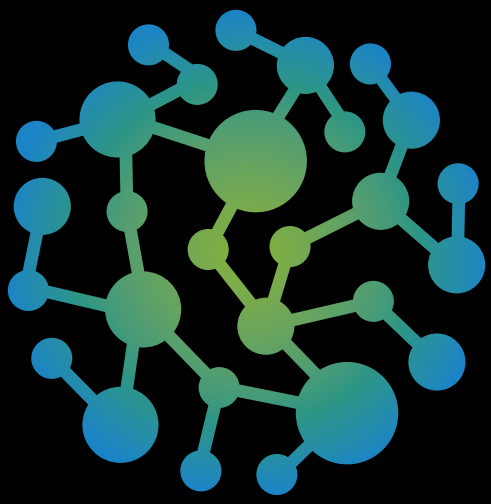


innovation

and Sustainability in the Value Chain

CYCLE 2012

SUPPLY CHAIN MANAGEMENT

ORGANIZATION

FGV GVces

PARTNERSHIP

citi

SPONSORSHIP

Citi Foundation

citi

MEMBER COMPANIES OF THE 2012 PROJECT

SMALL COMPANIES SELECTED FOR THE 2012 PROJECT

ORGANIZATION

PARTNERSHIP

SPONSORSHIP

SUPPORT

innovation
and Sustainability in the Value Chain

ORGANIZATION
Getulio Vargas Foundation
Center for Sustainability Studies of the Getulio Vargas Foundation, GVces

General Coordination
Mario Monzoni

Executive Coordination
Paulo Branco

STAFF
Center for Sustainability Studies of the Getulio Vargas Foundation, GVces
Ana Coelho, Giovanna Domingues Sanches

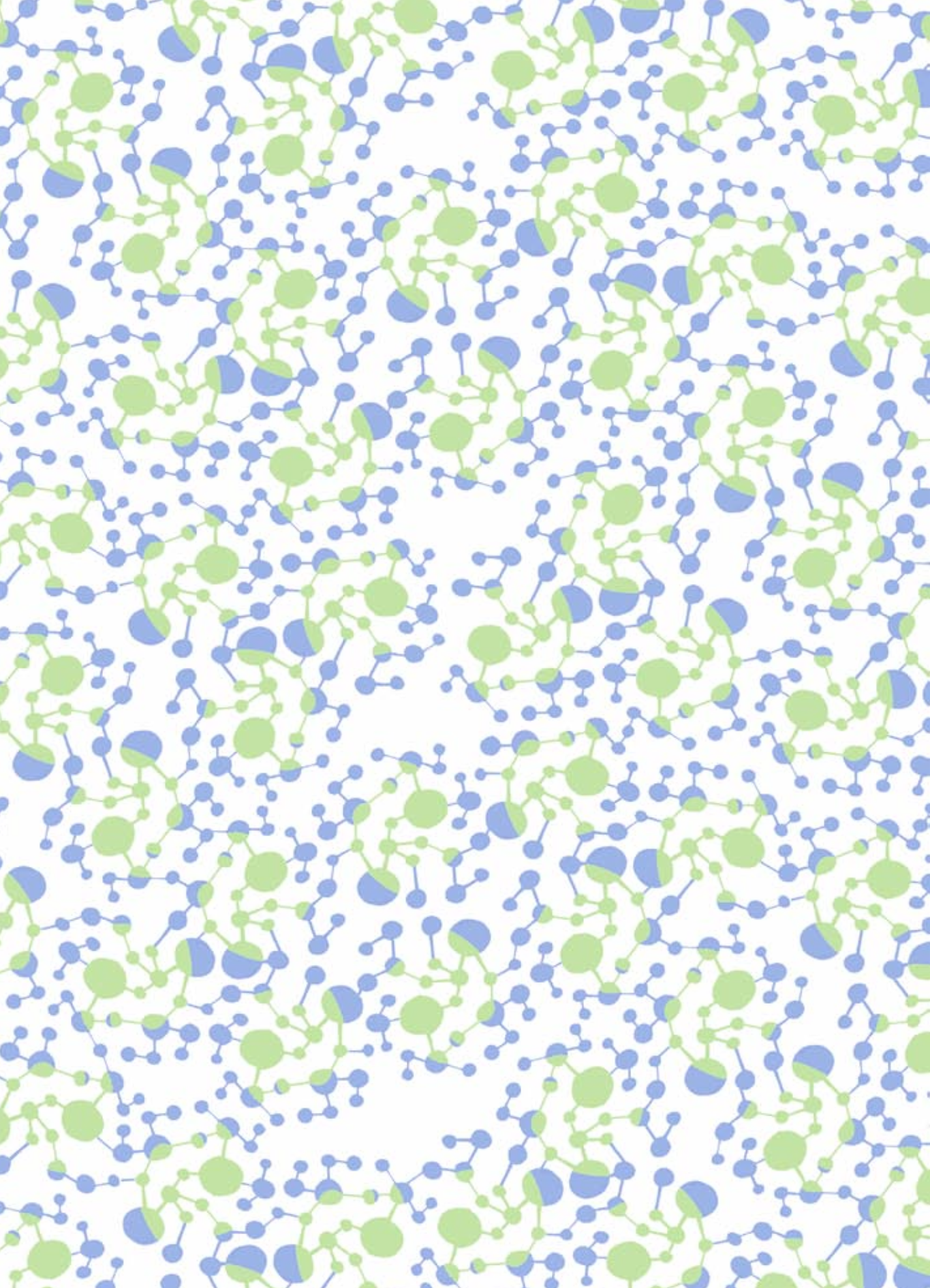
Technical consulting
Cristina Fedato

FGV/EAESP Innovation Forum
Wilson Nobre

Collaboration
Gustavo V. Breviglieri, Bel Brunharo, Luciana Stocco Betiol, Ricardo Barreto, Thiago Uehara

ART
Graphic Design and Art Editing
Vendo Editorial
Dora Dias

Illustrations
Atrium Consultoria



INTRODUCTION

The Center for Sustainability Studies – GVces

The Center for Sustainability Studies (GVces) of the Getulio Vargas Foundation (FGV) was created in 2003 and has since been establishing itself as a place of study, learning, reflection, innovation and knowledge production. It focuses on the development of public and business management tools, policies and strategies for sustainability on a local, regional, national and international level.

GVces

MISSION: To continually expand the frontiers of knowledge, contributing to sustainable development in the field of public and business administration.

VISION: To be a center of excellence in the co-creation, sharing and application of knowledge.

Its programs are guided by four lines of action:

- Training;
- Research and Knowledge Production;
- Interaction and Partnerships;
- Mobilization and Communication;

These four lines underpin all the initiatives of GVces, which currently runs eight thematic programs. Each one focuses on different issues and challenges of sustainability and is comprised of one or more projects associated with the same topic. The programs of GVces and their main objectives are:

- Innovation in the Creation of Value – promote innovation in business models, strategies, relationships, processes, products, services and practices, in keeping with sustainable development;

- Global Sustainability – raise awareness and interact with the private sector on: climate change, ecosystem services, biodiversity and water. And integrate public and private actors in the proposition and monitoring of public policies;

- Sustainable Finances – incentivize financial institutions to adopt social and environmental criteria in their activities, taking into account the central role of the sector in the development of a new economy;

- Environmental Politics and Economics – interact with government, private sector and civil society to create viable paths towards sustainable development, and to develop research and technical support for the revision, formulation and implementation of public policies for sustainability;

- Local Development – contribute to the construction of local development plans and tools, through participative processes, interaction and engagement with society, companies and government;

- Sustainable Consumption – promote sustainable consumption together with companies and government, and assess the

logic, results and impacts of consumption policies and procurement management;

- Integrated Training – conceive, structure and share training processes with a transdisciplinary approach, to encourage a culture of sustainability;

- "Página 22" Magazine – discuss the dilemmas of the 21st century and the challenges for economic models that make sense if they promote the social welfare and the maintenance of natural conditions that guarantee life on Earth.

