

Collaboration Mechanisms to Articulate Sustainable Innovation within Value Networks

1. Introduction¹

There is ample consensus that social, economic and environmental disequilibria at the global level have reached a scale that make impossible the continuation of economic activity on a “business as usual” mode. As an editorial of the *Journal of Cleaner Production* stated, “few still believe that we can continue on present technological and industrial course without major change” (Hall, 2002: 195). Bringing about that kind of change requires sustainable innovation (Boons & Lüdeke-Freund, 2013), defined as innovation that improves sustainability performance on the ecological, economic, and social domains (Boons, Montalvo, Quist, & Wagner, 2013).

However, changing the business model of a single organization will not suffice. When industries and companies coalesce around well-entrenched business models, sunk costs and lock-in effects emerge as a formidable barrier for sustainable innovation. Such a “set of inter-dependencies suggests that (...) a sustainable product cannot be produced by an unsustainable industry” (Wells, 2013: 229). In a recent paper, Hellström et al. (2015: 4) found that “business model innovation spanned the boundaries of one company, because it required changes in the business models of other actors.” Thus, sustainable innovation needs to encompass entire value networks (Allee, 2000). A value network (hereafter, VN) can be understood as the value-creating system, where different economic actors – supplier, partners, allies, and customers – work together to co-produce value (Peppard & Rylander, 2006).

The critical interfaces that enable sustainable innovation and system-wide value creation along a VN are the various collaboration mechanisms among participants. Within a VN, “a requirement for implementing sustainable management approaches is the capacity of different actors to collaborate with each other” (van Hoof & Thiel, 2014: 239). However, this topic has received relatively little attention among scholars who study sustainable innovation.

This study tackles the question of which collaboration mechanisms enable enterprises to create value for their VN. We draw on related strands of research to bring relevant constructs to the understanding of these mechanisms. After a literature review, we describe the methodology used and present findings that speak to the importance of different types of collaboration mechanisms, and uncover enabling conditions. The article closes highlighting our contributions to the understanding of how collaboration mechanisms are key to bringing about sustainable innovation.

2. Theoretical background

In the last decade, “sustainable development has taken hold and had an irreversible impact on the way we see the world... (it) has become part of our common usage in the media, within government policy and in corporate mission statements” (Hall, 2002: 195). In the context of management, the agenda of sustainable development has prompted the creation of constructs such as sustainable enterprise (Hope, 2009; Jones, 2008), or corporate sustainability (Antolín-López, Delgado-Ceballos, & Montiel, 2016; Bansal, 2005).

As firms internalize the sustainable development agenda, they must incorporate a wide range of stakeholder interests. Social and environmental issues are important in driving and implementing corporate innovation for sustainability, and can help embed sustainability into business purpose (Bocken, Short, Rana, & Evans, 2014). In particular, companies need to accept that value is not unidimensional, and migrate towards a triple bottom line approach (Elkington,

¹ Abbreviations: BoP (base of the pyramid), CAGR (compound annual growth rate), NPO (nonprofit organization), VN (value network).

1997), which considers long-term economic prosperity, social equity and environmental integrity in its practices (Bansal, 2005). Lozano et al. propose “a system comprised of resources and networks of relationships with stakeholders” as a foundation of a sustainability-oriented theory of the firm (2015: 440). Stubbs & Cocklin (2008) ask firms to adopt a “sustainability mindset” by connecting the organization’s success with its stakeholders’ success through engagement and collaboration.

When “sustainability considerations (environmental, social, financial) are integrated into company systems, from idea generation through to research and development (R&D) and commercialization”, a company engages in sustainable innovation (Charter & Clark, 2007: 9). While “most innovation research has focused on technical issues” (Hall, 2002: 195), sustainable innovation cannot be limited to technology and products. Changes to ensure a sustainable future impose the need to go beyond the technological and encompass the organizational domain. Innovation needs to become enshrined in sustainable business models, which depart from the neoclassical model of the firm and make social and environmental considerations a priority (Stubbs & Cocklin, 2008).

In sustainable business models, innovation revolves around three dimensions: technological, organizational, and social (Boons & Lüdeke-Freund, 2013; Boons & Wagner, 2009). Most research on business models privileges a single-actor perspective (Casadesus-Masanell & Ricart, 2010; Chesbrough, 2007; Morris, Schindehutte, & Allen, 2005; Osterwalder & Pigneur, 2010). This “framework of isolation” has partly neglected that the sources of value creation often occur *beyond the firm boundaries*, and require a system-level explanation of how firms interact with partners to create and capture value within a system of interdependent activities (Amit & Zott, 2001; Zott & Amit, 2010; Zott, Amit, & Massa, 2011), as mutually reinforcing value drivers exist within the VN (Boons & Lüdeke-Freund, 2013). The capacity to generate system-wide value through interlocking business models has been called “collaborative business modeling” (Rohrbeck, Konnertz, & Knab, 2013), allowing for the emergence of alternative VNs populated by new entrants to an industry.

By and large, the sources of value creation that go beyond the firm level remain under-explored. This is particularly critical when it comes to sustainability. “Many argue that incremental innovation is insufficient in slowing down environmental degradation (...) Incremental innovation builds on previous competencies and other assets, and is therefore less likely to disrupt economic systems” (Hall, 2002: 195) which are at the core of the problem. That is, sunk costs and lock-in effects determine that real change is not rational for incumbents, and only system-wide change is a viable option: “many industries remain unsustainable and thus require radical change” (Hall, 2002: 196).

“In order to combine economic growth in the next decades and the improvement of environmental quality, incremental improvements are not expected to be sufficient. Thus system changes are required” (Vollenbroek, 2002: 217). To be effective, sustainable innovations must go beyond the boundaries of the firm; they need to operate along the VN to become *systemic* (Breuer & Lüdeke-Freund, 2014), which makes collaboration imperative (van Hoof & Thiell, 2014). Collaboration between sustainability-oriented players becomes critical if we consider that innovation needs to move beyond incremental adjustments, and that incumbent firms have powerful incentives to erect entry barriers to disruptive entrants (Gauthier & Gilomen, 2016). The interactions among firms in the context of VNs have been studied by the collaboration literature (Soosay, Hyland, & Ferrer, 2008). Collaboration takes place when autonomous actors need to confront complex problems that exceed their individual capacity (Gray, 1985).

The interface that enables exchanges for system-wide value creation and capture by participants are the various *collaboration mechanisms* along the VN. Hellström et al. use this concept to signify something that “both triggers and enhances collaborative value creation and capture” (2015: 9). These authors identify a set of economic collaboration mechanisms, based on long-term contractual agreements and complementarity, such as lock-in and novelty in value propositions. Other economic mechanisms include knowledge transfer (Powell, Koput, & Doerr-

Smith, 1996), economies of scale and scope (Doz & Hamel, 1999), and relational capital (Kale, Dyer, & Singh, 2002). For a firm to engage in collaborative actions, it needs to shape the individual, group and organizational attitudes, as principles of alignment and congruence can eventually result in a “collaborative paradigm” generating inter-firm competitive advantages (Gold, Seuring, & Beske, 2010).

Other authors have examined social collaboration mechanisms. These include restricted access, macro-culture, collective sanctions, reputation and consistency (Jones, Hesterly, & Borgatti, 1997), stakeholders’ active participation (Matos & Silvestre, 2013), shifting of stakeholders’ goals from single to multidimensional, and capability building and learning by stakeholders (Gutiérrez, Márquez, & Reficco, 2015; Márquez, Reficco, & Berger, 2009; Reficco & Marquez, 2009; Schmutzler, Gutiérrez, & Reficco, 2014).

Scholars have pointed out that the way in which sustainability is constructed by firm and stakeholders’ collaboration within this system needs more research, as it involves inter-organizational networks in the sustainable development process (Boons & Lüdeke-Freund, 2013; Lozano et al., 2015). Despite the progress made, the literature on system-wide collaboration mechanisms (Chesbrough & Rosenbloom, 2002; Hellström et al., 2015; Hyland & Soosay, 2015) is still incipient. A recent study on sustainable chemistry concludes that “further research is needed on (...) the collaboration process, including knowledge exchange, advantages, challenges, and relation between the partners” (Mbéguéré, Gning, Dodane, & Koné, 2014: 59). This study seeks to make a contribution in that direction.

