SIGNALLING SUSTAINABILITY STRATEGIES: PRELIMINARY FINDINGS FROM TWO CASE STUDIES

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Abstract:
The purpose of this study is to develop our understanding on how sustainability strategies emerge. Two case studies focusing on business groups from the cork and electrical equipment sectors are compared and contrasted in terms of their sustainability strategies. We argue that the formation of a holistic sustainability strategy is dependent on the integration of a comprehensive range of environmentally-friendly practices which implies taking interdependent strategic decisions along the dimensions of actors, resources and activities. Furthermore, we suggest that sustainability pressures bring about new opportunities for energy industry players to enter new markets. Thirdly, we argue that companies tend to retranslate concepts to position resources in different frames according to their strategic goals at different moments of time to embrace the sustainability concept.

Key words: strategy formation, industrial networks, environmental sustainability

INTRODUCTION

Environmental sustainability concerns have been part of the industrial scenario since the late 1960s. Pollution control by single firms was the main concern in the past but the focus of recent research and managerial practice has moved away from individual firms to larger sets of inter-firms relationships and a wider range of ecological dilemmas (Klassen and Johnson 2004). The systemic nature of environmental problems dictates that significant improvements towards sustainability cannot be achieved by firms acting alone, but only via concerted efforts of wider networks of interconnected buyers and suppliers (op.cit.). Thus, the natural environmental constitutes a challenging issue for firms within a supply chain which "…must be dealt with through a well integrated and communicated strategy, not only within the organization but also with the members of the extended organization (supply chain or network)" (Lamming and Hampson 1996, p. S61).

The understanding of how environmental sustainability strategies are articulated is the main concern of this research. Although substantial work has already been done in this field as exemplified by studies of environmental supply chain and operations management (Gupta 1995; Kleindorfer, Singhal et al. 2005; Walker, Di Sisto et al. 2008), greening as potential source of competitive advantage (Porter and van der Linde 1995), ecological strategic change (Andersson and Sweet, 2002), transitions to sustainable socio-technical systems (Kemp 1994; Kemp, Schot et al. 1998; Smith, Stirling et al. 2005) and marketing's role in a green supply chain (Sharma, Iyer et al. 2010), there is a lack of integration between what is considered and framed as environmental practices and how those practices become the building blocks of a comprehensive environmental sustainability strategy. We address this issue with a broad research question: "how do companies engage in sustainability-driven processes of strategic change and how are those processes integrated within a holistic sustainability strategy?" We consider that systems and network approaches are needed to fully understand the development of such strategies since the transition towards environmental sustainability is complex, problematic and with long-lasting consequences. For example, building up environmentally-friendly practices such as implementing renewable energy systems or developing zero waste programmes involves dealing with interlocking technologies, well-established business relationships and a network's set of norms which in turn create systemic inertia that stand in the way of implementing those strategies (Andersson and Sweet 2002). Moreover, with increasing pressure for companies to publish reports on social and environmental responsibility activities, companies also have to be prepared to communicate effectively their sustainability aims and achievements (Tate, Ellram et al. 2010). Adopting the industrial network (IN) approach to strategy and the technological systems (TS) literature on transitions towards sustainability, we seek to understand the process of change towards the emergence of a sustainability strategy.

The paper addresses these questions in five sections. In section two we give an overview of the theoretical lens adopted in this study. Section three presents the research methodology and describes the decisions made on sampling, data collection and analysis. In section four, a

description of the cases is presented followed by the discussion of the implications of this research and concluding remarks in section five.

THEORETICAL BACKGROUND

The industrial network (IN) approach to strategy

The IN approach developed by the Industrial Marketing and Purchasing (IMP) group (Ford 1980; Håkansson 1982; Håkansson 1987; Axelsson and Easton 1992; Håkansson and Snehota 1995; Ford, Gadde et al. 1998; Ford 2002) suggests that firms operate in the context of interconnected business relationships, which in turn affects the nature and the outcomes of the firms' actions, forming a network. Strategy development has not been broadly discussed in the IN approach although is considered as a central issue in IMP research (Gadde, Huemer et al. 2003). In fact, a few writings have been given attention to the subject of strategy within the IMP group (Håkansson and Snehota 1989; Axelsson 1992; Araujo and Easton 1996; Mattsson 1998; Gadde, Huemer et al. 2003; Baraldi, Brennan et al. 2007).

Some distinctions might be drawn between IMP and strategic management theory viewpoints on strategy. The literature on strategy is usually concerned with a firm's ability to triumph in competitive environments and the efforts of one actor to influence relationships with an external environment. This view is questioned within IMP such as Axelsson (1992) and Araujo and Easton (1996) who reject the idea of a faceless environment and call for a relational view of strategy "embedded in a set of practices and relations lasting long enough to allow us to attribute consistency and strategic intent to the behaviour of firms" (p. 361). In this sense a particular strategy is not clearly articulated from prior intentions, but emerges from a pattern of consistent actions and decisions of firms over time (op. cit.). In the IN approach, strategic action is about the efforts of a firm to influence its position in the network which involves collaboration and mutual dependence within business relationships (Johanson and Mattsson 1992). According to this view, strategising is not about a company's self-contained pathway to achieve particular goals but about "identifying the scope of action, within existing and potential relationships and about operating effectively with others within the internal and external constraints that limit that scope" (Håkansson and Ford 2002, p. 137). We adopt this perspective in discussing the emergence of an environmental sustainability strategy where a number of actors (or stakeholders) influence, and are influenced by, the company's activities. The concept of stakeholder implies that "…the operation of the firm is dependent on a number of interacting groups of interdependent and interconnected interests, the sum of which is greater than the individual parts" (Ulhøi, Madsen et al. 1996, p.247).