The Innovation and Sustainability in the Value Chain Project

One of the initiatives of the Innovation in the Creation of Value program that was launched in December 2011, in partnership with Citi and with sponsorship from Citi Foundation, is the Innovation and Sustainability in the Value Chain (ISVC) project, which aims to promote innovation for sustainability in small and medium enterprises in the context of the value chains of large companies. The focus of the project on micro, small and medium enterprises that operate in the value chains of large corporations is justified on account of the representativeness of these businesses in the Brazilian economy and also due to their potential contribution to the innovation and sustainability of the chains to which they belong.

Micro, small and medium enterprises represent 99% of all companies in Brazil and account for 20% of the country's GDP, in addition to absorbing more than 70% of formal employment in private non-farm establishments, according to the Annual Report on Labor in Micro and Small Enterprises 2010/2011, published by the Brazilian Statistics Institute (IBGE). Despite their abundance, these small-scale companies generally have less access to technical knowledge on innovation and sustainability and, even when they do, they usually lack the financial resources to transform this knowledge into goods or business practices.

Given this context and the economic, social and environmental challenges that we face today, it is necessary to join forces not only so large companies establish a responsible management of the externalities in their value chains, but also so they involve and engage their suppliers in the pursuit of innovative solutions. In this respect, large companies, which on account of their economic power exert significant influence on the chain, play an important role in the promotion and co-creation of so-called innovation ecosystems.

Similar to biological ecosystems, where living and abiotic beings interact in a complex and dynamic network in constant search of balance for their survival, innovation ecosystems involve different actors that need to engage with one another to promote innovation. In other words, it is a network of institutions that are organized and interconnected around a focal institution (also called a platform) that engages in economic transactions and institutional partnerships with suppliers of products and services, distributors, contractors, creditors, and teaching and research institutes, among other actors, so together they can create value through innovation [1]. This and other concepts involving large companies, sustainability and innovation in the value chain are addressed in chapter I.

Taking into account the economic relevance of small and medium enterprises (SMEs) and the importance of partnerships in value chains, the theme of the inaugural cycle of the project is Supplier Management, and its specific goals are to:

- Produce and disseminate knowledge on innovative sustainability practices in the value chain;

- Recognize and incentivize innovation for sustainability in small and medium enterprises that operate in the value chain of large companies;

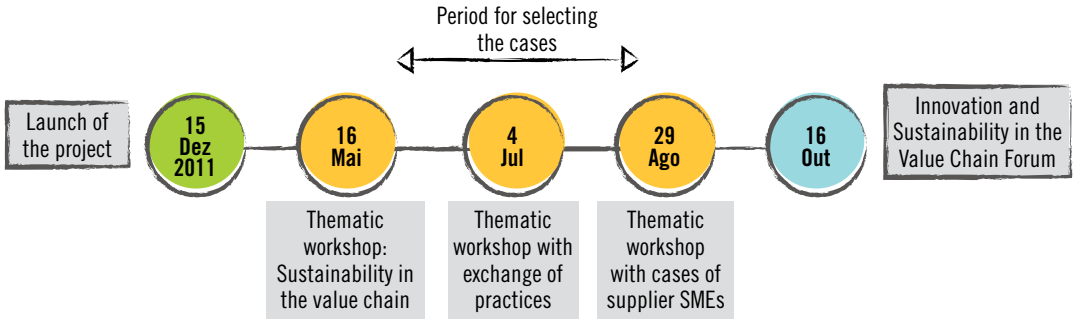
- Mobilize large companies to develop

innovative sustainability strategies for their production chains;

- Create venues to share experiences and to network, engaging social actors around the topic of innovation and sustainability in the value chain.

To meet these goals, the project established two fronts: one with large corporations and another with SMEs, which were integrated throughout all the activities. The figure below illustrates the Work Plan for the 2012 Cycle:

By becoming members of the ISVC project, large companies agreed to engage in dialogue and



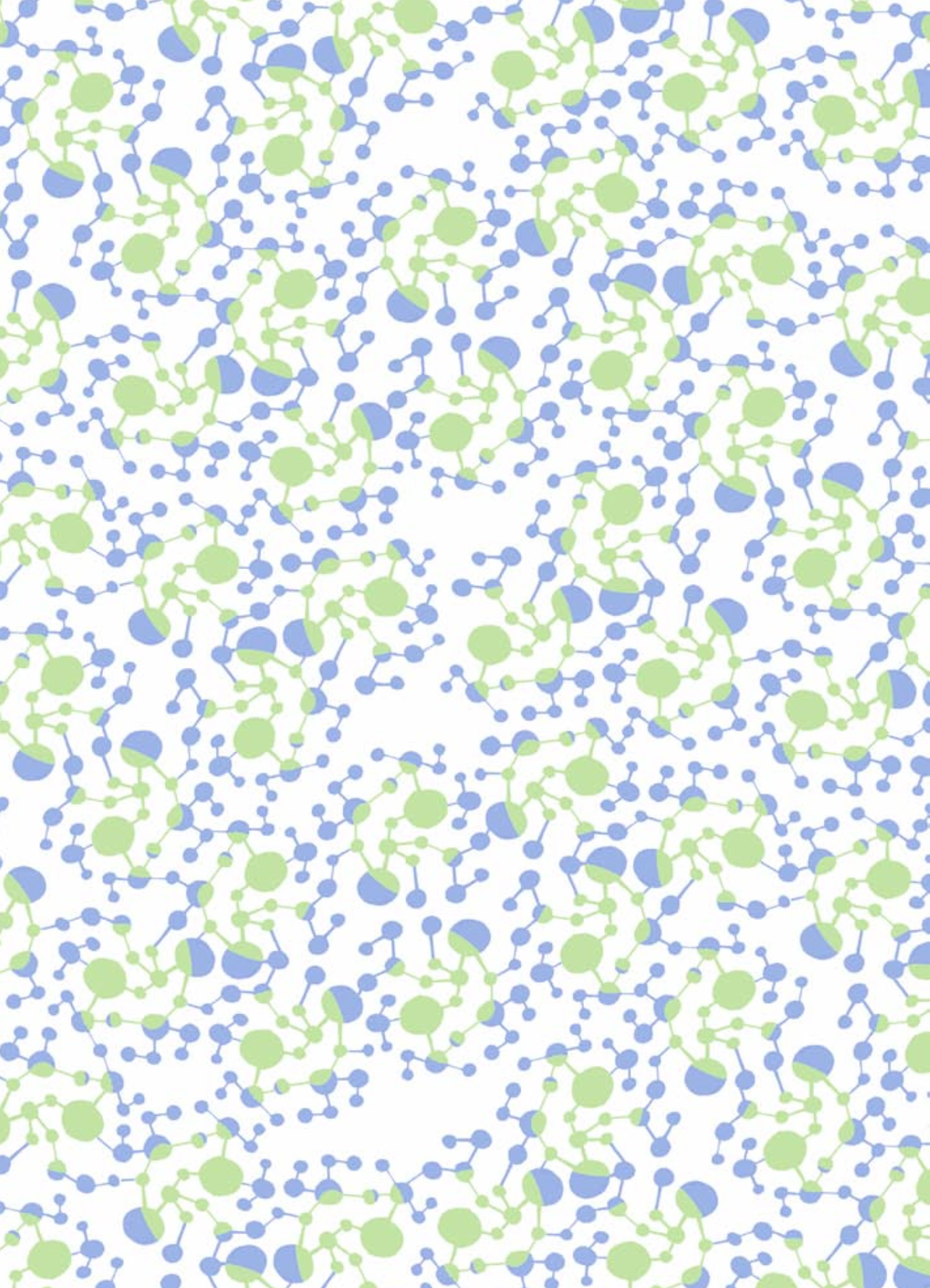
share experiences on management and relationship with suppliers in three workshops. Moreover, the participants in the workshops received and shared technical and methodological support to identify risks and opportunities in the management of the production chain of their companies, so they could incorporate innovative sustainable principles and practices into their daily operations. Throughout this 2012 Cycle, 25 large companies participated in the ISVC project. The activities undertaken and the main results of the dialogues involving the member companies are presented in chapter II.

On the project's other front, it identified nine small supplier companies that were innovators in sustainability. Besides giving visibility to their practices, the project proposed to extract the lessons they had learned, disseminate the knowledge and engage in dialogue with large companies at one of the workshops that was organized. In this workshop, the SMEs gained exposure in an environment that was conducive to the formation of partnerships, in addition to sharing experiences among themselves and with the large member companies. The results of the project on this front, as well as the presentation of the nine selected practices, will be detailed in chapter III.