3. Methods

3.1. Research design

We base our research on a case study approach, recommended to “facilitate exploration of a phenomenon within its context using a variety of data sources” (Baxter & Jack, 2008: 544). As proposed by Yin (2003) case studies are useful when the research questions focus on the “how” and “why” of a phenomenon, covering contextual conditions, when the boundaries between the phenomenon and the context are not clear. More specifically, we choose a “multiple” case (Yin, 2003) or a “collective” case study (Stake, 2005) approach, which is well suited for exploring complex inter-organizational processes, where comparisons are needed to explore differences or similarities within and between cases (Baxter & Jack, 2008; Eisenhardt & Graebner, 2007; Stake, 2005; Yin, 2003). Ours is an embedded multi-case study where we need to focus on specific subunits in order to understand the collaboration phenomena.

3.2. Sample selection

We followed a strategy of purposeful sampling, whereby case selection is the opposite of random, and actively guided by a given criterion (Creswell, 2013; Maxwell, 1996). The logic of purposeful sampling lies in selecting “information-rich cases”, which are “cases from which one can learn a great deal about matters of importance and therefore worthy of in-depth study” (Patton, 2002: 242). Although the sample is limited in size, focusing on information-rich cases allows for valuable insights and in-depth understanding, much as statistically representative samples allow for generalization (Patton, 2002). “When the objective is to achieve the greatest possible amount of information on a given problem or phenomenon, a representative case or a random sample may not be the most appropriate strategy (...) because the typical or average case is often not the richest in information” (Flyvbjerg, 2006: 229).

This purposeful sample targeted three VNs structured around focal “green innovators” (Chen, 2008): new entrants that created a niche with clear social and environmental advantages over imperfect substitutes in their industries. Since the testing of our tentative assumptions requires probing inside the organization as well as examining the external dynamics in place, we will focus concurrently on two interrelated levels: the focal company and the VN that revolves around it.

“Focal companies are those companies that usually (1) rule or govern the supply chain, (2) provide the direct contact to the customer, and (3) design the product or service offered” (Seuring & Muller, 2008: 1699).

3.3. Sample description

Our sample is a subset of a larger sample defined by the Social Enterprise Knowledge Network (SEKN) protocol, as part of the “Sustainable Enterprise in Latin America” research project. To be selected for this study, firms must have more than five years of operations, and show a consistent focus on social and environmental sustainability, considering the impact of their activities on various stakeholders. For our particular subset, we focused our attention on three focal companies with operations in Colombia (see below), where most of the authors are based. This had the advantage of allowing for longitudinal observation along an extended period of time. Those organizations have participated in a number of training activities with our School, from which various studies have emerged.

In the following lines we provide a succinct summary of those three focal companies. We also crafted maps for each VN, showing the roles of participating actors (nodes) and the value transactions among them (arrows). The solid lines represent relationships that are “contractual, tangible revenue generating,” while the dashed lines represent those that are based on “critical intangible or informal deliverables such as knowledge exchanges and benefits” (Allee & Schwabe, 2009: 29). The directionality of arrows represents the value flow between parties: those which point in one direction represent a one-way transfer of value, and those which point in both directions represent a bi-directional flow.

WOK

Focal company. Founded in 1998, Wok is a chain with 17 restaurants in Bogota. It offers high-quality Asian food at affordable prices to middle- and high-income customers. Progressively, the company decided to integrate social and environmental dimensions into their operational and strategic decision-making. Wok is considered the first “green” restaurant chain in Colombia. By 2015, Wok had 660 employees and revenue of US\$ 21.4 million

Industry. Leading chain of Asian food with fish entirely sourced from community-based, sustainable sources.

Insert Figure 1 about here

GRNCOL

Focal company. Founded in Bogota in 2009, it designs and builds green rooftops and vertical gardens. Groncol provides design, raw materials, installation and maintenance for green rooftops and walls in a one-stop shop in several Latin American countries. Their reliable and well-designed products, sold at attractive prices, have jumpstarted the “green infrastructure” industry. By 2015, Groncol had 85 employees and revenue of US\$ 1.5 million.

Industry. Leader of vertical gardens and green roofs industry.

Insert Figure 2 about here

ECOFLORA

Focal company. Founded in Medellin in 1998, it produces and markets bio-pesticides for agricultural use, natural ingredients for foods and cosmetics, and cleaning products for households and personal care. EcoFlora products are sold in Colombia, Ecuador and Peru. By 2015, Ecoflora had revenue of US\$ 3.5 million.

Industry. B2B seller of industrial dye produced from plants, and producer of natural pesticides and home cleaning products. B2C seller of green home cleaning products.

Insert Figure 3 about here

3.4. Data collection and analysis

Data was collected between April 2014 and May 2016. We interviewed a total of 31 individuals (see a list of the positions occupied by these interviewees in Appendix A). We sought to target key informants; knowledgeable agents, in key positions of responsibility for the implementation of the studied ventures, who we considered as proxies of their organization (Lavrakas, 2008). A majority of the interviewees worked for the focal companies, although we also approached individuals who participated in the VNs — such as distributors, partners, community representatives and customers. Each interview lasted 90' on average, and took place face-to-face. Contents were recorded digitally, and then transcribed into paper. Transcripts were then analyzed with the help of CAQDAS (Computer Aided Qualitative Data Analysis Software). Using one such software, Dedoose, we carried out a thematic analysis: the identification of themes based on a number of specific research questions and a pre-existent theoretical framework, “where coding takes place iteratively between bottom-up and top-down coding” (Bergman, 2010: p. 391). We initially identified themes using top-down coding, specifically trying to identify categories established by the extant literature. Once this initial examination was exhausted, a new iteration of bottom-up coding was undertaken, since we sought to identify new themes not previously captured. The coding was initially done by a research assistant and then completed and reviewed independently by two co-authors. Finally, the other two co-authors independently reviewed the complete coding to avoid biases.

4. Findings

Within these VNs, participants established collaborations that enabled opportunities for value creation, delivery and appropriation. In keeping with the three-dimensional structure of sustainable development (Elkington, 1997; WCED, 1987) and, more specifically, of the corporate sustainability construct (Bansal, 2005), we posit those collaboration mechanisms can also be classified according to their nature into economic, social and environmental, as explained below.

4.1 Social Mechanisms

Social collaboration mechanisms enable relationships among people and organizations embedded in the VN. As they coordinate and safeguard exchanges (Jones et al., 1997), social mechanisms lay the ground for successful implementation of economic mechanisms. For a summary of the collaborations mechanisms found, see Appendix B.

4.1.1. Restricted access

A smaller number of exchange partners reduces coordination costs, increases frequency of interaction, and facilitates the safeguarding of agreements (Jones et al., 1997). In our sample, this variety reduction mechanism was applied with both customers and suppliers.

Restricting customers. Wok chose to focus on like-minded customers, consciously making decisions that could alienate those who do not prioritize sustainability, and keeping only those who are aligned (at least, passively tolerant) with the value of sustainable consumption. When Wok decided to redesign its menu in response to sustainability concerns, its sushi menu decreased 30%. On that decision, the company's CEO commented:

You might say it wasn't a logical decision; a marketing expert may say 'you were wrong in making that choice because you lost sales.' But, I don't think our message to customers should be just about sales.

Restricting new entrants. Access is restricted on the demand side by establishing mechanisms that will support like-minded players (e.g., upholding the values of sustainability), and erecting barriers towards those who are willing to cut corners on the environmental benefits and undercut the industry on price. Groncol has led the creation of an industry-wide association that seeks to, on the one hand, support growth of small members and disseminate good practices and, on the other hand, leave out those who will cut corners to gain unfair price advantages.

4.1.2. Macro culture

A macro-culture is made of shared assumptions and values that guide inward and outward actions and create patterns between interdependent VN stakeholders, building convergence of expectations through socialization, common language and tacit rules for behavior (Jones et al., 1997). Establishing and nurturing a common macro-culture in the VN was an explicit concern in the studied sample. At Wok, those efforts were targeted both inwards and outwards, as the following worker quotes show:

The company has educated us on everything that it does on the social and environmental fronts. Wok is a school where we all come to learn. Colombia is a highly diverse country, and through Wok we have come to appreciate our suppliers, our country, and our planet. Every step the company takes is followed by training.

Not only do we need to educate ourselves in sustainability; we also need to educate our customers. The only way to do that is to have clear information and to be convinced about what we are doing. We're not just selling food, but also social and environmental consciousness, which is extremely important.