In short, a fully integrated environmental strategy should shape the company's relationships with customers, suppliers, policymakers and all its stakeholders (Hart 1997). While helpful to understand actors' influence on strategy development, the "stakeholder perspective" (see for example Fineman and Clarke 1996; Perrini and Tencati 2006; Rivera-Camino 2007) puts too

much emphasis on the stakeholders' ability to influence a company's strategy towards environmental sustainability. Instead, the IN approach to strategy highlights the importance of connectedness between actors to delimit the scope of a firm's actions but equally emphasizes resources and activities as delimiters of those actions. In this sense, Gadde et al (2003) discuss three strategising issues for a company which have to be dealt with the dimensions of an industrial network – resources, activities and actors.

Strategising through resources

The first issue is to establish a balanced level of involvement in close business relationships in order to access other companies' resources without restricting its operations and compromising its ability to change. From a network perspective, an individual resource is embedded not only in a firm's collection of resources, but also in a wider network of activity patterns, in a resource constellation and in a web of actors. Implicitly, the use of resources is seen as dependent upon what actors can make out of them as suggested by the Penrosian view of the firm but also dependent on how a network evolves over time (Mattsson 1998) and the time at which the resource is embedded (Halinen and Törnroos 1998). Business relationships are also taken to be strategic resources in the sense that through relationships the resources of a company are tied to resources in other companies giving rise to systematic combination of resources. This view of relationships as resources and as providers and consumers of other resources reveals new features for strategic action given that "a significant part of a company's total resource base is located beyond its ownership boundary and is controlled bilaterally with other firms" (Gadde, Huemer et al. 2003, p. 359). This is because a firm partially controls resources owned by other firms and has its own resources partially controlled by the requirements of counterparts (Araujo, Dubois et al. 1999). Companies involved in close relationships have to continuously reassess how their resources should be combined and with which counterparts given that those decisions will affect resources' features and value (Gadde, Huemer et al. 2003). This implies that the value of a resource is not given as assumed in the microeconomic view of the firm. Instead, and as it possesses multiple features and can be used in many different ways, its value is dependent on the way it is used and combined with others. Furthermore, the systematic process of combining and recombining resources within relationships brings further opportunities for the development of new resources. Relationships are therefore an important resource and also a tool to change the use and value of other resources.

In a sustainability context, the value of a resource might be differently framed accordingly to who is using it, where and when it is being used. Firms can take each other's waste, heat, water and other resources in order to reduce the total consumption of resources in the whole network (Shrivastava 1995). In this sense, waste produced within a network is valued and used as raw material in other networks. We use the term value as suggested by Normann and Ramirez (1993) and Ramirez (1999) i.e. extending the notion of exchange value to include the value gained and co-produced through its use and by actors who interact with each other. The value of a resource might be created not only when it serves its encoded purpose but also when it adds environmentally-friendly features to the final product. As suggested by Baraldi et al (2009) in their study on the Loccioni's "Leaf Community" project where a network is

developed to build up an environmentally-friendly house, eco-sustainability might be seen as "a value that is created when specific products and facilities cause as little as possible negative impact on natural resources" (p.3). They further highlight that embedding such a positive value in a specific resource requires that several resources from different actors get combined. Thus an individual resource may be used and valued in different or overlapping networks as suggested by Mattsson (1998) and the different networks may interact and overlap with each other giving place to new resource combinations and consequently new resource developments (Håkansson 1993).

Strategising through activities

The second strategising issue concerns weighing up the interplay between influencing others and being influenced by others - i.e. business relationships are central to strategic action in the sense that a company affects other actors but at the same time is affected through the same relationship. Hence strategic actions are not taken in isolation (Håkansson and Snehota 1989; Gadde, Huemer et al. 2003) since they depend not only on the companys' own activities, but also on the activities performed by their counterparts and the way they are connected. Although the strategic management literature suggests that firms should avoid being over dependent and controlled by others, the IN approach stresses the importance of building interdependences systematically in order to obtain benefits through cooperation (Dubois 1998; Håkansson and Ford 2002; Gadde, Huemer et al. 2003). Because companies are involved in overlapping networks (Mattsson 1998) and not just a single one, their efficiency and effectiveness in one network is dependent on how they connect their activities and resources with those from other networks (Gadde and Håkansson 2001). The implication is that identifying the scope for action in a strategising process means assessing present and future relationships in order to identify which counterparts should be activated in the development of the strategy, given its activities and resource bases (Gadde, Huemer et al. 2003).

Our view is consistent with this approach in the sense that to build up a sustainability strategy companies are faced with the need to activate different activities performed by different actors. For example, in their study on the implementation of a recycling system between a food and a waste distribution networks Andersson and Sweet (2002) stressed the importance of creating new activity links between both systems and integrating activities in the whole recycling activity chain, from food suppliers to waste handling firms.

Strategising through actors

The third issue is to balance control's ambition in the sense that successful companies in controlling the network surrounding them are also hindrances for innovation. In strategic management literature, actors are seen as individual firms who attempt to win a control position over counterparts relying mainly on its own resources. In the IN approach a company's position is determined by the activity links, actor bonds and resource ties which emerge from their business relationships, that is to say, "the position of a company is determined more from the outside than from the inside, and is contingent on how the company relates to the firms with which it actually is involved in business exchanges"

(Gadde, Huemer et al. 2003, p.362). Strategising through activity coordination and resource exchanges is therefore conditioning and conditioned by actor bonds in the sense that it is the interaction between actors that determines its ability to mobilize resources and get involved in activities. As an example, Andersson and Sweet's study (2002) on the development of an environmentally sustainable system for waste recycling showed how the roles of actors involved necessarily had to change to adapt to a higher degree of technical interdependencies and to a new way of performing activities. Similar conclusions were drawn in Håkansson and Waluszewski (2002) study on IKEA's chlorine-free catalogue paper where the new "green" catalogue required new bonds with several actors to allocate new combinations of different technologies.

