstanding for their business culture, work conditions, social commitment, talent development and innovation efforts. These achievements foster employees’ trust, loyalty and satisfaction.

DISCUSSION

This paper focuses on ICT business to understand eco-innovation practices as encompassing the efforts of project networks to fulfil environmental responsibilities. The research approach to ICT analysis presented in the paper extends beyond the more traditional issues of ecologically sound company operations and sustainable ICT use and addresses the situatedness and sociality of *sustainable ways of doing*. The question posed by the research served to frame eco-innovation practices within project networks. We identified four main practices: cleaning the ICT landscape, saving energy, connecting life and work and enhancing the efficiency of processes. Using a methodological framework based on the practice approach, we discussed the main elements of practices, including actions, actors, resources and value.

These findings address the role of the focal company as an innovative solution provider engaged in specific projects, viewed within situational contexts in which new sustainable practices emerge. These practices develop through resource integration by actors within project networks and support the process of creating environmental value. The study’s approach to eco-

innovation includes a broad definition of the phenomenon (Arundel & Kemp, 2009), which sees Green ICT as a compelling opportunity for innovation efforts, representing the offering of eco-friendly innovative practices (new solutions, information, infrastructure, tools, and languages) for the project networks. The focal company adopts a sustainable innovation model that focuses on holistic environmental performance and business value in terms of the reduction of costs, the improvement of the company's image and the enhancement of customer and employee satisfaction. Our results are consistent with the study by Rennings & Zwick (2003).

The development and use of Green ICT enables a process of enactment (sense-making and sense giving) within ongoing social practices wherein macro-level phenomena, such as sustainable and environmental issues, are created and recreated through the micro-level actions taken by project networks' actors. This finding is similar to those of Orlikowski (2002) and Schultze and Orlikowski (2004) in their analyses of the link between technology and firms' practices.

The practice-based approach advocates social-, contextual- and process-oriented views of innovation - that is *innovating* (Russo Spena, Mele 2012a). Eco-innovation is understood as *a participative social process* (Corradi et al. 2010). Thus, eco-innovation is not viewed as the result of a company's processes; rather, it is considered to be formed in a practical constellations (Schatzki, 2001) in which actions are performed and resource elements (e.g., tools, images, spaces and competence) are used and integrated. In these constellations, actors who innovate are carriers of practices within project networks. Here, we address the necessity of focusing on 'eco-innovating' as a system of ongoing practices shared and performed using merged resources to create new and better sustainable efforts. These efforts are accomplished by socialising and sharing knowledge, actions, tools, languages and artefacts (Russo Spena & Mele, 2012a, b).

From this perspective, the adoption of a practice lens may contribute to recent studies on networks and eco-innovation in the IMP tradition (Baraldi et al. 2009; 2011).

Even if these two research fields start from different theoretical premises with different ontological and epistemological stances, the practice-based approach can produce new insight within the IMP literature. IMP has an empirical focus on interaction and relationships and the development of the ARA model, the 4R model, and the value network as tools to analyse connected relationships within industrial networks.

Studies adopt critical realism as the philosophical choice for investigation of business relationships (Mouzas 2001; Easton 2002; Morais 2008; Ryan and O'Malley 2006; Sousa and de Castro 2008). "From a critical realist perspective, in studying business relationships one is attempting to identify structures and the mechanisms by which the nature of the relationship are brought into being (Ryan, Tahtinen, Vanharanta, Mainela 2009, p.1).

The practice-based approach utilises practices as units of analysis. Even if PBS considers action, actors and resources, scholars adopt a holistic view from which practices emerge. PBS share a performative and relational epistemology wherein "objects, artefacts, and technologies acquire meaning and agency only in a context of action, and therefore in relation to the human actors that interact with them" (Corradi et al. p. 25). The ontological and epistemological premises are about being and *knowing*, as grounded in social practices.

Cook and Brown, (1999) and Raelin (2007) address the epistemology of practice by arguing that "this approach recognizes that practitioners in order to be proficient need to bridge the gap between theory and practice ... Practitioners use theories to frame their understanding of the context but simultaneously incorporate an awareness of the social processes in which organizational activity is embedded" (Raelin 1997: 572).

Social practices are interconnected; it is the connectivity that allows the resolution of the individual/collective, action/structure, micro/macro, and theory/practice dichotomies.