The company implemented campaigns to reduce the use of napkins and straws among its customers, and worked internally to reinforce sustainability values. A "Green Group", formed by waiters and bass boys who received sustainability training during a year, had the mission of becoming change agents, educating fellow co-workers and customers on sustainability issues. Soon afterwards, Wok took the conversation on sustainability way beyond its own products. The company launched a publication, distributed freely and produced in partnership with the Natibo Foundation (an environmental NGO), to disseminate the accomplishments of those who work on the environment and to create awareness about endangered species -such as the marmoset and the jaguar, or the indiscriminate hunting of sharks, among others.

4.1.3. Capacity building

A sustained effort to build capacity along a VN can be of critical importance to overcome its challenges (Matos & Silvestre, 2013). There are no easy fixes in contexts where the poor operate, characterized by substantial transaction costs, poor information infrastructures, and lack of market intermediaries (Rufin & Rivera-Santos, 2008). Empirical research has shown that engaging low-income consumers or producers usually increase transaction costs substantially compared to economically privileged markets (Austin et al., 2007).

Sampled VNs consistently featured a deep and sustained effort to develop market-relevant capabilities in communities linked to supply chains. These efforts were motivated by self-interest, but went beyond it. Self-interest, for example, cannot explain company efforts to help “emergent” suppliers to connect with third parties –some of them direct competitors. Capacity building went beyond technical training, and included reinforcing governance and participatory decision-making capabilities in local communities.

One of Ecoflora’s primary concerns has been to develop local capabilities for securing inputs and other supply alternatives, such as their own crops. Ecoflora supports communities’ technical capacity building so that they can develop sustainable livelihoods. According to Ecoflora Cares’ President:

We never buy to a single person. We buy to an organization within the community. Sometimes the community struggles to build that organization, and Ecoflora supports these efforts. We are cautious that they are the ones who make the decision.

4.1.4. Cross-sector coalitions

Cross-sector partnerships can stabilize turbulent environments and help organize supply. “Operating in BOP [Base of the Pyramid] environments may imply a tour de force toward institutionalization [through] the construction of structured system of conventions shared by all participants” (Reficco & Marquez, 2009: 522). The VNs in our sample consistently resorted to cross-sector partnership to fill institutional voids and mobilize communities’ latent potential. These coalitions were broad-based, and included governmental agencies (local, regional, national) and complementors from other industries. Most importantly, NPOs played a critical role as mediators and “bridging organizations” (Westley & Vredenburg, 1991). In the words of Ecoflora’s Supply Chain Manager:

There is always a critical organization that mediates with communities. In Atrato, it was the *Espavé Foundation*, in Chigorodó it was the *Indigenous Council*, and in San Luis it was *Friends of the Forest*. These organizations hold the firm’s hands and make the process viable. They will organize meetings and facilitate decision making with community leaders. They make possible to strike long-standing agreements.

4.1.5. Knowledge transfer

Entry into a new field usually requires specialized knowledge that is not easily produced inside one firm, or obtained off the shelf through market transactions. Instead, the locus of innovation is found within networks of inter-organizational relationships that sustain an evolving community. Learning occurs within the context of membership in such communities and may require different kinds of organizations and practices (Powell et al., 1996). To enable collaboration, knowledge transfer needs to be ongoing, deep and strategically relevant.

In 2007, Ecoflora set out to manufacture an industrial dye based on *jagua*, a wild tree that grew on the country’s Pacific coast. This plant was only available in Chocó, Colombia’s poorest region, which implied both opportunity (for social impact) and challenges (for reliable supply). The later was overcome by engaging subsistence peasants with wide-ranging training programs. As of 2016, Ecoflora purchased from its network of community suppliers in Chocó over thirty extracts from plants —both wild and farmed. These relations were governed by agreements, which established Ecoflora’s commitment to transfer the know-how to maximize processing and value adding activities on premises, as well as to ensure clean production processes. In addition to farming training, the company provided ongoing technical support to ensure good environmental and agricultural results, most often through local technicians.

4.2 Economic Mechanisms

Economic collaboration mechanisms add value through changes in supply and/or demand along the VN. Value added is understood in the tradition of the strategic management literature, as a wider wedge between suppliers' opportunity cost and buyers' willingness to pay (Brandenburger & Stuart, 1996; Ghemawat, 2009). For a summary of the collaboration mechanisms found in sampled companies, see Appendix B.

4.2.1. Uncertainty reduction through a change in "industry architecture"

Value is created not just at the firm level, but also within an organizational ecosystem (Moore, 1996). A change in the distribution of roles and activities among participants alters industry architecture, which can be defined as "sector-wide templates that circumscribe (...) 'who does what' and 'who takes what'" (Jacobides, Knudsen, & Augier, 2006: 1200). Reordering the pieces of the puzzle may increase willingness to pay or reduce costs, for example, by reducing uncertainty.

In Groncol's VN, Sika, a global manufacturer of specialty products for construction and industry, had developed a technically advanced roof cover with the right drainage attributes for building roof gardens. Despite the technical advantages of the product, sales were not taking off (see Figure 4 below). The product was being pitched by installers to architects, but only a few took the risk of purchasing an untested product from a nascent industry that required the integration of various technical components and expertise. Groncol took it upon itself to realign different actors, so as to change the entire architecture of the "green infrastructure" industry.

Insert Figure 4 about here

An integrator was inserted within the VN (see Figure 5) to provide a one-stop solution that combined expertise in all relevant disciplines involved in the nascent field (materials, biology, construction), and a clear accountability for results. As one of those integrators, Groncol takes care of the design, production, distribution, installation and maintenance of green walls and roof tops. This new industry architecture reduced uncertainty and, thus, end-users' perceived risks.

Insert Figure 5 about here

According to an interviewee,

...the company has its own design department with architects. I work close to them to make the right selection of plants, because they know close to nothing about landscaping; they need the support of biologists. Unfortunately, most biologists in this country are trained to understand lab experiments more than real world conditions, so they need the support of us: agricultural engineers. Whenever a client walks in, the whole team works together to figure the best plant and soil configuration to fit that particular building.

Long term contracts or outright integration can be a suitable alternative to market bargaining when the time and resources required to find the right partners is substantial, as established in the transaction costs literature (Williamson, 1975).

4.2.2. Novelty through complementarity

Complementary assets create a hitherto non-existent value proposition in ways that neither party would have been able to do separately. When a new offer creates value for consumers, it translates into their willingness to pay.

As explained earlier, the green infrastructure was struggling to take root in Colombia due to lack of coordination. To remedy that, Groncol partially integrated backwards and developed “Metro Verde,” a specialized plant nursery. This company quickly became leader in that segment, supplying not only Groncol but the entire industry of green infrastructure. The combination of high-quality roof cover and wall infrastructure, specialized compost, the right mix of plants plus design and service, created a high-quality and dependable portfolio of products. Reliable supply enabled market demand in the emerging “green infrastructure” business, and willingness to pay by consumers. As an interviewee explained,

Endeavor recommended Groncol to develop their own supply of specialized plants. We then needed to develop a special carpet, to roll out on roof tops. I was inspired by a sample someone brought from Canada. It took me three years—and lots of headaches and failures—to develop that carpet. Groncol also had to develop their own supply of compost. I put them in contact with a small startup and trained this supplier because making compost is a highly technical, very precise matter: a variance of three degrees and your flowers die.

In addition to creating value through complementarities, the strategic management literature suggests that backward quasi-integration for the focal firm via partial ownership or vertical contracts serves to assure supply in thin markets (Jewkes, 1930) and reduce uncertainty (Levy, 1985).

4.2.3. Economies of scale and scope

Firms establish alliances with competitors to jointly fund research that may, otherwise, be too costly or risky. By doing so, they capture economies of scale and scope (Doz & Hamel, 1999). Building a new VN may entail capital-intensive investments. Some of those fixed costs are diluted by partnering with VN actors.

Ecoflora routinely engages in open innovation programs, where they leverage R&D capabilities of other organizations (think-tanks, universities, even competitors), and bring them down to market by recognizing a royalty to the innovators. Starting in 2008, Ecoflora forged an alliance with the Universidad de Antioquia to fund research relevant to its product pipeline. By 2014, Ecoflora partnered with other six universities to launch BioIntropic, a think-tank devoted to foster sustainable businesses that create wealth from the region's biodiversity.