To Baraldi et al's (2007, p. 890) words: "there is a scope for an empirical study employing an industrial networks conceptual framework to unravel and understand the details of how strategies (however they are defined) are formed and emerge in a network context". Our aim is to unravel some of those details by exploring how sustainability strategies are constructed in a network context. Given that such strategies inevitably involve long-term and path dependent processes of change, and different kinds of companies' interventions in different systems (e.g. environmentally-friendly technological innovations, cost efficiencies in production and consumption, regulation compliance), we decided to look for further insights from the literature on socio-technical system transitions which has specific implications for the implementation of sustainability strategies.

Socio-Technical System Transitions

Concepts and ideas regarding transitions between socio-technical systems have been deployed to address the problem of moving towards environmental sustainability (Kemp and Soete 1992; Kemp 1994; Kemp, Schot et al. 1998; Berkhout 2002; Elzen, Geels et al. 2004). There are two key concepts in this literature: technological regimes and technological transitions. A technological regime is defined as the complex of scientific knowledge, engineering practices, production process technologies, product characteristics, user practices, skills and procedures, and institutions and infrastructures that make up the totality of a technological system (Kemp 1994). As the definition incorporates the influence of several social groups, like scientists, users, firms, societal groups, the regime concept has been relabelled as a "socio-technical regime" (Rip and Kemp, 1998) to represent the interaction between social groups and the creation of networks with mutual dependencies and coordinated activities (Geels 2004; Geels and Kemp 2007). A technological transition, in turn, is defined as the transformation process of an old regime (or set of regimes) into a new one (Kemp, Rip et al. 2001). Rather than a change of existing processes and products, a technological transition encompasses a more fundamental change of basic technologies whether related to production, transport or consumption, as for example, the replacement of hydrocarbon-based energy supply or the use of renewable energies (Kemp 1994).

According to Kemp (1994), the dominance of particular technological trajectories is strongly related to the adaptation of the "selection environment" to fit the old technological regime. This term is used to highlight the role of institutions and socio-technical relationships in the selection of technologies. It includes all the factors that determine selection, namely the knowledge transfer between supplier-user that enables the exchange, social processes related to habituation and taste formation (consumers' preferences, habits, lifestyles and the way they adopted and used past technologies) and political factors, which enhance the role of government in the generation of knowledge, taxation regimes, public procurement and regulation. In the long run, technological regimes become outdated and are replaced by new ones. In summary, innovations bring about the gradual replacement of technological regimes through technological transitions.

Much of the work done to conceptualize change and intervention in the 'systems in transition' literature (Kemp, Rip et al. 2001; Geels 2002; Geels 2005; Geels and Kemp 2007) uses Rip and Kemp's (1998) 'multi-level' model of innovation, which describes regimes shifts and transitions between three levels: macro, meso and micro. The macro-level is formed by the socio-technical landscape, formed by exogenous aspects of the environment such as economic growth, political coalitions, cultural values, normative rules, environmental problems. The meso-level comprises the socio-technical regime discussed previously. The micro-level is related to the emergence of radical innovations in niches, which interacts with the established regimes at the meso-level, within a macro-landscape (Geels and Kemp 2007). According to these authors, system innovations are a result of the interplay between processes that occur within and across these levels, in different phases. However, the shift into a new technological regime depends primarily on the previous context which means that although a new paradigm has evolved, the old and the new may co-exist for a long time. Furthermore, shifting to a new regime is a complex process where strong barriers need to be overcome. Strategic niches (where radical novelties can be nurtured), system-builders (entrepreneurs), institutional support and actors' capabilities are seen as playing important roles in regime shifts (Kemp, Schot et al. 1998; Kemp, Rip et al. 2001).

In the context of the sustainability debate, Kemp and Loorbach (2006, p. 15) call for strategies designed to promote "transitions towards more environmentally and socially benign societal systems". The success of transitions to sustainable technological regimes depends on a wide range of factors (Kemp 1994): technical advances achieved, future cost efficiencies that might be accomplished not only in production, but also in consumption, evolution of market demand shaped by users' needs, preferences and environmental awareness and finally on government policy (in the form of R&D subsidies, favourable tax incentives, environmental standards, etc.). The problem, as remarked in the literature, is that shifting to sustainable regimes is a complex process that involves not only technological changes, but also profound changes in the organizational and social dimensions.

RESEARCH QUESTIONS AND ANALYTICAL FRAMEWORK

As stated earlier, the purpose of this research is to study the process of developing and articulating a company's strategy towards environmental sustainability. In order to crystallize our ideas on the emergence of an environmental sustainability strategy and assist the data collection and data analysis we drew up an analytical framework (Figure 1) based on the theoretical dimensions discussed in the previous two sections.