This report proposes not only to demonstrate the win-win relationship between the corporate client and the small supplier, but also to come up with proposals to meet the challenges of incorporating sustainability into supply chain management and sustainability innovation into value chains. These proposals will be addressed in chapter IV.

Through this report, the project hopes to awaken the interest of the reader and mobilize the various actors involved in the topic of sustainability in value chains, highlighting the importance of the relationship between clients and suppliers and of innovation as a way of making changes to the traditional system in which these chains operate.

[1] GAWER, A.; CUSUMANO, M. A. How companies become platform leaders. **MIT Sloan Management Review**, Cambridge, United States, v.49, n.2, p. 28-35, 2008.
IANSITI, M.; LEVIEN, R. Strategy as ecology. **Harvard Business Review.** Ipswich, v.82, n.3, p. 68-78, 2004.



CHAPTER 1:
Innovation and Sustainability in Value Chains

I.1 Sustainability in the Value Chain

The classic view of the role of companies in society, which for many decades consisted of functions such as producing goods, providing services and maximizing profits, began, particularly from the 1980s onwards, to acquire new focuses and responsibilities. Changes in the Brazilian and international social, political and economic landscape over the past few decades – namely globalization, the information revolution, the growing power of corporations, the indiscriminate use of natural resources and the worsening of social problems – have increased the pressure on companies to take responsibility for the social and environmental impact of their operations.

The growing involvement of companies in these collective issues of society began as a philanthropic option, wherein companies viewed themselves as organizations making a voluntarily contribution to the common good. But this vision, even though it has provided and continues to provide extremely important collective benefits, was inadequate to meet the challenges and responsibilities imposed on companies. As such, companies began to realize that their responsibility or social role consisted of the responsible management of their business and consideration for the needs and interests of all their stakeholders. A company that takes this approach begins to see itself as part of a complex system: it no longer tries to engage with the community, but instead understands that it is part of the community and that its durability depends on harmonious action inside the community. Their agendas incorporate issues such as permission to operate, cleaner production, relations with stakeholders, human rights, ethics and transparency in governance, among others.

At the same time, these changes in the landscape provided companies with a whole new range of opportunities and markets to be explored. Socio-environmental responsibility and sustainability are topics that have now become part of the strategy of an ever growing number of companies and organizations that want to make their business more consistent with the new landscape and with global challenges.

As companies adjust their business strategies to develop a vision of sustainability, identifying the most critical and relevant issues for them to run their business responsibly, they will realize that, to minimize risks and maximize opportunities, they will need the cooperation of their business stakeholders. In this context, developing methods of collaboration and streamlining business relationships with partners in their value chain becomes essential and effective. Companies that benefit from an integrated vision of sustainability in the value chain develop closer commercial ties, build stronger and more lasting relationships and, as a result, acquire an important competitive advantage for sustainability. This approach to value chain management was responsible for the emergence of what is now called Sustainable Supply Chain Management.

I.1.1 How to define and delimit a company's value chain?

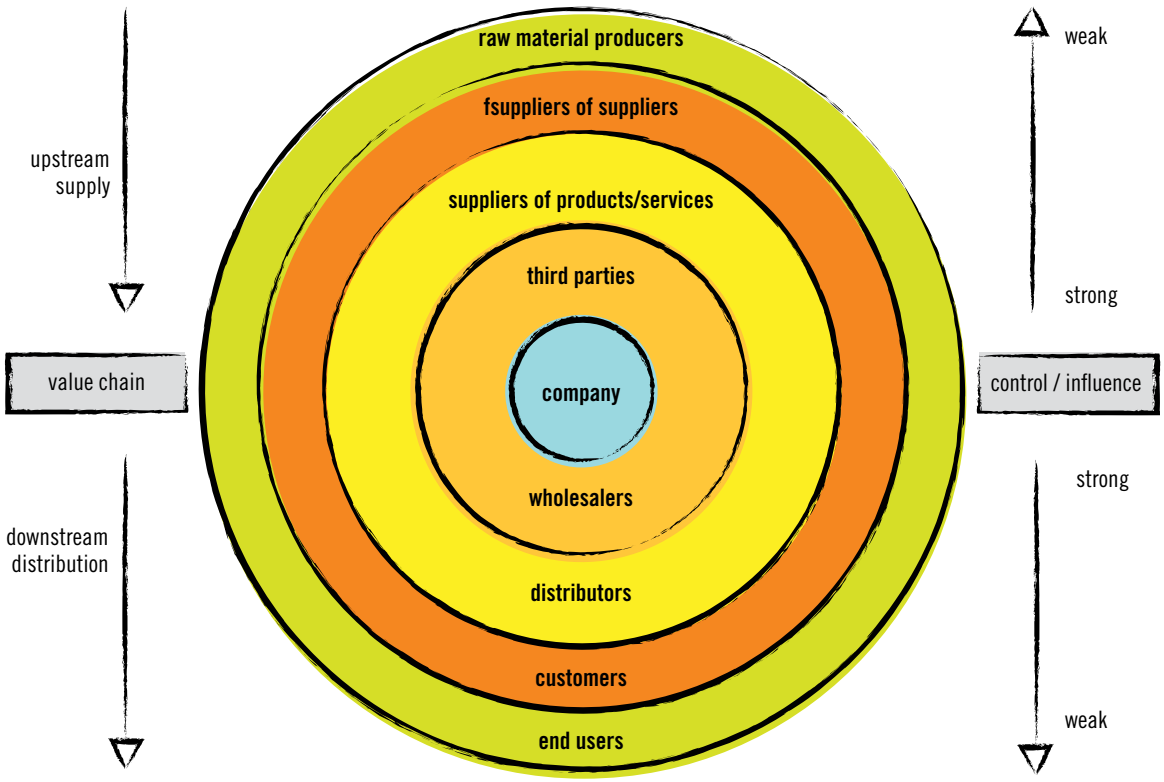
The best known and most widely used definition of the value chain to date was developed by Michael Porter in the late 1980s, as part of the discussions on competitive advantage. Porter described the concept as "the set of activities that add value to a product or service from the initial stages of the project/production to the final consumer service". At the time, a key factor in Porter's work was to introduce to companies an integrated approach, wherein the vision of processes could begin to substitute the fragmentation typical of functional areas and departments. If expanded and placed in the present

day context, the concept becomes essential for the challenges and opportunities related to sustainability.

When the vision of sustainability is integrated into this concept of the value chain, sustainability in the chain can be defined as "the management of raw materials and services from suppliers to manufacturer/ service provider to customer and back with improvement of the social and environmental impacts explicitly considered" (WBCSD New Zealand, 2003). In other words: companies assume a social leadership role in their work with the chain, considering economic, social and environmental aspects in their management practices and relationship with suppliers, turning them into partners in the construction of a new way of doing business and thereby contributing to the incorporation of sustainability into the value chain of the company.

The value chain encompasses all the company's upstream and downstream links. Upstream are the suppliers, sub-suppliers, producers and service providers, which constitute the supply chain. Downstream from the company are the distributors and final customers. Looking at the value chain from the point of view of sustainability also means substituting the linear form of management for a circular one (Figure 1). In other words, substituting the linear "take-make-waste" strategy, which is typical of the system of production and consumption that

FIGURE 1 **Value chain:** spheres of control and influence [**SOURCE:** GRI - Global Reporting Initiative. GRI Boundary Protocol. January/2005]



has long proven to be unsustainable, for a circular "borrow-use-return" model, which considers the limits of the carrying capacity of the planet.

The value chain also considers the flow of information, as defined by Handfield and Nichols (1999): "The value chain encompasses all activities associated with the flow and transformation of goods from the raw materials stage (extraction) through to the end user, as well as the associated information flows. Materials and information flow both up and down the value chain. Value chain management is the integration of these activities through improved relationships along the chain, to achieve a sustainable competitive advantage."

The growing importance attributed to the convergence of the topics of value chains and sustainability has altered the management and operational focus of companies over the past two decades: from maximization of local factors to consideration of the entire value chain, including the stages of production, consumption, customer service and product disposal.