As R&D is a fixed cost, ambitious research programs are usually limited to large companies, at least in the developing world. Leveraging resources and highly specialized capabilities from third parties allowed Ecoflora to compete on knowledge-intensive niches with companies from industrialized countries, despite being only a mid-sized company from an emergent nation.

4.2.4. Lock-in

Uncertainty is reduced through long-term contracts and/or fixed agreed upon prices. In the sampled VNs, most contracts between focal companies and suppliers are long-term, on agreed upon prices conditioned to the delivery of specific quantities and quality.

In the green infrastructure business, Groncol sells not just installment but long-term maintenance. The firm has proprietary technology that ensures optimal maintenance of their products. The decision to build a green wall or a roof top implies a long-term commitment, as it is hard to reverse. According to an Endeavor report, “construction companies are reluctant to engage with third parties who may lack the appropriate know-how” to maintain such valuable investment. Thus, the integration of installation and maintenance of green infrastructure within the same firm serves to lock-in otherwise risk-averse customers.

4.3 Environmental Mechanisms

Environmental collaboration mechanisms restore ecosystems providing services and biodiversity conservation, and decrease a VN’s impact on ecological systems through closed material loops, industrial symbiosis, and end-of-pipe approaches. A restored ecosystem can go back to providing services important for life: provision (e.g., food, water, air), regulation (e.g., climate, disease), support (e.g., nutrient cycles, crop pollination), and cultural (e.g., spiritual, recreational). These services are key to biodiversity conservation and their robustness attests to a limited impact of human activity on ecological systems. For a summary of the collaboration mechanisms found, see Appendix B.

4.3.1 *Joint production planning*

To make industrial and commercial activity compatible with the requirements of sustainable development, corporations must ensure environmental integrity through adequate corporate environmental management. “Corporate environmental management is an effort by firms to reduce the size of their ‘ecological footprint’” (Bansal, 2005: 199). In such a quest, companies need to move beyond a self-centered focus in their planning and operations and work closely with their VN partners.

Ecoflora worked with various partners to guarantee supplies from underprivileged communities. One of their projects focused on helping poor families replant their lots with 10 to 30 *jagua* trees (source of a natural dye); even cattle ranchers were persuaded to bring back those trees to their pastures and thus restore a silvopastoral system. Once these systems were in place, joint production planning became the collaborative mechanism that made environmental, economic and social sense.

In a similar token, Groncol has contributed to the creation of a healthier environment in urban centers. According to the World Health Organization, quality of life depends on every human having access to 15 square meters of green. Bogota’s citizens can only access an average of 5 square meters of green per capita. The green walls and roofs installed by Groncol have collected more than 2.2 million liters of water, and captured close to 12,000 tons of greenhouse gases annually.

4.3.2 *Industrial symbiosis*

Industrial symbiosis applies the ecological metaphor of industrial ecology to action between firms (Chertow, 2000). As an environmental collaboration mechanism, industrial symbiosis “engages diverse organizations in a network to foster eco-innovation and long-term culture change” (Lombardi & Laybourn, 2012: 28). In this mechanism, “wastes” from one actor become supplies for another and there is a reduction in overall impact on the environment (Frosch & Gallopoulos, 1989). Not only have Groncol’s collaborative efforts helped with restoration, their symbiosis has taken care of close to 500 tons of “garbage” annually. As Groncol’s CEO explained, “our compost

is made with waste material from Cajicá (outskirts of Bogota), a town that has waste separation programs. The environmental implications of what our company is doing today are substantial.”

While cost efficiencies are not absent in these initiatives, their primary goal is not economic but environmental. Seuring and Muller make this point with examples where “suppliers are trained and their overall (environmental) performance is improved even though the focal company usually buys less than 10% of their total output” (2008: 1705).

4.4 Enabling Conditions

As we examined our data, we found that more than collaboration mechanisms were at play. Bringing about system-wide sustainable innovation seems to be facilitated through certain enabling conditions deployed by a focal firm. These are nested within these firms’ organizational identities and embodied in policies. As firms evolve, they build specific capabilities that serve them well to create or modify an appropriate VN. Organizational identity, policies and capabilities in place enable firms to engage others in sustainable arrangements. For a summary of the enabling conditions found, see Appendix B.

4.4.1 Organizational identity

Data suggests the critical role played by organizational identity and DNA, anchored in widely shared values (Morgan, 1986). In our sample, those organizational values emerged from the personal values and ethical leadership of their charismatic founders. The prevalence of founders’ leadership on sustainability issues, is evidenced in Wok’s CEO words: “Our sustainable fishing policy has never been questioned. It’s always been in his [founding entrepreneur] mind, and it was born with the company.”

4.4.2 Organizational policies

Organizational policies are written statements and guidelines that consider an organization’s mission and values to address specific organizational needs. They guide actions and communicate the organizations’ directions, code of ethics, laws, regulations, and rules as well as strategic plans and accepted processes. In the ensuing paragraphs, we describe five critical policies that allowed for collaboration at the VN level.

a. Focus on value creation through innovation. In our sample, focal companies actively sought to create “uncontested market space” (Kim & Mauborgne, 2005), and then distribute value fairly with stakeholders while preserving the environment. Wok pays community fishers about 10 times their best foregone alternative, and offers customers lower prices for better perceived quality, while respecting restrictions in fish supply dictated by biological imperatives (in ways the rest of the industry largely neglects). Yet, their community-based fish supply chain substantially improved their margins. For example, the new model almost doubled the margin of contribution of a tuna sushi order (from about 35% to 67%), a most popular product.

Following the implementation of the new sustainable fish supply chain (2010), sales have maintained dynamic growth, with a Compound Annual Growth Rate (CAGR) of 20%. Moreover, net benefits grew 86% on average (129% in 2010-11, and 51% in 2011-12). As benefits grow quicker than sales, efficiency gains are evident. Wok’s gross margins (55%) are higher than the industry average (43%), even though the company has more stringent environmental and social policies than the rest of the industry. Although the market tends to perceive its offerings as being of higher quality, its prices tend to be lower than those of direct competitors (Lobo, Reficco, & Rueda, 2014).

The capacity to simultaneously create value for the consumer (higher quality at lower prices), for investors (increasing revenue, higher margins), society (paying providers substantially higher than their cost of opportunity), and the environment (voluntarily accepting limits to growth imposed by sustainability concerns), can only be explained because of the ability of the focal company to create substantial value in relatively uncontested market niches.

b. Satisficing approach to value capture. In sampled VNs, the focal company deliberately refrained from following the dictum of maximizing the capture of financial value, particularly when doing so appears to be incompatible with sustainability requirements. Profit was actively sought, but not at any price. These companies' main role was perceived as being catalysts for positive social and environmental change, a feat that was deemed non-negotiable. Economic benefit was not maximized but sought in a measure considered "sufficient" to satisfy providers of financial capital and make the business operation financially sustainable. Value was distributed "fairly" with other stakeholders, such as suppliers and customers, as shown below.

c. Fair pricing with suppliers. One of the sampled organizations came up with ad-hoc pricing mechanisms to make up for the limitation of standard micro-economic tools when dealing with poor suppliers. Value-based logic would advise managers to push price as close as possible to suppliers' cost of opportunity, and buyers' willingness to pay, to avoid leaving value on the table (Brandenburger & Stuart, 1996). Given the prevalence of institutional voids at the BoP, and the chronic lack of opportunities that the poor endure, pushing purchasing prices close to suppliers' cost of opportunity only perpetuates poverty. Thus, Wok pays community suppliers 10 times the price of their best foregone alternative.