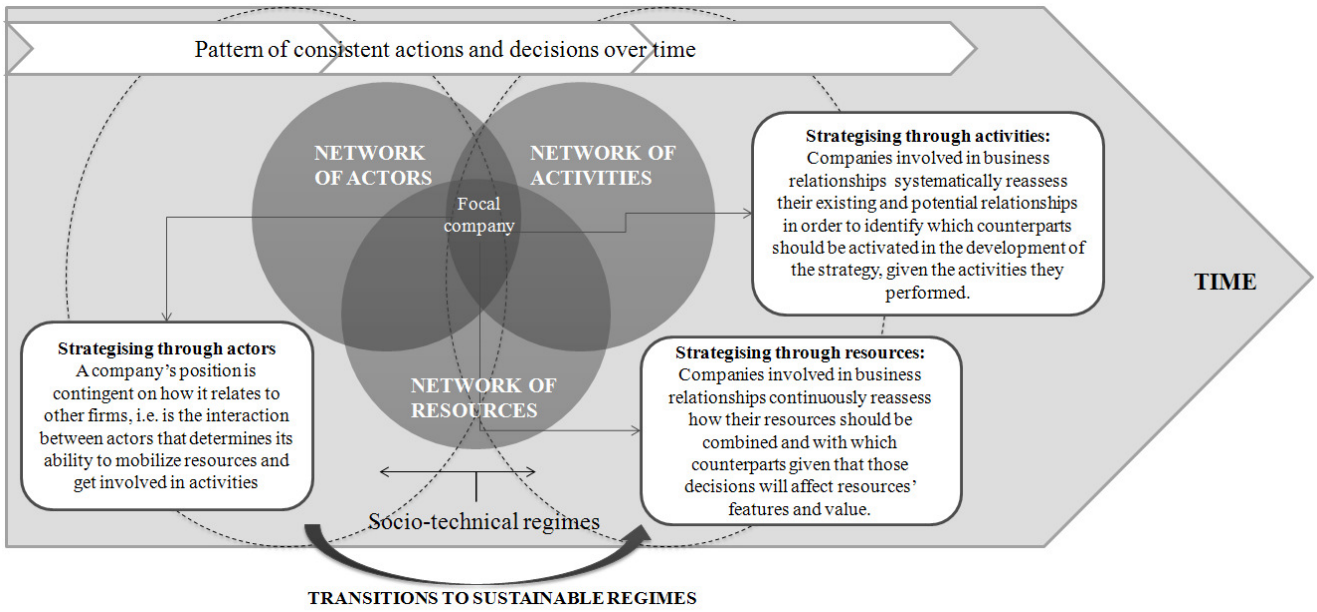

Figure 1: Analytical framework
The emergence of an environmental sustainability strategy

Using this framework, we seek to understand the process of change towards the emergence of an environmental sustainability strategy by raising particular issues such as: what criteria are evaluated to implement particular practices given the co-existence of old and new socio-technical regimes?; what resources are valued as environmentally-friendly and by whom?; what relationships are activated to get access to those resources and what activities are connected with others' to achieve environmental sustainability goals?; what tools are used to frame a sustainability strategy?. Overall, we believe that answering these questions will shed some light on how an environmental sustainability strategy emerges from a pattern of consistent actions and decisions taken over time and how companies articulate their sustainability strategy discourses to communicate their actions.

RESEARCH DESIGN

This paper draws on a case study approach. We argue that case research provides a strong contribution to the development of theory in management fields (Dubois and Araujo 2007). In network studies, we have to deal with difficulties arising from delimitating relevant time periods, defining boundaries of the study and dealing with the dynamic nature of relationships embedded in networks. These problems can be more obviously circumvented with the use of case studies since they are well-equipped to deal with interdependencies as well as changes over time (Easton 1998; Dubois and Gadde 2002; Dubois and Araujo 2004; Dubois and Araujo 2007). We adopted the following research design:

• ***Unit of analysis and Unit of Observation:*** Given our research goals, the unit of analysis was defined as the "process of change towards sustainability" reflecting the actions undertaken by a company to build up an environmental sustainability strategy. We followed Di Gregorio and Davidson (2008) suggestion on the distinction between unit of analysis and unit of observation. According to their view a researcher looking at a specific process, project or programme within a company is dealing with a unit of analysis different from the unit of observation. The unit of analysis is related to what we aim to analyse – in this case we are looking at processes of change towards a sustainability strategy. To get information about this processes we collected data via interviews with different participants within a company and different sources of documentation. These are our units of observation.

• ***Sampling:*** An appraisal of potential companies for this study was made through the Portuguese Business Council for Sustainable Development. Five companies were selected based on their size and industrial sector. On one hand, large companies were selected because the opportunities to examine the integration of multiple practices are larger than in small and medium companies which may not have the resources or motivation to implement such strategies. It should be noted that our focus is placed on more fundamental processes of change towards sustainability strategies where multiple practices are in place and difficult to integrate such as shifting to renewable energy systems, changing product/service offerings to sustainable ones or implementing supply chain recycling schemes, rather than discrete and relatively minor practices such as initiating paper and plastic recycling activities. Thus the examples or episodes selected are related to long-term processes of change from which we attempt to follow the patterns through which changes are created and strategies emerge. Additionally we also assume that companies with a certain size would be more inclined to pursue such a strategy and publish their practices in sustainability reports, as they are likely to suffer greater stakeholders' scrutiny. On the other hand, different sectors were selected to provide a diverse range of findings and to allow for comparisons between different technological systems. For the purposes of this paper two of those companies belonging to the cork and energy-based industries are analysed in terms of their sustainability strategies.