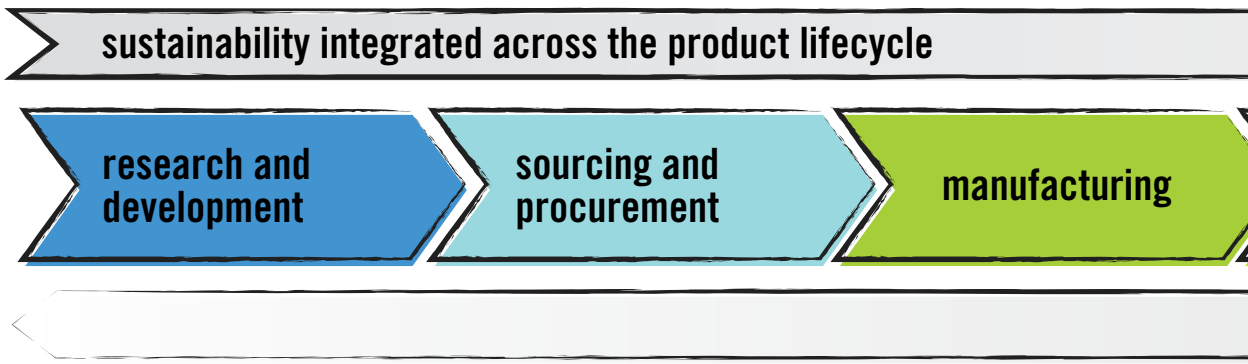
The topic of sustainability, therefore, has significant interface with value chain management, since companies have started to consider all stages of the production process in their decision making and conduct more in-depth analyses of each one of these stages. Accordingly, in order to reconcile the greatest possible generation of value with the lowest possible cost, companies ought to view sustainability as a new frontier of innovation that can assure them a position of leadership and distinction.

I.1.2 Business visions

In 2010, the company Accenture conducted and published, in partnership with the United Nations Global Compact, the survey "A New Era of Sustainability" that presented CEO reflections on the current and future challenges on the path towards a sustainable economy. In all, 766 company CEOs were interviewed from a wide range of countries and industries..

The following are some of the main conclusions of the survey:

FIGURE 2 **"The Sustainable Supply Chain"**, Accenture 2009

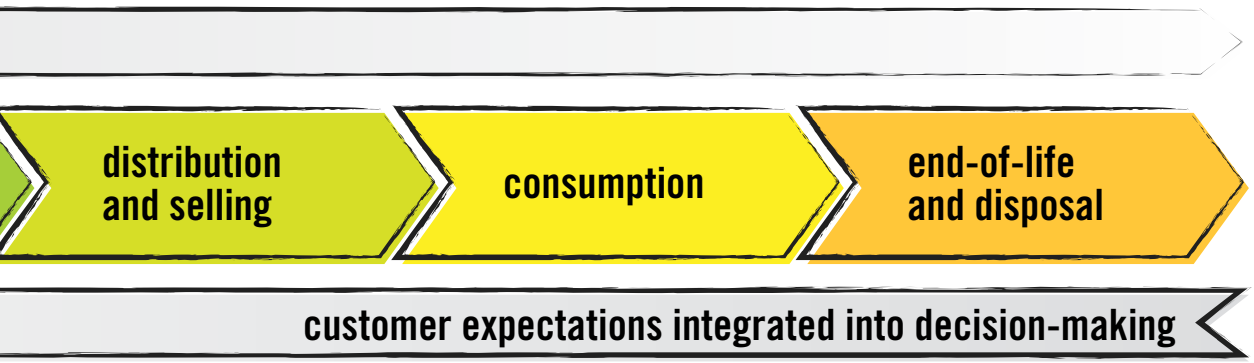


- 93% of CEOs believe that sustainability issues will be critical to the future success of their business;
- 96% of CEOs believe that sustainability issues should be fully integrated into the strategy and operations of a company;
- 72% of CEOs cite "brand, trust and reputation" as one of the top three factors driving them to take action on sustainability issues;
- 88% of CEOs believe that they should be integrating sustainability through their supply chain, while only 54% believe that this has been achieved within their company.

Another study by Accenture, conducted in 2009, surveyed 245 supply chain executives from large companies to analyze their position on strategies to handle pressure from customers and regulators to adopt more sustainable production processes. Although the impression persists that implementing more sustainable processes and technologies represents a cost increase for the company, the study suggests that this does not have to be the case. The survey intended to identify whether and to what extent sustainability is present in companies that have good results in their supply chain management.

Among the companies surveyed, a benchmark group was identified called "masters" that achieve excellent performance in cost effectiveness and customer services. After analyzing the role of sustainability in the supply chain management of these masters, it was first noticed that this group of companies takes an integrated view of the entire chain. According to Figure 2 below, once it is integrated into the product lifecycle, sustainability is considered from the research and development stage through to post-consumption.

The masters apply a three-dimensional approach to business development, seeking to maximize performance in the dimensions of cost-efficiency, quality of service and sustainability. According to the study, the integrated view of the chain taken by the



masters means that these companies are constantly involving their suppliers in the joint development of new solutions, with a focus on the complete product lifecycle. Masters develop products with a commitment to sustainability, actively manage the ecological footprint of their supply chain, select systems and processes thatt offer the best capital return and in doing so benefit from their integrated view of sustainability in the value chain.

Sustainability management in the value chain of these companies is a way to:

- **Meet the current and future demands of customers and of self-regulation and conduct** – i.e., companies frequently turn their attention to this topic when dealing with requests and enquiries from customers, or to comply with legislation or respond to pressure from stakeholders involving good production chain monitoring practices;

- **Generate a positive impact through cost reduction** – working in conjunction with business partners allows companies maximize the use of resources, reduce rework and review processes, among other cost reductions related to the triple bottom line;

- **Manage reputational risks** – most large companies have weak links in their chains from an ethical, social and/or environmental point of view, and they can work proactively to minimize these risks;

- **Comply with voluntary commitments**, such as the Global Compact and Brazil's National Compact for the Eradication of Slave Labor and Compact for Integrity and Against Corruption – signatory companies of these public commitments understand that compliance requires a joint commitment with their chains;

- **Pursue process and product innovations with a focus on sustainability** in conjunction with business partners – the companies benefit from creating an environment conducive to innovation for sustainability in their chain;

- **Promote and develop innovation ecosystems** [1] which comprises the company and its suppliers, customers and other partners such as investors or the community – the perspective of the ecosystem suggests that an isolated organization cannot handle the challenges of innovation, and that it must interact with upstream and/or downstream partners in its chain.

It is also important to stress that "early movers" – those companies that consider sustainability as a goal before the rest – acquire skills that competing companies will be pressured into developing later (whether due to strticter regulation or pressure from consumers or civil society organizations). This competitive advantage puts them in a favorable position, since sustainability is an integral part of economic development.

There are various global initiatives to assist companies address sustainability issues with their value chains, particularly with respect to supplier management. One of them, developed by the Global Compact and presented at Rio+20, lays out practical steps for companies to start incorporating the topic in their supply chain management. According to this study [2], supply chain sustainability is increasingly recognized as a key component of corporate responsibility. It highlights that managing the social, environmental and economic impacts of supply chains, and combating corruption, makes good business sense as well as being the right thing to do.

As the importance of the topic grows and the critical mass of companies incorporates sustainability criteria into their supply chains, collective initiatives have emerged for managing the social and environmental variables present in the production chains. One example of such a collaborative platform is Ecovadis (www.ecovadis.com), a French firm that provides information for companies to assess the environmental and social performance of their suppliers on a global scale, offering critical social and environmental indicators for different sectors and production activities. Sedex, the Supplier Ethical Data Exchange (www.sedexglobal.com) is another example – it is a not-for-profit organization dedicated to driving improvements in responsible and ethical business practices in global supply chains.

Another significant initiative, which addresses the topic of supply chain sustainability by tackling the challenge of climate change, is CDP Supply Chain. CDP – Carbon Disclosure Project (www.cdproject.net) – is a non-governmental, not-for-profit organization that has the largest database on the impact of climate change on companies. The CDP Supply Chain project is one of the initiatives of the broader Carbon Disclosure Project, since most emissions of large companies occur in their production chains.