Often, these companies procure non-traditional commodities to replace standard industry inputs. In the lack of well-established markets for these new commodities, it is difficult to understand prices as the equilibrium point between aggregates of demand and supply; and, as these markets approach the condition of oligopsony, price could simply be dictated by the focal company. Thus, these companies often resort to ad-hoc ways of calculating price. The following quote by Ecoflora's Supply Chain Manager is illustrative of that ad-hoc logic:

To identify all the costs for suppliers, we started by trying to figure out the implicit costs of having grown those trees. We looked for hidden costs because these are wild trees, so the community never spent a dime on them. Nonetheless, we calculated how much it would have cost us to plant and grow those trees, up to the point of having mature specimens, as healthy and beautiful as theirs. We then moved on to calculate the value of each fruit, dividing the tree value by the average fruit volume produced by each tree. Finally, we added the direct costs associated with harvesting and transporting those fruits, and then production fixed costs –such as securing all required legal licenses. Since this is a wild fruit, it needs a special permit to be issued by local authorities, and that entails a cost. So, we added up all costs and, then, we topped it with a 20% premium. That's how we came up with the price of having a good fruit in our plant. Afterwards, we organized a meeting with the community, and made sure that everything was clearly understood and nothing had been left out. Once we all agreed on the price, a supply contract was signed between the community and our company.

d. Fair pricing with customers. Here too, sampled companies eschewed the standard logic of pushing price as close as possible to customers' willingness to pay. Wok has consciously priced its dishes lower than the competition: a basket of Wok's representative products is sold 24% below competitors' prices, despite a market which considers Wok's offering as being of higher quality (Lobo et al., 2014). This deliberate policy was founded on respect for customers and the value they would capture as they patronize Wok. In the words of Wok's CEO, "it's about pricing responsibly to make the business viable with reasonable margins. We try to be respectful and fair, heeding Wok's market conditions and costs rather than competition drivers."

e. Acceptance of limits to growth. Under the leadership of the focal company, sustainable VNs readily accept the social and environmental constraints to revenue growth. Wok gave up the idea of scaling up to keep pace with the nation-wide expansion of its main competitors. Doing that would have been incompatible with its policy of exclusively having fresh produce from poor communities. As its CEO explained:

Unrestrained growth is incompatible with Wok's concept —maybe good for others, but not for us! In fact, if today we decided to open 10 new restaurants in a year, we probably couldn't because of the limits imposed by the environment and by our community-based procurement model. It's not like opening one more McDonald and carbon copying a successful model. That's part of Wok's essence.

4.4.3 Critical capabilities

If values and policies are not supported by core capabilities, difficult to imitate or substitute, they would amount to little more than good intentions. The three capabilities presented below appeared constantly in the studied cases.

a. Corporate social entrepreneurship. When a business ecosystem extends deep into vulnerable populations and excluded regions, institutional voids force the need to backward integrate, (at least partially) to develop (or create from scratch) a supplier base. Although large portions of this task are outsourced (often to NGOs, hence the need to manage hybrid value chains), a focal company still needs special skills and sensitivities to manage that interface.

The concept of corporate social entrepreneurship was coined to identify a skill-set, traditionally associated with social entrepreneurs, which is deployed under the umbrella of a private business (Austin, Leonard, Reficco, & Wei-Skillern, 2005, 2006; Austin & Reficco, 2009; Hemingway, 2005; Kuratko, 2006). After working for 15 years in a development NGO, organizing afro and indigenous communities (“the poorest among the poorest”) to produce market crops, Ecoflora's Supply Chain Manager swapped sides and leveraged the resources a private business musters for the sake of economic development. He describes his role as the “interface” between the worlds of community and enterprise.

Insofar as the company sought its procurement of supplies from underserved rural communities (not commercial companies), managing those relations became mission-critical. When hiring the Supply Chain Manager, Ecoflora's CEO warned him that “this is not an NGO, but *we do want to have measurable social impact.*” As a company stockholder explained: “We have incorporated to our structure a group of people in charge of managing the community-based supply chain. We've developed a system, with its own metric, to manage relations with community suppliers, which include technical assistance, training, financing, incentives.”

b. Establishing business friendship relations. The concept of business friendship was coined to describe long-term relations with suppliers, which depart from the usual arms-length impersonal ties motivated purely by self-interest. Instead, these are embedded relations where the economic component is coupled with a long-term interest in the well-being of those specifically involved (Reficco & Marquez, 2009; Uzzi, 1997). Such pattern appeared in the VNs studied, with focal companies developing strong personal empathy with suppliers, celebrating their gains and feeling their pains, showing commitment with their wellbeing beyond issues of price, quality and quantity of trade flows. High levels of initial mistrust needed to be overcome, and monetary incentives proved insufficient to secure buy-in from community suppliers. In such cases, according to Wok's Procurement Manager, “trust is much more important than any signed business agreement (...) These communities have been cheated so many times that they thought our proposal was just another lie.”

The value of establishing trustworthy face-to-face relations, as the basis for bonding social capital, is crucial as a substitute for lax contract enforcement (Rufin & Rivera-Santos, 2008). In Chocó, where both Wok and Ecoflora tap into community-based suppliers, 90% of all available land is collective property. Limited private property and little or no collateral means that commercial contracts are difficult (or impossible) to enforce. In the absence of arm's length incentives, business friendships can be a viable second best.

c. Re-directing demand. In some markets, short-term pull may not be aligned with the good of people or planet. Some customers might even rebel against changes required by environmental sustainability. This forces a delicate balancing act. A company that limits itself to serving demand replicates existing consumption patterns, and thus makes matters worse by consolidating the *status quo*. Leaping forward too far from established demand patterns can also be problematic, as a company may place itself out of the market and be condemned to irrelevancy.

Wok walks a fine line: it connects with a wide public (not only the limited niche of green consumers) and tries to reorient their consumption patterns bit by bit towards environmentally friendly habits. In the words of Wok's Director of Operations, "working with customers has been, and will be, the hardest part of the transition [towards sustainable consumption]. People have their own views." This balancing act between *following demand* and *redirecting it* is accomplished through a tightly integrated value proposition that combines quality, sustainability and design addressed to a wide (although not massive) base of customers.

5. Discussion

On the basis of these findings, we have crafted three emerging propositions:

- **Proposition 1.** "Sustainable innovation at the VN level requires (economic, social and/or environmental) collaboration mechanisms."
- **Proposition 2.** "Economic and environmental collaboration mechanisms are enhanced by the use of social collaboration mechanisms."
- **Proposition 3.** "Economic, social and environmental collaboration mechanisms in the value network are facilitated by the existence of enabling conditions within the focal firm".

The conceptual map below captures the logical sequence that link all three. For clarity sake, the ensuing discussion has been structured around those propositions.

Insert Figure 6 about here

P1. *Sustainable innovation at the VN level requires (economic, social and/or environmental) collaboration mechanisms.*

In the search for a higher total value creation, not available to any individual firm, companies engage in the creation of VNs. Unlike natural ecosystems, VNs need to be built. Business development requires the redesign of VNs, and collaboration mechanisms play a key role in this redesign (Hellström et al., 2015). Different collaboration mechanisms reinforced each other. Reinforcement and fit have been characteristics within the strategic management literature. Going beyond the identification of mechanisms that enable coordination fulfills a long-held aspiration (Jones et al., 1997).

Our interpretations benefitted from the constructs already identified in the extant literature, but went further in adding an environmental dimension to collaboration, as well as specifying conditions that were instrumental in the emergence of sustainable innovation at the level of the VN.

By tying different traditions that had hitherto been disconnected amongst themselves, we brought together the pieces of the puzzle, finding synergies and logical connections between the *three dimensions* of sustainable development (i.e. social, economic and environmental) as they apply to collaboration at the VN level, something that had not been done before. We also found a logical sequence that had not been identified hitherto, by which (a) several **enabling conditions** nested within a focal company prompt it to assemble or restructure an extended VN (examined below, in P3); (b) a number of **social collaboration mechanisms** lay the ground for the “social construction of markets” (Reficco & Marquez, 2009); and (c) a variety of **economic and environmental collaboration mechanisms** glue together joint collaborative work along the network. These mechanisms are examined in P2, below.

The three sampled VNs succeeded in bringing about sustainable innovation, understood as innovation that improves sustainability performance on the ecological, economic, and social domains (Boons et al., 2013). As explained earlier, the new entrants brought clear benefits for the environment and for society vis-a-vis the incumbents they competed against. These experiences pose an intriguing question. Those focal companies accomplished something remarkable: they increased income for suppliers, offered higher quality and/or lower prices to customers, while keeping their investors satisfied and preserving the environment. That rare combination is only possible when massive value is unearthed through innovation. These were either new industries or niches, with little or no competition. It remains to be seen whether that magic alchemy will prove feasible when these industries mature and are subject to the time-tested dynamics of price-based competition and declining margins. Making enlightened decisions is relatively easy when there is plenty of value to be distributed around. The *trade-ons* found at initial stages can be offset by *trade-offs* when competitive dynamics settle in. This interaction between *trade-ons* and *trade-offs* is yet to be explored, at least under the lenses of value-based approaches.