• ***Data collection:*** This study uses multiple data sources, mainly documents and interviews. Primary data (semi-structured interviews with people involved in processes of change towards the establishment of a sustainability strategy) and secondary data (documents provided by the interviewees about the companies, sustainability reports – henceforth SR, media articles and companies' websites) were collected. A pilot study was first undertaken in one company where a draft interview guideline was implemented based on five sets of questions concerning: 1) company perspective on environmental strategy; 2) origins of ideas for environmentally-friendly changes; 3) evaluation criteria to implement environmentally-friendly changes; 4) implementation; 5) outcomes for the company and for the network. Afterwards, a first interview was set up in each company with the person responsible for the sustainability strategy. From these interviews other interviewees were identified using a snow-balling sample where other actors involved in their companies' transitions to sustainability strategies were recommended as useful respondents to interview. The two cases which reported here make use of 16 interviews in 8 companies and the analysis of 15 SR's and institutional documents.

• ***Data analysis:*** The interviews were fully transcribed and analysed in terms of main sustainability practices discussed by the respondents. The compilation of transcribed interview files, SR's and supporting documentation was then analysed supported by qualitative analysis software (Atlas.ti). The analysis resulted in a case report organised by the key themes identified through the process of coding. Each theme is directly or indirectly related to the five set of questions.

FINDINGS: TWO CASES OF SUSTAINABILITY-DRIVEN CHANGE

Companies' background and approach to sustainability

Two companies, referred throughout the paper as CorkCo (cork products manufacturer) and TechCo (a producer and service provider of energy-based equipment) were examined. Both companies established a sustainability strategy within a dedicated department and communicate their actions through Annual Sustainability Reports (SR). Those strategies are differently articulated as described below.

CorkCo transforms and commercializes 30% of world cork production and has been leader in this industrial sector for over 130 years. Their activities are claimed to be unique in terms of sustainability practices, on one hand, because they represent a crucial contribution for the exploitation and preservation of cork oak forests across Southern Europe and North Africa; on the other hand, given the characteristics of cork as a raw material, the opportunities it has to act in an environmentally-friendly manner are endless. CorkCo activities are based on an intrinsically ecological raw material which favours a zero-waste policy by using, recycling and re-using cork waste in their different business areas (automotive, aeronautical, construction and wine industries). **TechCo** is an energy-based group providing products and

solutions to energy, engineering, transports, buildings and renewable energies sectors. They work mainly within projects where consortia of companies are formed to develop energy-based solutions. Their main competence is to work as "bespoke tailors" where each project is unique and designed according to customers' specifications. They started operating in the mid 1940s as an equipment manufacturer for the electricity market and evolved into a high-tech supplier of products and engineering services, claiming to combine their tradition with permanent technological evolution. As their activities produce non-recyclable and non-reusable waste, their reason to justify a sustainability strategy is based on their efforts to be present in the so-called renewable energy markets using their capabilities in the energy technologies sector to expand their offerings.

Key events to articulate a sustainability strategy

CorkCo and TechCo transition processes towards sustainability can be traced back to when they first started their businesses, although a formal position only became visible with the publication of their SRs (both started publishing in 2006). Figure 1 depicts the sequence of events referred as critical in establishing the sustainability strategies of CorkCo and TechCo.