1.2 Innovation for Sustainability

For decades, innovation has been the topic of study in academia, where concepts, theories and classifications have been developed on the subject by various scholars, among them the economist Joseph Schumpeter. According to him, innovation is a new combination of means of production that is fundamental for economic development, and it can be applied to different stages of a business and emerge in five situations:

1) The introduction of a new product or service;

2) The introduction of a new method of production;

3) The opening of a new market;

4) The conquest of a new source of supply of raw material or semi-manufactured product;

5) he establishment of a new organization of a business.

Another aspect of innovation analyzed by Schumpeter refers to its degree of novelty. There are radical types of innovations that provoke major changes in the world, such as the creation of a new economic sector, and there are incremental innovations, or improvements, that continually advance the process of change and introduce new features to known products, services and processes.

Although they are frequently confused and often used as synonyms, innovation and invention are words with distinct meanings. Innovation only comes about through the implementation of an idea and after the measurement of its results. Invention, meanwhile, is only innovative when introduced and accepted by the market. Moreover, for innovation to occur, a company depends on internal factors, such as its management model, and external factors, such as the regulatory framework and the economic climate in general.

As far as classical economists and business administrators are concerned, a company is a driver of economic development and provider of goods and services that, through innovation, guarantees higher quality and lower costs for its goods and expands its markets. However, given the growing perception over the past few decades of the social and environmental risks and impacts of economic activities, society at large began to demand other responsibilities from companies besides the reduction of costs and the improvement of goods and services. This prompted the emergence of corporate social responsibility, which requires companies to comply with legislation, develop quality relationships with stakeholders and integrate social and environmental concerns into their business operations.

This is the context in which innovation has become a key strategy for companies to meet the challenges of sustainability. In other words, innovation allows a company to achieve the economic results and also help tackle environmental and social challenges on a global scale.

As such, innovative companies in sustainability are expected to introduce new developments across all levels and stages of the business, and the results should benefit both the organization and society insofar as they deliver improved quality of life and respect the carrying capacity of the planet. Sustainable innovations should, therefore, produce benefits for the three dimensions of sustainability, being economically viable, environmentally balanced and socially equitable.

As we have seen, the traditional approaches to markets are suffering strong impacts as a result of the new competitive conditions and the challenges of sustainable development: companies will have to adapt and develop innovative solutions. Therefore, it will be important for business executives to recognize that sustainability is one of the key drivers of innovation [3]:

- Sustainability is not a threat to profitability like many executives believe it to be. In fact, the idea that sustainability is competitive is based on the reasoning that investments in the area can save resources, eliminate waste and drive productivity. This is why sustainability should be a touchstone for all innovation.

- In the future, only companies that make sustainability a goal will achieve competitive

advantage. This means rethinking business models as well as products, technologies and processes.

Accordingly, addressing sustainability in the value chain implies, among other things, promoting innovation for sustainability in the interface with customers and suppliers.

I.3 Sustainability in Supply Chain Management

Sustainability in the production chain is a broad topic that involves various departments of companies. Once the company has established a strategy to address the topic in its chain, all company departments that interact directly or indirectly with business partners have their own contribution to make to sustainability in the chain [4].

The R&D department, for example, which is responsible for product design and development, can contribute to a more sustainable production chain by reducing material use, by identifying substitute materials to minimize dependence on natural resources or resources with a high social and environmental impact, and also by prioritizing the use of more sustainable inputs, such as recycled or fair trade materials. The marketing department also plays a fundamental role in the promotion of sustainability in the chain, particularly in relation to the company with its chain of customers, distributors and consumers. A marketing department that is geared towards sustainability can influence consumer choice by providing information on the product and its sustainability impacts, strengthen information on sustainable consumption to users (with actions ranging from labeling to online forums or events), establish in conjunction with the logistics department take-back schemes and reverse logistics programs for products and packaging, and also promote the reuse and recycling of products by customers, with a view to sustainable consumption.

However, most of the sustainable production chain management opportunities are associated with the inclusion of sustainability criteria in supply chain management. The principle of co-responsibility of large companies for the management practices and production of their suppliers has led companies to rethink their policies for certifying, selecting, contracting, evaluating and monitoring suppliers. Meanwhile, by taking relationships with suppliers beyond the usual confines of business that focus exclusively on quality, price and delivery times, companies have encountered an excellent opportunity for innovation and the development of more competitive and sustainable solutions.

The need to study and understand supply chains is very often explained by the global expansion of business operations, which also involves the need to question companies about their operations and their relationship with their suppliers. In the business world, radical changes in the competitive environment put even more pressure on companies to produce and distribute high-quality, low-cost products in exceptionally short time frames [5]. This forced companies to find more dispersed business models, resulting in ever longer and more complex supply chains [6].

The pursuit of efficiency and the maximization of profits led companies to transfer many of their activities to upstream (supply) and downstream (distribution) organizations in their value chain. However, this transfer of responsibility still only took into account price, quality and delivery times, while ignoring the social and environmental, ethical and governance risks inherent in the activities previously

carried out by the departments under the operation and control of the company itself. As a result, companies were urged to take responsibility for the social and environmental impacts of their suppliers.

Nowadays, companies face the challenge of striking a balance between the supply of products on a global scale and the promotion of both environmental and social development for the stakeholders along the production and supply chain [7]. The pursuit of solutions for these issues originated in the companies with global value chains, primarily those with suppliers and distributors in the developing world or in countries with a track record of violating decent employment standards.

In general, scandals that cause different stakeholders to take a more critical view of large-scale companies and their supply chains have served as a major driver of change. Recent examples in Brazil include reports of perilous working conditions in the supply chain of companies in the textile, civil construction and agribusiness sectors, among others, which are widely exposed in the national and international media.

Within the range of options for developing sustainable value chains, supply chain management has emerged, therefore, as being particularly relevant, and it is where the greatest risks and also the best opportunities for financial gains can usually be found.

Sustainability actions in the supply chain are predominantly handled by a company's procurement department and are supported by the sustainability and operations departments. These departments together have the power to develop supply chain management policies and practices that integrate the economic, social and environmental dimensions of development.

It is common for companies concerned with addressing the topic of sustainability in the supply chain to establish their own strategies, called Responsible Sourcing strategies or programs. These programs consist of a series of policies, procedures and measures that aim to address the principle aspects and impacts in the chain.

These practices may be classified into two categories or groups:

a) **Internal actions in the company, related to the supply chain management strategy** – includes practices such as training procurement staff in sustainability, reviewing the certification, selection, contracting and evaluation processes of suppliers to include sustainability criteria and indicators (triple bottom line) and developing a code of conduct for suppliers;

b) **Intervention actions in the supply chain** – involves a greater understanding of the supply chain and actions to improve it, which include the mapping of critical topics and suppliers, development and educational initiatives for suppliers, as well as the adoption of affirmative policies for specific categories of suppliers, such as local and/or small-scale suppliers.

Moreover, concerning internal policies, companies introduce sustainability to the supply chain when they promote transparency in their business relationships, and when they set prices and margins in order to promote equity and profitability throughout the chain. This vision substitutes the backwards-looking practice of "squeezing" the supplier, in the belief that the contracting company benefits from this.

These types of win-lose situations have historically been the standard in relations between suppliers and buyers. From a contemporary point of view, however, this concept loses its value as the members of the chain (buyers and sellers) seek a higher plateau and begin to focus on win-win situations, a strategy that can lead to better results for all the parties involved [8].

This vision of supply chain management may be described as "... the means of building closer relationships with selected strategic suppliers, the purpose being to discover the added features that could enhance the relationship while improving business performance as the companies work in a network environment for mutual benefit and increase the likelihood of creating profitable new revenues together [9]".

This win-win focused vision is undoubtedly in line with the concept of innovation ecosystems, which emerge in environments where the focal company manages its production chain in a way that is conducive to the formation of partnerships with its suppliers. This is the subject of the next chapter, which will look at the supply management of the large member companies of the project, the sharing of good practices in their chains and the results of dialogues between the companies and the nine small selected suppliers.

[1] ADNER, R.; KAPOOR, R. 2010. Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. **Strategic Management Journal**, 31(3): 306–333.