When faced with tough *trade-offs*, who will these companies prioritize? Will it be their suppliers (who are likely to stay with them anyway, as their best foregone alternative is not appealing)? Will it be their customers (lowering quality or increasing prices)? Will it be investors (lowering their capital base or asking them to give up some economic for social value)? Or finally, will it be the environment (thus risking their values and DNA)? Further studies should examine these *trade-offs* carefully, as the very notion of “sustainable enterprise” and its viability will be put into question, depending on the answers given to those dilemmas.

P2. Economic and environmental collaboration mechanisms are enhanced by the use of social collaboration mechanisms.

Social mechanisms revealed themselves as precursors to economic and environmental collaboration mechanisms, *a necessary yet insufficient* condition. Our study fills two gaps identified by Hellström and his associates (2015): namely, we examined social mechanisms that address the coordinating and safeguarding challenges present in business exchanges; and we extended the studies about these phenomena beyond the distributed energy industry.

The social mechanisms, embedded in the studied VNs, operated in different ways. Restrictions in access reduced coordination costs, increased frequency of interaction, and facilitated safeguarding of agreements. Our sample showed restricted access to both customer and new entrants. Restricting access to like-minded customers sought to build, through frequent interactions, a community of values that could be the basis of brand loyalty and repeat-purchases. Such an expansion strategy has been called *scaling deep*: “focusing [...] energies and resources on achieving greater impact in your home community by doing one of the following: improving the quality of your services, achieving greater penetration of your target client population, finding new ways to serve your clients” (Taylor, Dees, & Emerson, 2002: 243).

Scaling deep is an alternative to scaling up, when growth proves incompatible with the requirements of sustainability. Scaling deep becomes relevant whenever “culture plays a powerful role in shifting problem-domains, and change must be deeply rooted in people, relationships, communities and cultures” (Moore, Riddell, & Vociscano, 2015: 77). To scale deep, organizations “intensively share knowledge and new practices via learning communities, distributed learning platforms and participatory approaches, invest in transformative learning, networks and communities of practice” (Moore et al., 2015: 77). In this sense, restricted access reinforces the construction of a macro culture.

Several social collaboration mechanisms reinforce each other. As restrictions support like-minded players on the demand side, and erect barriers and/or increase costs on the supply side, a macro-culture develops. Furthermore, this macro-culture limits who is considered as potential partner and knowledge transfers. The reinforcement of all these social collaboration mechanisms is part of the role human resources management has in bringing a sustainability culture to an organization: as the sampled cases portray, it is necessary to generate dialogue, build consensus and align capabilities (Colbert & Kurucz, 2007).

While scaling deep is a common practice in the world of non-profit organizations, to the best of our knowledge it had never been hitherto identified in the context of commercial sustainable enterprise. This reflects the hybrid nature of privately-owned sustainable enterprises: they are in the market, but not for the market sake; *they are in the market to change things*. They need to serve established demand (or risk bankruptcy), while at the same time changing demand’s underlying values and reorient supply towards sustainable patterns. This imbues sustainable enterprises with some of the characteristics of mission-driven NGOs, while sharing other traits with traditional commercial corporations.

P3. *Economic, social and environmental collaboration mechanisms in the value network are preceded by enabling conditions in the focal firm.*

Our empirical analyses unveiled that collaboration mechanisms at the VN level are facilitated by the existence of enabling traits within the focal firm. Although intuitive, the importance of organizational identity (Albert & Whetten, 1985) should not be under-emphasized. Organizational DNA gives meaning and direction to company policies and capabilities, and is a necessary (yet insufficient) condition to bring about larger ripples of change in their industries. Organizational identity provides the limits of what is deemed acceptable, and anchors difficult (i.e. costly) decisions. When firms consider themselves catalyzers of positive social and environmental change, profits are seen as means towards higher goals, and company policies embrace a “satisficing” (*satisfy + maximize*, or maximize within acceptable limits) approach to value capture. This concept is embodied in policies that fully internalize social and environmental costs, such as fair pricing with suppliers and customers. The same idea supports self-imposed limitations to product portfolio, or to the pace of geographical expansion, to accommodate the constraints imposed by sustainability concerns. When scaling up proved incompatible with sustainability, scaling deep emerged as a viable alternative.

Focal firms, engaged in sustainable innovation at the VN level, develop special capabilities and sensitivities to manage hybrid value chains. Upstream, capabilities such as corporate social entrepreneurship develop pools of suppliers from vulnerable populations in isolated regions plagued with institutional voids (Austin et al., 2005, 2006; Austin & Reficco, 2009; Hemingway, 2005; Kuratko, 2006). Business friendships can then be established in those stabilized environments. Downstream, the capacity to redirect demand entails a delicate balancing act between serving demand and leading it towards more sustainable consumption patterns. Our research unearths a fallacy with most variants of the “you can do well by doing good” perspective, which assumes that there is market pull and willingness to pay for sustainability. *If such a demand existed, there would*

be more supply of it. In the absence of such a demand, however, sampled organizations worked to lead change and *create demand for sustainability*, reorienting existing consumption patterns towards environmentally friendly habits. The critical capabilities identified (e.g., corporate social entrepreneurship or business friendship relations) allow for the establishment of cross-sector partnerships that stabilize turbulent environments, organize suppliers and achieve ecosystem restoration.

6. Conclusion

This study has gone beyond the boundaries of a single firm to increase our understanding of how sustainability can be achieved within the VNs in which companies participate. We examined the collaboration mechanisms used in VNs to achieve sustainability.

We confirmed findings of the extant literature that established the importance of economic and social collaboration mechanisms in bringing about sustainable innovation at the VN level, and added an environmental dimension. We brought in transaction cost economics and social network theories to understand the collaboration mechanisms that coordinate and safeguard exchanges all along VNs. We identified the conditions that enable focal firms to collaborate and create value at the VN level. Finally, we tentatively established propositions between enabling conditions, collaboration mechanisms and outcomes. Two uncovered issues deserve special attention: scaling deep as an alternative to scaling up, and *trade-ons* in the emerging novel VN that can disappear over time via price-based competition, as previously discussed.

Our study is not devoid of limitations. Having a small sample allowed us to delve deep into each case, and the task now is to examine the stated propositions in a larger sample. The long interviews that constituted the most important source of information in our study are subjective accounts that could be legitimately questioned by a sceptic observer. Further studies should test if sustainable innovation can only emerge tied to green new entrants, or if this is an idiosyncratic trait of this small sample. Another limitation of our study is the fact that the oldest case in our sample is 19 years old, and is still immersed in the process of building a scalable and competitive VN. As we have mentioned above, some questions about the long-term viability of the sampled VNs are granted.

Having said that, and since our study encompassed different industries ranging from agribusiness to restaurants, and offerings that ranged from specialized products to mass consumption ones, we are confident that our findings and interpretations hold for a wide range of VNs. We hope that this study has shed some light on the phenomena of system-level sustainable innovation.

Insert appendices A & B about here

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Figure 1: Wok and its value network