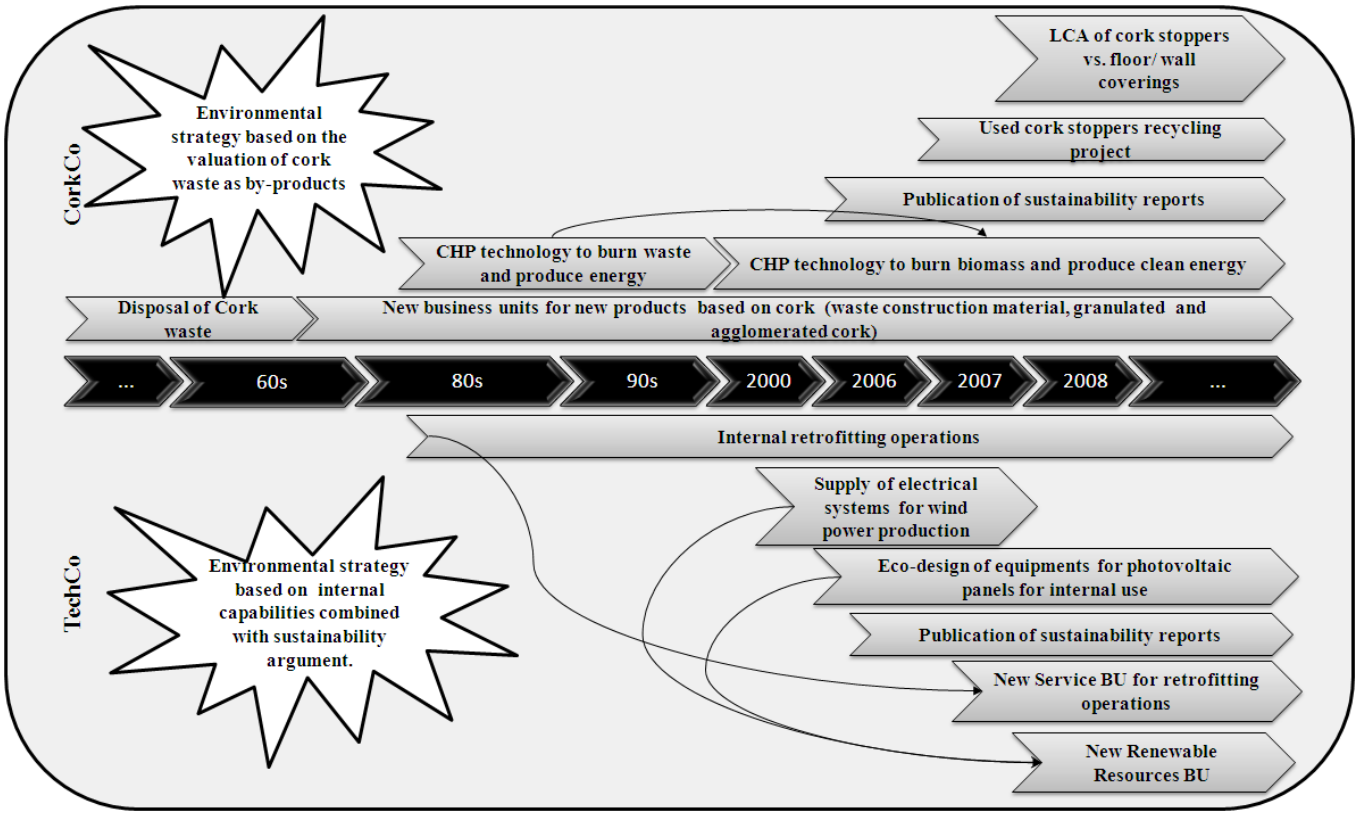

Figure 2: Articulation of environmental strategies

Signalling environmental sustainability strategies in CorkCo

CorkCo is well-versed in environmentally-friendly practices. Their core business is based on cork stoppers production which generates cork waste valued as by-products (powder and

pieces) for other applications. Declaring their commitment towards a zero-waste policy, the company looks for opportunities to reuse those by-products by setting-up new products entirely based on cork waste (e.g. construction material, granulated cork, agglomerated cork). Those practices around reusing waste from one business unit to another are hardly new. Indeed, in the mid 1930s thanks to the increasing use of cork derivatives in thermal and acoustic coverings, the cork industry began to flourish. Although Portugal was the biggest producer of cork, the transformation of the raw material was monopolised by foreign organisations. It was only in the 1960s that CorkCo´s new industrial units were built to produce a range of cork derivates. The initial aim was to use up 70% of the waste generated from cork stoppers production, transforming the waste into granules and the granules into agglomerates. These in turn were used as by-products to produce a whole set of new applications of cork (with applications in cars, spacecraft, nuclear power stations, floor coverings and parquets, shoe soles, jewellery, house decoration items, memo boards). Researching and testing new applications from cork became a priority for CorkCo's operation to date.

Internally, CorkCo also engages in energy efficiency projects based on co-generation systems (CHP – combined heat and power) through which energy (power and heat) is produced using cork powder as fuel and used in their manufacturing operations. As before, a new opportunity to re-use waste was grabbed in the mid 1980s with the CHP implementation. This also brought new opportunities for CorkCo when in mid-2000s, cork waste was classified as a type of biomass and thus considered as carbon neutral. There are major governmental incentives in the Portuguese energy market to implement CHP systems with biomass fuel. Companies willing to invest in such systems gain financial benefits, by selling clean energy to the grid and re-purchasing it at a lower price. However there are technological constraints to these implementations; only companies that are large enough and have significant heat and power needs are able to engage in such schemes. CorkCo produces a type of biomass and clean energy. Both resources may be internally incorporated in its production operations or sold in the biomass and energy markets.

Besides the zero-waste policy pursued in their internal operations, since 2007 they are also engaged in promoting and implementing recycling schemes. In partnership with their customers and other entities they collect, recycle and re-use used cork stoppers i.e. after consumption and produce new products. The project was particularly difficult to implement because it would require access to final customers' waste. Several organisations were invited or encouraged to participate; an environmental NGO, companies from the hospitality channel (hotels, restaurants and cafes), waste collectors, transporters, schools, shopping centres and supermarkets were involved to ensure the collection and transport of used corks across the countries they operate in to CorkCo facilities. The power position held by CorkCo was mentioned by the environmental NGO representative "a persuasive factor to accept the challenge". This project was planned for 2 years until it was finally launched in different countries.

The external actions taken by CorkCo towards the promotion of cork as a sustainable material resulted, on one hand, from the pressures of competition mainly the plastic and aluminium screw caps producers who offer wine stoppers at lower prices. On the other hand, customers also pressured them to reveal the environmental impacts of the products they supply, particularly in their main two markets: the wine and construction industries. To counter those pressures, in 2008 CorkCo invested in research on life cycle analysis (LCA) of the environmental impacts of its main products – cork stoppers and floor and wall coverings – comparing these with the main competing products in order to reinforce their sustainability claims. Although their core business is the production of cork stoppers, they started to target the sustainable construction sector where they play an important partnership role for customers concerned with adopting the best eco-efficient practices. Rather than operating a business unit for construction material, like they would have done in the past, they promote the concept of eco-efficient buildings by highlighting the environmentally-friendly features of their products.

Signalling environmental sustainability strategies in TechCo

TechCo does not benefit from the natural advantages of the cork manufacturer. Instead, their manufacturing activities use up resources that go unrecovered, to produce equipment for grid sub-stations, transformers, and automated warehouses. Their strategy towards sustainability includes innovation to provide integrated products and services in the form of energy management solutions, rather than merely equipment, and recycling and re-use of equipment packaging.