[2] UNITED NATIONS GLOBAL COMPACT and BSR. **Supply Chain Sustainability: A Practical Guide for Continuous Improvement for Small and Medium Enterprises**, 2010. Available at http://www.unglobalcompact.org/docs/issues_doc/supply_chain/SupplyChainRep_spread.pdf. Last accessed on: September 10, 2011

[3] NIDUMOLU, R. PRAHALAD, C. K. AND RANGASWAMI, M.R. 2009. Why Sustainability is Now the Key Driver of Innovation. **The Harvard Business Review**, September, 2009.

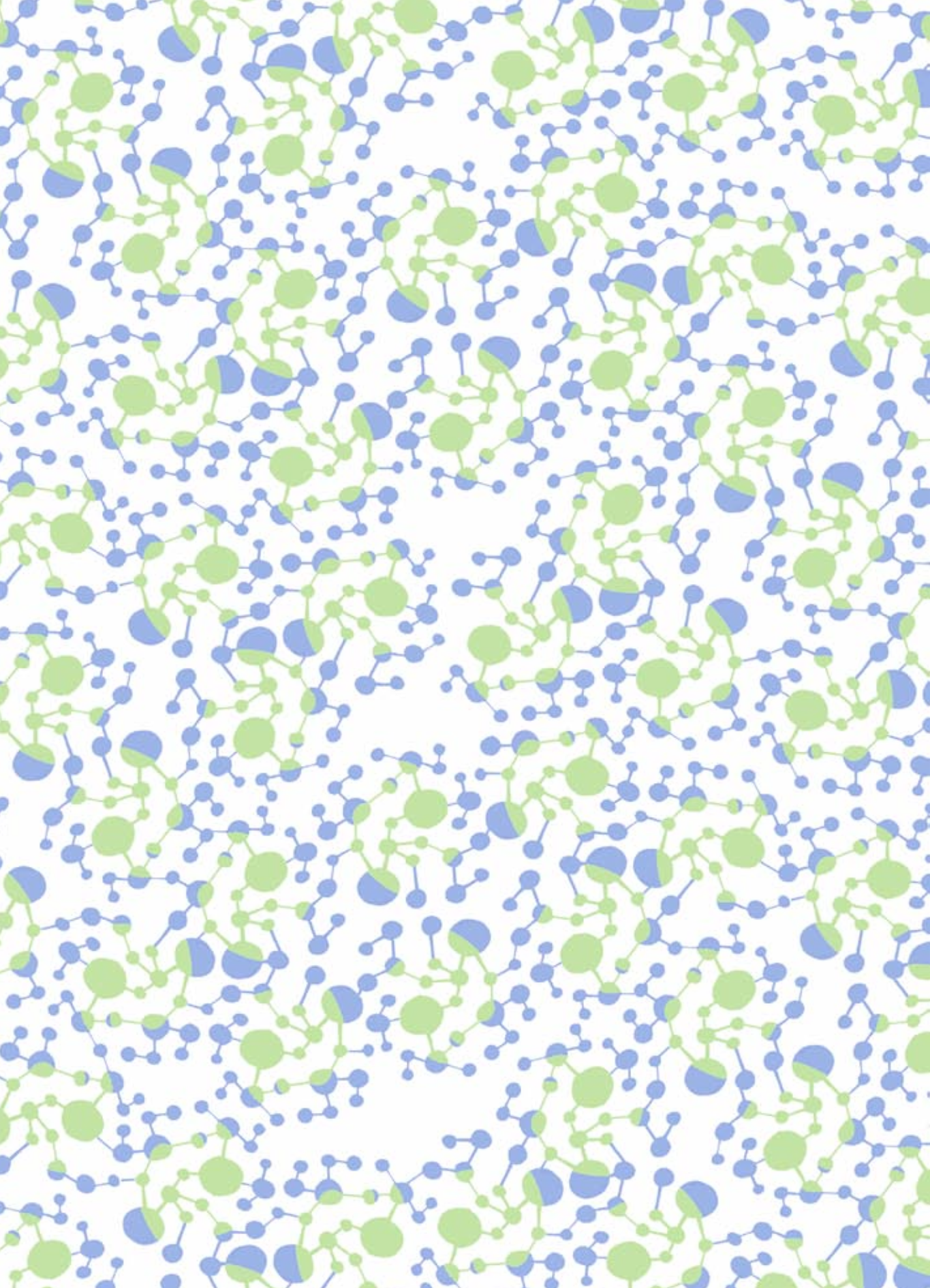
[4] SUSTAINABILITY. **Unchaining Value: Innovative approaches to sustainable supply.** United Nations Environment Program and United Nations Global Compact. 2008. Available at: http://www.sustainability.com/library/unchaining-value#.UHboxu1uHzJ. Last accessed on: August 12, 2012.

[5] STOCK, J. R. **Reverse Logistics Programs.** Illinois: Council of Logistics Management, 1998

[6] CHRISTOPHER, M. **Logística e gerenciamento da cadeia de suprimentos.** Translation: Mauro de Campos Silva. – 2. ed. - São Paulo: Thomson Learning, 2007. Translation of: Logistics and supply chain management.

[7] HART, S. L.; MILSTEIN, M. B. Creating sustainable value. The Academy of Management Executive, v. 17, n. 2, p. 56-69, 2003.
SRIVASTAVA, S.K. and SRIVASTAVA, R.K. Profit driven reverse logistics. **International Journal of Business Research**, v.4, p. 53–61, 2005.
SRIVASTAVA, S. K. Green supply-chain management: A state-of-the-art literature review. **International Journal of Management Reviews**, v. 9, n. 1, p. 53-80, 2007.

[8] [9] POIRIER, C. C. 2003. "Supplier Relationship Management: An Advanced Supply Chain Management Technique". **CSC Proprietary.**



CHAPTER II:
Sustainability in the Supply Chain of Large Companies

II.1 The ISVC project and large companies

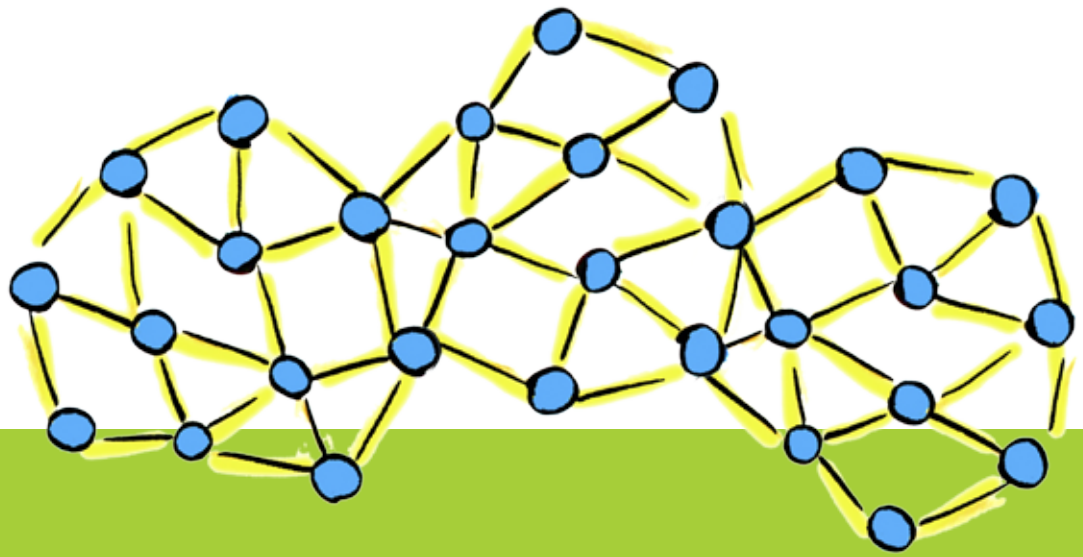
Sustainability, innovation and value chain management are topics addressed in this project that are extremely relevant and increasingly present in business strategies. When tackled together, they offer large companies an important opportunity to improve their performance and influence. Moreover, large companies play a key role in the promotion and development of innovation for sustainability, which can be encouraged in the interface between client and supplier.

With the goal of mobilizing large companies to develop innovative sustainability strategies for their production chains, encouraging the sharing of experiences and supporting the generation of knowledge, the project organized workshops for 25 large companies from the financial, chemical, cosmetics, electric power and transport sectors, among others. Each participating company was represented at the workshops by two professionals – one from the sustainability department and one from the procurement department – generating a richer dialogue at the workshops themselves and promoting an internal discussion at each of the companies.