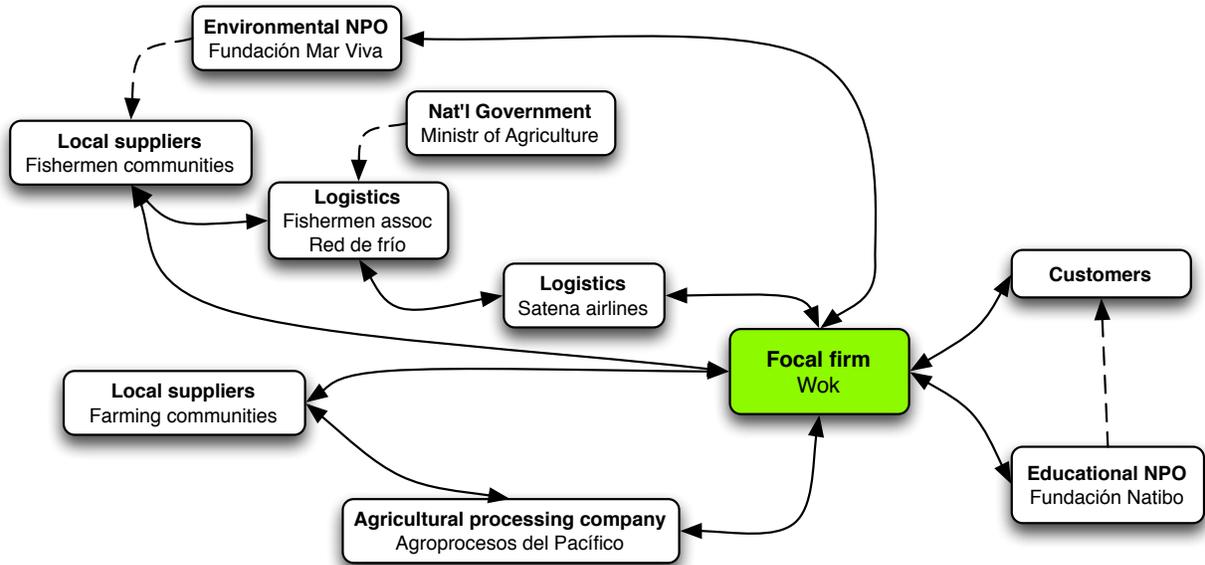


Figure 2: Groncol and its value network

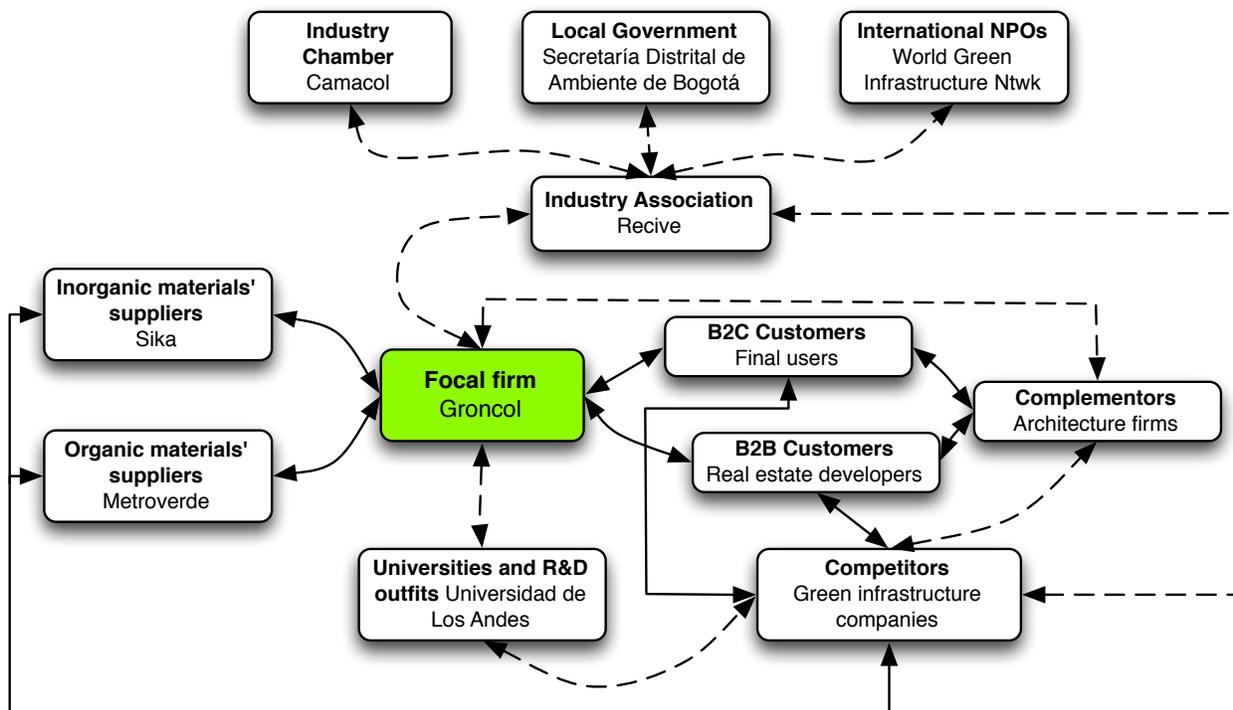


Figure 3: Ecoflora and its value network

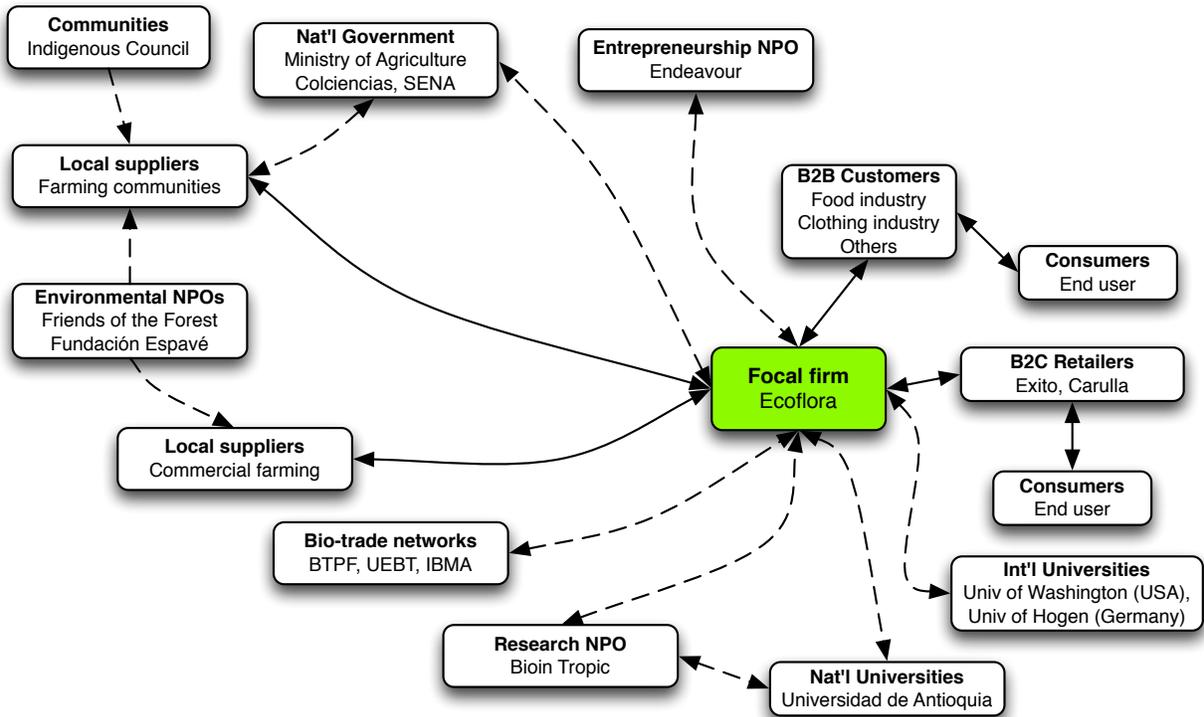


Figure 4: Green infrastructure industry architecture before Groncol

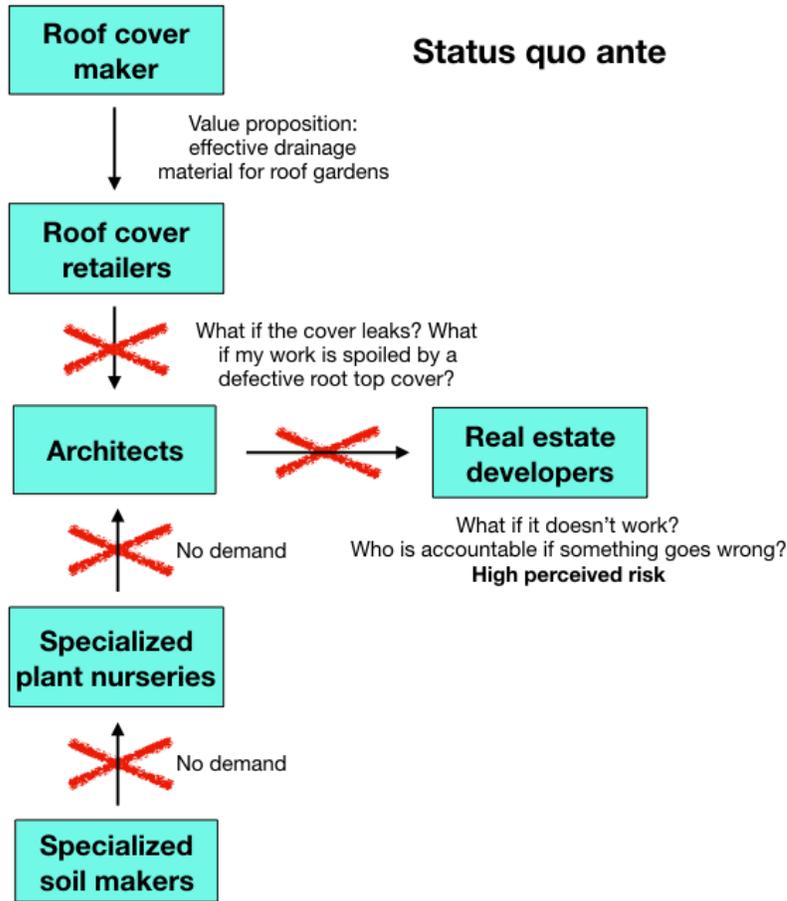


Figure 5: Green infrastructure industry architecture after Groncol's innovations

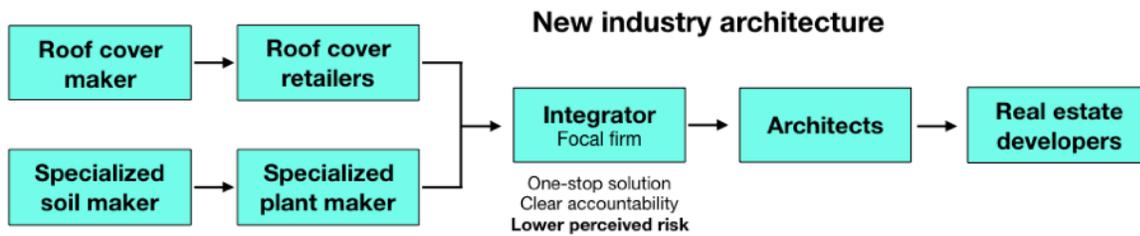
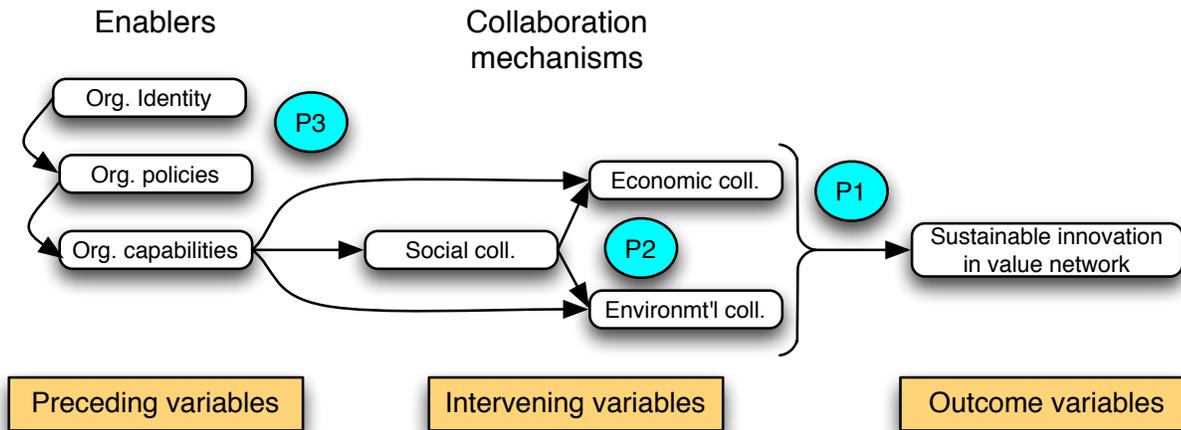


Figure 6: Conceptual map



Appendix A: Positions occupied by the interviewees in the sample

WOK	ECOFLORA	GRNCOL
Operations manager	Ecoflora Agro CEO	CEO
Founding entrepreneurs (2)	Ecoflora Cares CEO	Founding partner
Administrative manager	Founder and shareholder	Customers (2)
Store manager	R & D Manager	Supplier
Administrative clerk	Innovation VP	CEO of complementary (architecture firm)
Procurement manager	Supply chain manager	Representatives from industry association (2)
Financial manager		CEO and founders (2) of competitor firm
Quality manager		Operations and Financial Managers of competitor firm
Service manager		
Suppliers (2)		
Workers (3)		

Appendix B: Collaboration mechanisms in sampled cases

	Economic Mechanisms	Social Mechanisms	Environmental Mechanisms	Enabling conditions
Wok	Change in industry architecture: eliminated intermediaries and develop a reliable supply from a region which previously had no participation in formal fishing industry.	Macro-culture: educated employees and customers on the limits of the environmental system on consumption. Sought to build a community of shared values with employees and customers.	Joint production planning with suppliers of food and spices.	Organizational identity: company founded on the value of “respect” (towards customers, communities, the environment). This is not a abstract declaration, but an anchor which guides all policy decisions –including some that carry substantial financial implications for the bottom line.
	Novelty through complementarity: brought to market world-class fish by creating a business-friendly environment in a region hitherto plagued by institutional voids. Substantial value came about through the combination of business-related skills with community fishing skills.	Restricted access: restricted menu despite positive demand for unsustainable catch, which alienated some customers.		Organizational policies. “Respect” implied refraining from maximizing value capture in relations with customers and suppliers (see details in body of article). “Satisficing” approach to profits.
	Lock-in: long-term contracts with suppliers, which created trust and eased the internalization of new practices by communities.	Capacity building: ongoing deep and ongoing training to artisanal fishermen.		
		Cross-sector coalitions: cross-sector partnerships with NPO and governments to engage communities and turn them into reliable suppliers.		

	Economic Mechanisms	Social Mechanisms	Environmental Mechanisms	Enabling conditions
		Knowledge transfer: sought to maximize value capture by vulnerable communities which supplier their business.		