TechCo analyses their portfolio of products and services continuously in order to select which should be maintained and which should be further developed in the future. As they produce long life equipment they tend to be involved in one-off projects. Therefore they designed new offerings to keep engaged with existing customers. One way to do so was to combine their resources and capabilities on energy-based technologies with the sustainability argument. In 2007, they implemented a new Service Business Unit where equipment is revamped. This unit covers several repair and retrofitting operations in situ or at the customers' facilities such as: repair of transformers, charge controllers, medium voltage apparatus; installation of systems for protection and safety in old equipment; adaptation of current circuit breakers to old switchboards; reconversion of machinery; reconditioning of mechanical components of engines and alternators; renovation or replacement of the magnetic core in alternators; reconditioning, balancing and testing of ventilators, pumps and submersible pumps. These retrofitting operations, which were already a part of their internal operations for decades, are very different from a conventional repair operation. They are highly costly and require high levels of intervention and skilful labour. However, by re-using pieces of equipment that otherwise would be wasted (reuse 50% to 90% of the materials used in transformer, electrical equipment and rotating machine production) they are able to significantly reduce the consumption of materials and deliver retrofitted equipment with the same level of warranty as new equipment. Customers of this new service might use

equipment and machinery supplied by TechCo as well as from competitors, as they have the capabilities to work on equipments from different manufacturers.

TechCo also realised that the sustainability debate could open up opportunities to enter new markets. As stated in their 2007 SR, sustainability concerns "affords the development of new business opportunities, principally in the environmental domain" (p. 82). Supported by their existing capabilities in power energy technologies they decided to invest in R&D activities to offer systematically new solutions, products and services in the renewable energy areas. For TechCo the shift towards the production of technologies for renewable energies "is a clear sustained opportunity to enter into new areas of equipment production, developing new technology, know-how and competence levels for better interaction with the company's target markets" (SR, 2007, p. 82). One strategy was to design and implement environmentally-friendly solutions as internal projects and use it as showcase windows to the market. The so-called eco-design of equipments for photovoltaic panels to pursue energy efficiency with renewable sources in their facilities was one such example implemented in 2006. In 2002, their involvement in a consortium for wind power production as the supplier of electrical and electromechanical systems played a major opportunity to enter in the renewable energy market with the advantage of being recommended as a preferred supplier by some of the bigger players in the Portuguese energy market. The outcomes of this project were vital for the opening of a new business unit in 2008 - Renewable Resources Unit - totally dedicated to design and implement solutions for renewable energy production projects.

DISCUSSION AND CONCLUDING REMARKS

The analysis of the cases provided some accounts on how a company's environmental sustainability strategy emerges over time. We suggested that investigating such process of strategy development encompasses a two-fold enquiry: firstly it entails an examination on how companies find themselves engaged in sustainability-driven processes of change; and secondly on how they integrate different processes to construct a holistic sustainability strategy. This section aims at presenting some answers to those questions.

How do companies engage in sustainability-driven processes of change?

Through actors' orchestration

Both cases illustrate that engaging in sustainability-driven activities is dependent upon the ability to mobilize resources beyond a company's ownership and get involved in activities which would only be possible through counterparts' participation. CorkCo was able to develop a recycling project of used cork stoppers because they found the right partners to work with. As the project required access to the final customer's waste, CorkCo used its position in the network to activate other relationships with actors with whom such project could be established. By engaging in new relationships with a Portuguese NGO for environmental protection, hotels, restaurants and cafes, waste collectors, transporters, schools, shopping centres and supermarkets CorkCo ensured the collection and transport of

used corks to their facilities. TechCo's case also exemplifies how interaction between actors is crucial to develop environmentally-sustainable offers. One of the arguments used by TechCo to justify their position towards sustainability is the investments made on a new business unit in 2008 – renewable resources – which "will most certainly contribute toward a significant environmental improvement, thus helping our society in the reduction of CO_2 emissions" (SR, 2008, p. 13). But TechCo decided to enter in the renewable energy market because the relationships within the wind power consortium in 2002 raised the opportunity to reconfigure and enhance their know-how on this kind of implementation. From that project on new relationships with other actors from renewable energy business were activated and TechCo was involved in new other consortiums for wind power, solar power and micro-cogeneration until they finally decided to enter in that new market with a new business unit totally dedicated to renewable energy technologies. In this sense, we suggest that actors' orchestration is a key strategic activity to achieve environmental sustainability goals.

Through resources' configuration

The two cases suggest new insights on how companies evaluate the usefulness of their resources according to their strategic goals at different moments in time. For example, cork waste was valued as a by-product to produce new cork-based products and as bio-fuel to produce clean energy. This reconfiguration of resources' value to embrace new employments was not dictated by the market alone. In the first stage, back in the period 1960s- 80s, a cost efficiency rationale was at the heart of change while more recently, the reasons for such resource configuration were framed by sustainability arguments. Thus a question might be raised on how the same routines and resources are being framed differently over the years. Some of the technologies and practices communicated as truly sustainable (e.g. CHP) are 30 years old when the sustainability debate was not on the agenda. The outcomes of a technological change, as the CHP technology, were not pursued due to sustainability reasons but are now justified as environmentally-friendly. The practice of using cork waste to produce new cork applications are also very well established since the 1960s but are now being labelled as "zero-waste" policies. TechoCo in turn is devoted to offer a new service to customers who which to make use of old equipments, but those activities have been performed for decades. Our findings suggest that building an environmental strategy and developing environmental capabilities does not always involve new practices such as new recycling schemes, technological changes, or eco-design. Instead it can also be built through a reconfiguration of resources (waste reconfigured as by-products) and, what's more, through a change in the discourse through which these practices are framed. Companies tend to retranslate concepts to reposition resources in different frames, according to varying regimes of valuation. If the regime of valuation is based on sustainability measures, resources will be framed accordingly. If an actor attributes a value to a specific resource such as the government classifying cork waste as biomass the regime of valuation changes. It is not a case of markets placing value on resource but a wider network of actors such a NGOs and government who affect how the value and features of resource are interpreted.