II.2 Advances and results of the workshops

Several different concepts and case studies were presented and discussed at the workshops, which were also attended by GVces staff and guest specialists, in a participatory environment where the exchange of experiences was encouraged. These activities allowed for a better understanding of the supply chain management dynamic, identifying the maturity of the practices of each company, the potential for improvement and the ways to achieve this.

Below we present the main results obtained in the workshops, in order to consolidate the lessons learned, to recognize the efforts and advances of the par-



ticipating companies and to place the accumulated knowledge at the disposal of everyone involved in the construction of more sustainable value chains.

II.2.1 Diagnostic of supply management [1]

The participating companies were asked to complete a qualitative survey in the form of a questionnaire that was intended to map the workings of the institutional supply management systems and practices. The questionnaire included general questions on supply management and also on issues of sustainability, and was divided into six parts:

1) identification of the organization and the respondents;

2) characteristics of the purchases and the supplier base;

3) procurement strategies and supplier management;

4) sustainability in the procurement strategy;

5) description of innovative practices; and

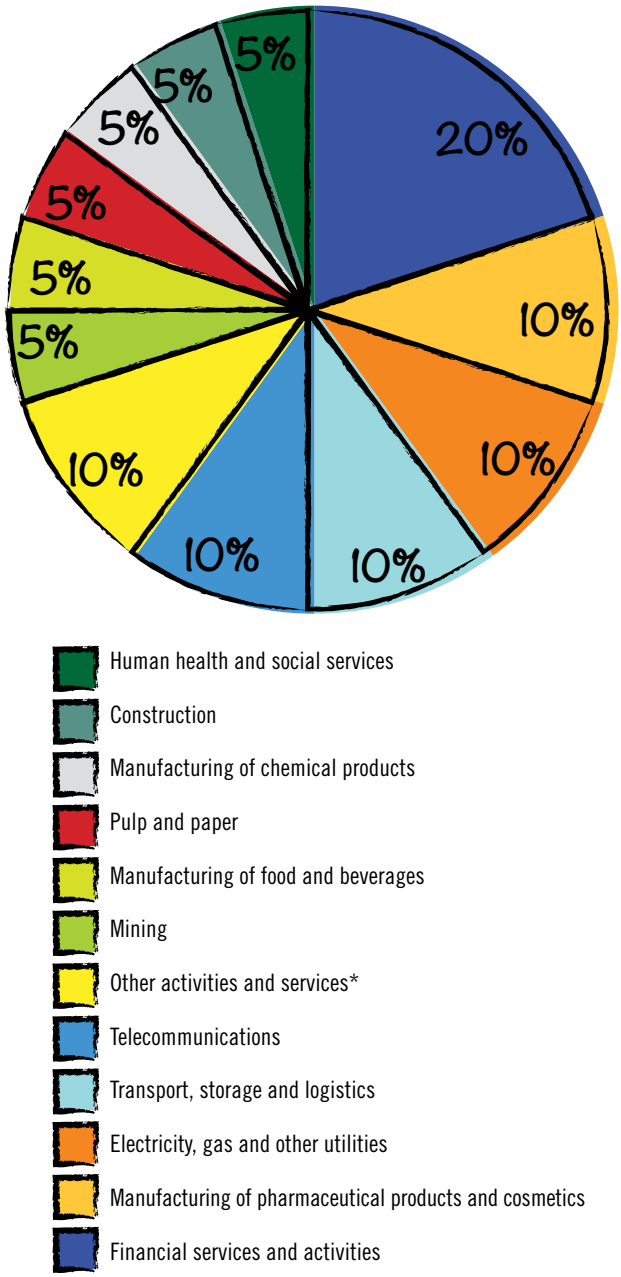
6) comments and final observations.

Below we present the main results of this survey, together with some analysis. The results of the closed--end questions are presented in accordance with the frequency of the responses. Of the 24 companies surveyed, 20 responded to the survey.

II.2.1.1 Characteristics of the companies and their procurement profile

As we can see from Figures 1 and 2, the group is comprised of companies from various different sec-

FIGURE 1 **Field of activity of the companies**



* Production of ethanol and sugar, fleet management and health insurance

tors of the economy, although they are all large-scale companies that together represent a significant volume of purchases: 55% of them spend more than 1 billion *reais* annually in procurement.

Figure 3 reveals that many of the responding companies (30%) have a broad supplier base (more than 3000). The survey also identified a large number of small and medium enterprises in these chains: 38% of the companies have more than 1000 small suppliers and 31% have more than 1000 medium-sized suppliers. These data confirm the power that large companies have on a large portion of its chain, since the difference in size between client and supplier allows the big client to influence and dictate the rules more easily. Furthermore, large companies should be able to perceive and analyze their co-responsibility

FIGURE 2 **Annual procurement spending** (in R$)

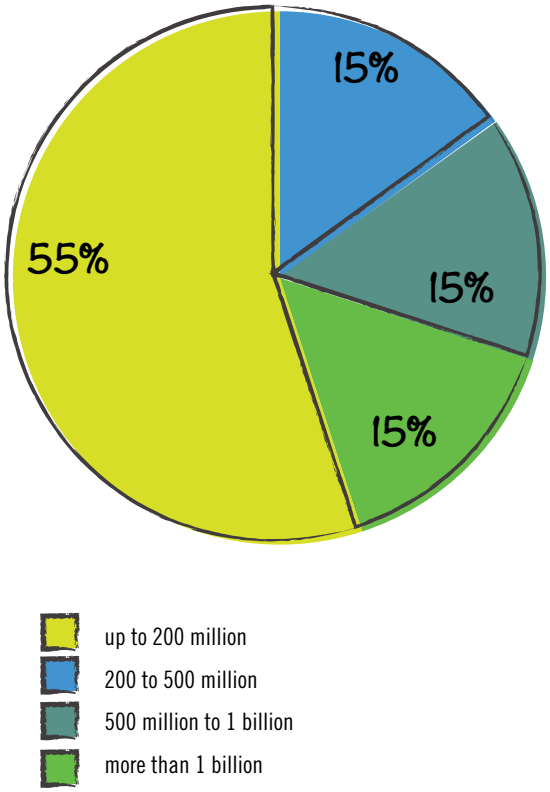
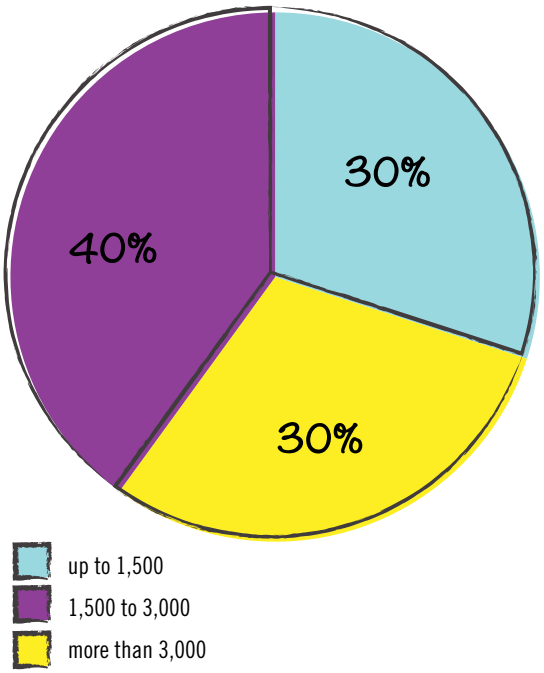


FIGURE 3 **Total number of suppliers** (approximate)