Notwithstanding these differences, there is a space for integrated studies. IMP scholars have a different viewpoint on actors for whom the interest is on action and the agency can be also not human. However, the practice lens could add a holistic view to activities, actors and resources as it focuses on interrelated elements. Conversely, IMP research tradition could add an understanding of interaction with others as “the key means for those who live in the business rainforest to prosper and develop” (Håkansson et al. 2009: 65).

The adoption of a practice lens can help to clarify how resources are implemented through action and interaction to co-create value within a highly interrelated network of relationships (Håkansson & Snehota 1989, 1995; Ford & Håkansson 2006; Gummesson & Mele, 2010).

The conceptualisation of eco-innovation practices as a set of actions, actors, resources and values can add insights to value conceptualisation for IMP scholars. Ford & McDowell (1999) show the necessity to express value in more complex relational terms by analysing the value created by different actions and by the perspective of dense and interactive network relations. Moller and Halinen (2000) and, more recently, Ford (2011) argue that value is the outcome of the interaction that takes place both at the focal dyads and at wider network structures. Value is co-created in interactions among the actors and this value creating logic in a network must enhance the value creation for all actors by exploiting business opportunities (Ford 2011).

In conjunction with research from Corsaro and Snehota (2010) Mele et al. (2010), we find value more intertwined with how actors frame and interpret relationships and interactions and how the interactions impact the actors’ conduct. Our understanding of practices incorporates the value element in addition to actors, resources and activities and considers the mutual benefits that actors create collaboratively. Schau et al. (2009) address practices that are linked together to enhance the value that is achieved by the actors. Practices can be analysed as a process of collective value creation, whereby value underlies all practices. This approach is consistent with recent studies within service-dominant logic (Korkman, et al. 2010), wherein practices are the real unit of value creation. This view moves the focus from value in exchange to value in context as the practice lens positions actors in a context in which they act, interact and integrate resources by sharing practices. This study is not only an analysis of actors and activities, but it also broadens the analysis to incorporate the system that fosters actions. In line with research from Storbacka and Nenonen (2011), the practice is not synonymous with action but “refers to ‘a way of doing’ which is embedded in a context of interlinked subjective and objective elements” (p. 31).

In conclusion, we posit that there is a way to make practice-based approach, IMP and S-d logic work well together.

IMPLICATIONS

The main contribution of this paper is its examination of the ways in which eco-innovation can be pursued by adopting a practice-based approach, with specific implications for managers. We observe that the practice-based approach helps companies to make their ICT more sustainable (i.e., Green ICT).

By developing eco-innovation that supports project networks, companies can focus on holistic corporate performance, efficiency and business value. Eco-innovation thus becomes a collective

achievement that allows practitioners to appraise and contest the various performances of their environmental practices, thereby constantly refining them.

Managers must understand that ICT is becoming a strategic weapon in the greening of their business. Although ICT is a minor contributor to environmental problems, it can represent a key solution. Of course, the development of eco-innovation is not a predictor of success. Future competitiveness in the areas of sustainability and the environment also depends on institutions, infrastructure, education, the macro-economy, regulation and education.

Specific implications about the practice-based approach can be drawn. Innovation should be viewed as an emergent phenomenon that can be detected through patterns. It emerges from the flow of actions and interactions and through shared practices carried out by actors - that is *innovating*.

Managers should consider innovation practices as the locus in which learning, working, and innovating occur. As practitioners, managers should use practice theory to frame their understanding of the projects—as situated contexts—and of social processes through which innovation is revealed. They should also be aware that the practices of context produce collective knowledge about eco-innovation. This knowledge should be activated and distributed through project networks as a platform for a continuous eco-innovating. The goal is to see ‘innovating in-practice’.

Tapping into practical knowledge provides tools for practitioners to focus on the creation of eco-innovation and not simply on the object. In this way, observing practices simultaneously considers the elements, the context and the system.

Finally, we address the generalisability of our results. In accordance with Halinen & Tornroos (2005) and Jarvensivu & Tornroos (2010), we observe that the essence of case research is not to generate theories but to furnish the capacity to understand phenomena. From this perspective, we aimed not to reveal universal truths but to obtain multiple new insights and generate a local and historically context-specific understanding of the investigated phenomenon (i.e., the practices of eco-innovation). Thus, specific limits are linked not only to the single case but also to the breadth of the empirical investigation. The other actors in project networks should be investigated further to allow the network dimension to emerge as a whole.

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