Through activities' structure

From the discussion above it is evident that companies activate new and existing relationships with counterparts because they do not own the complete set of necessary resources to perform particular activities. Sustainability-driven processes of change demands new structures of activities. Let us revisit the recycling project of used cork stoppers described above as an example. The project required the design of a structure of interdependent activities performed by different actors. It started with the advertisement of the project around all points of final consumption which was performed by a NGO. Secondly, it was necessary to provide the collection of cork stoppers from final consumers. This activity, performed by the hospitality channel, supermarkets and final consumers, was subsequently connected to the transportation activity which in turn was performed by waste collectors and transport companies. And finally, after arriving to CorkCo facilities the recycling activity itself takes place. In this sense, this project was only possible because a new activity structure involving different actors and resources was designed, tested and implemented. TechCo in turn, developed internal R&D activities to design and implement environmentally-friendly solutions to be used in-house. However those activities would not have the desired effects if they were to be confined within the company's walls. In this sense TechCo managed to use their know-how on the implementation of electrical and electromechanical equipments to further extend their activities as renewable energy systems providers. By establishing the necessary interdependences between their activities and those of the wind power consortia's participants they were able to enter in the renewable energy market and make this entry a key event of their environmental sustainability strategy.

How do companies integrate a mixture of sustainability-driven processes of change within a holistic environmental sustainability strategy?

The examples described above show that companies are involved in different sustainability-driven processes of change at the same time (see figure 2). Some processes are short-term and entail low degrees of intervention from different actors such as the development of life cycle analysis performed by CorkCo. Others are long-lasting and require the involvement of several actors and the activation of new business relationships such as the new business unit for renewable energies established by TechCo. This does not mean that some are more influential than others in terms of the sustainability value they might create because all are part of an integrated strategy that is progressively articulated as a whole over time. Moreover, instead of looking at such processes as discrete episodes, each process should be seen as a result of path-dependent event trajectories which leads to new episodes and triggers effects that become visible across the network. By returning to figure 2, which illustrates the sequence of events referred as critical to establish an environmental sustainability strategy, we realize that some of the events are intrinsically linked to past episodes and consistent with past ways of doing things. Take CorkCo adoption of CHP technologies as an example. CorkCo presents the adoption of CHP technologies to burn biomass and produce green energy as a key practice towards environmental sustainability. Such practice may be traced back to 1980s when cork dust was just dust. 20 years later the same practice is part of an

environmental sustainability strategy and claimed to be carbon neutral. Similar conclusions might be drawn on the TechCo implementation of a new business unit for retrofitting operations. Practices that are being used since the 1980s almost 30 years after are considered as crucial to build up a sustainability strategy. On one hand, the evidence suggests that building such strategies is very much dependent on how resources are valued and by whom as discussed before. But, on the other hand, it also depends on how those strategies are articulated, i.e., how strategic discourse is differently framed according to the scope of the strategy (in this case a sustainability strategy). In this sense, the strategic discourse is also a dimension to be considered when examining how companies integrate different practices into one strategy. It is this strategic discourse that frames and communicates the environmental sustainability performance of a company to the outside world, strengthening or weakening its reputation as a sustainable company.

In order to strengthen their positions, companies are being pressured to gain environmental certifications and publish sustainability reports. Such documents are interpreted as evidence that companies are committed to develop sustainable strategies as a comprehensive set of different activities that co-exist over time. Environmental certifications and corporate social responsibility reporting might therefore be seen as tools which along with other bodies of knowledge, contribute to construct the concept of a "sustainable company". The interplay between reports and actual initiatives may work as a device to gain (or lose) environmental legitimacy and to deliver (or break) promises to stakeholders. Reporting is a tool to frame and communicate a companies' position towards sustainability but also a tool to spread information about environmental "best practices" and "best partners" throughout a network. By publishing successful implementations within large consortia TechCo is not only boosting their position but also contributing to its customers' and partners' recognition as "sustainable companies". CorkCo is also affecting other companies through the publication of SRs. By communicating the results of the LCA of its main products compared with its main competitors they publicized the differences of environmental impacts between cork stoppers manufacturing and plastic and aluminium stoppers which portrayed the latter as "less sustainable" products when compared with cork based products.

Concluding remarks

The purpose of this research was to develop our understanding on how environmental sustainability strategies emerge using a network approach. We used two case studies to seek insights on how strategy formation regarding sustainability may contribute to the industrial networks' research agenda. We argued that the formation of a holistic environmental sustainability strategy is highly dependent on the integration of a comprehensive range of environmentally-friendly practices over time which implies taking interdependent strategic decisions on actors' orchestration, resources' configuration and activities' structure. These decisions do not necessarily emerge within the context of environmentally-friendly goals. Instead, they are the result of a consistent pattern of actions taken over time in a sequence of episodes that pave the way for the emergence of a holistic environmental sustainability strategy. In addition, these strategies are dependent on the past and current characteristics of the socio-technical systems where companies are embedded in, such as environmental

pressures from various stakeholders, governmental incentives to implement environmentally-friendly technologies or the opportunities to diversify based on the sustainability argument. In this sense, we suggest that sustainability pressures bring about new opportunities for energy industry players to enter new markets. Finally, we suggest that companies tend to retranslate concepts to position resources in different frames according to their strategic goals to embrace the sustainability concept. Mature technologies and practices are therefore re-translated into new frames to embrace the sustainability concept whenever possible.

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