Groncol	Change in industry architecture: inserting an “integrator” before the client, diminished transactions costs.	Restricted access: dealt with unfair competition building high environmental standards through industry association.	Engaged with organizations so that wastes from one become supplies for another. Groncol’s has taken care of close to 500 tons of 3rd parties’ “garbage” annually, to create their vertical gardens and green roof tops.	Organizational identity: the environmental value of green infrastructure products is considered essential, not only part of a marketing pitch. This commitment guided policy decisions, at the levels of firm, VN and even industry.
	Novelty through complementarity: the combination of different technical skills (architects, biologists, agricultural engineers) enabled the emergence of a new industry.	Macro-culture: customer education on environmental benefits of green infrastructure products. Development of industry standards.		Critical capabilities. Re-directs demand towards sustainable consumption patterns.
	Economies of scale and scope: engaged competitors to jointly invest in the creation of a supplier, which would serve the entire industry. Coopetition: cooperate to create the business, compete to capture value.	Capacity building: offered training in vegetated infrastructure to complementors and distributors.		

	Economic Mechanisms	Social Mechanisms	Environmental Mechanisms	Enabling conditions
	Lock-in: by tying up installment and maintenance, risk-averse customers are locked in, which creates a steady cash revenue for focal company.	Cross-sector coalitions: cross-sector partnerships with NPO and governments to engage communities and turn them into reliable suppliers.		
Ecoflora	Change in industry architecture: a supply chain (industrial dye) that previously derived from the petrochemical industry, came to be supplied by farmers.	Macro-culture: seeks to educate B2B and B2C customers on environmental benefits of replacing chemicals-based dye by plants-based substitutes.	Moved beyond a self-centered focus in planning and operations to work closely with VN partners	Organizational identity. Company created with the mission of improving the lives of Chocó's farming communities – among the poorest in Colombia.
	Novelty through complementarity: it changed an industry by leveraging the installed capacity of R&D of local universities, and combining them with its commercial skills.	Capacity building: offered training to artisanal plant suppliers.		Organizational policies. Company decided never to turn its back on those artisanal providers of plants.
	Lock-in: long-term contracts with suppliers, which created trust and eased the internalization of new practices by communities.	Cross-sector coalitions: cross-sector partnerships with NPO and governments to engage communities and turn them into reliable suppliers.		Critical capabilities. Established business-friendship relations with artisanal suppliers. Re-directs demand towards sustainable consumption patterns.
		Knowledge transfer: sought to maximize value capture by vulnerable communities which supplier their business.		