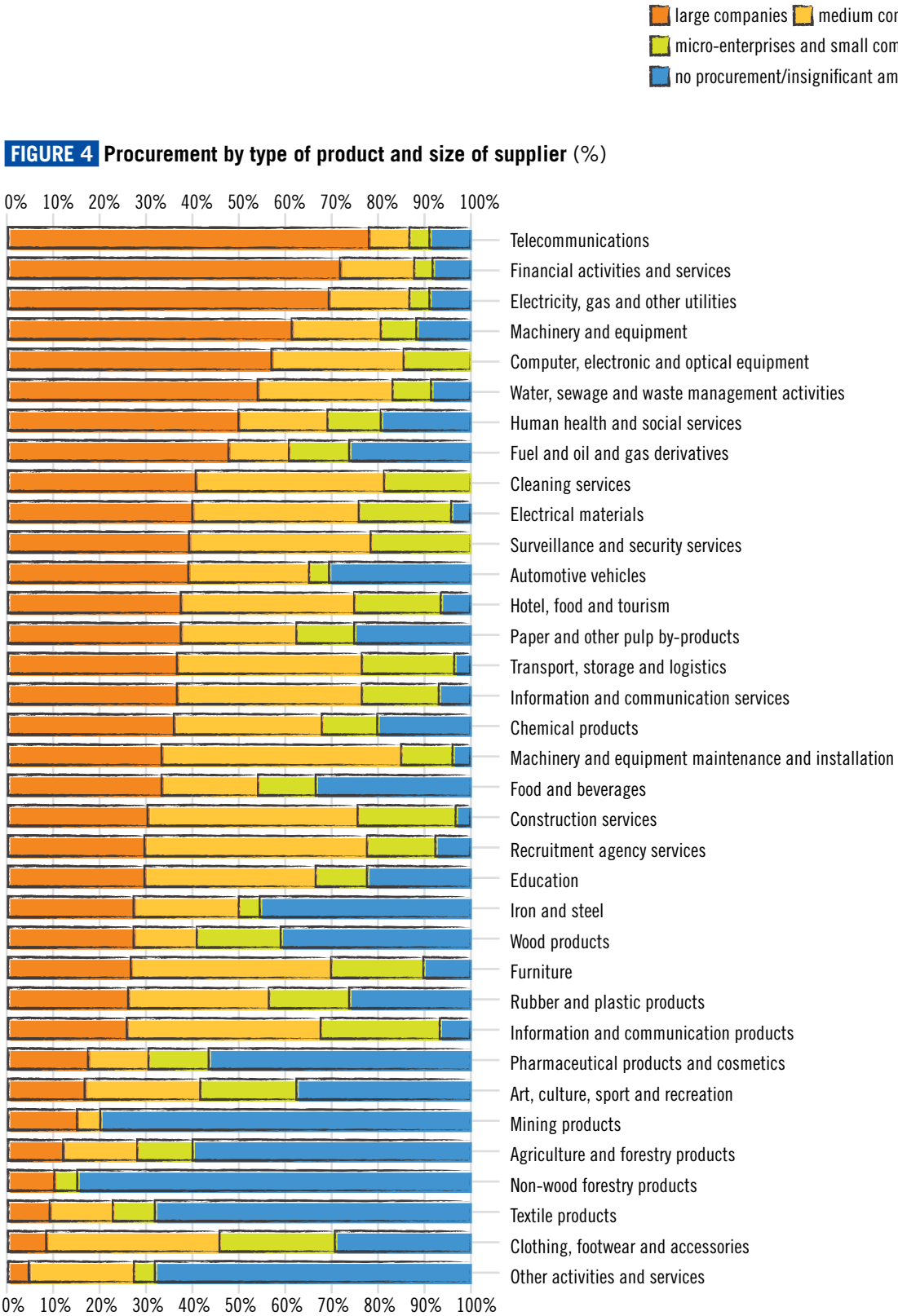
with this chain and also identify the innovation for sustainability opportunities that are available.

Figure 4 shows how the procurement is distributed, by size of supplier, among the various categories of products and services. Looking at this figure, it is possible to identify in which procurement categories the smaller suppliers predominate.

An analysis of these responses can help companies identify where the SMEs are located in their chains and, consequently, where the innovation for sustainability opportunities with these partners may be found. It reveals, for example, that certain types of services are purchased from large suppliers (such as telephony and financial services) while others are provided by smaller suppliers (namely transport and equipment maintenance services).

The survey also reveals that, in 80% of the responding companies, the procurement structure is centralized, in 10% it is decentralized and 10% it is mixed.

FIGURE 4 **Procurement by type of product and size of supplier** (%)



This centralization could, to some extent, mean greater difficulty identifying and contracting local suppliers and a greater likelihood that large suppliers are used. Meanwhile, it could facilitate the implementation of sustainability strategies and innovation in supplier management, as corporate policies and practices can be defined and disseminated throughout all the operations.

One prominent variable impacting sustainability in supply management is the practice of spot buying. When a company operates based on spot buying, it is very often dealing with sporadic suppliers about which it knows very little. Meanwhile, partnerships based on long or medium term contracts make it easier for the client and the supplier to work together in search of the best supply conditions from a variety of viewpoints, including innovation and sustainability. Another factor making it difficult to develop sustainable relationships with suppliers is sourcing from companies located in other countries, a situation in which the client usually has little information about the supplier.

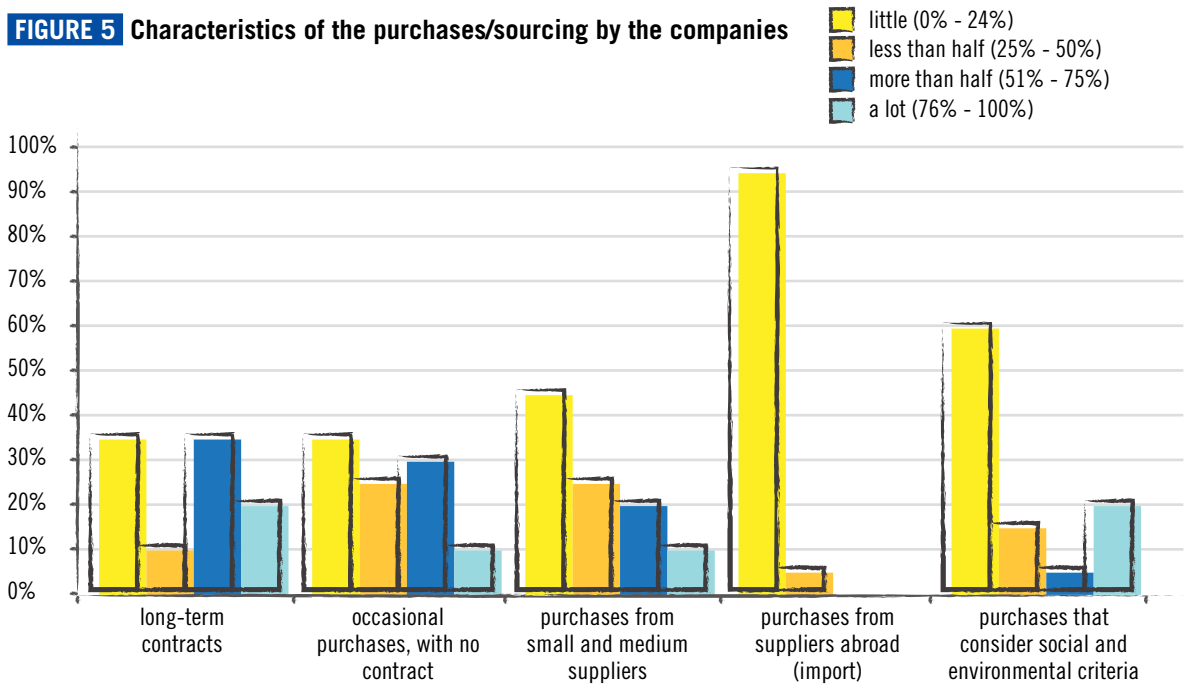
Figure 5 presents some data to help characterize the purchases of the surveyed companies.

It is worth pointing out that this result does not vary significantly between services or manufacturing companies. It should also be noted that procurement that considers social and environmental criteria corresponds to less than 25% of the total volume of purchases for 60% of the companies. This reveals the potential for an increase in sustainability in supplier management.

II.2.1.2 Characteristics of the procurement strategies and supply chain management

Figures 6, 7 and 8 below aim to describe the procurement strategies and supply chain management of the surveyed companies.

FIGURE 5 **Characteristics of the purchases/sourcing by the companies**



In Figure 6, the statements indicate possible ways for companies to make their procurement department and their relationship with suppliers more strategic. For example, by having a formal plan for the procurement department or discussing with the department whether it takes long-term issues into account, the company boosts the value creation of both the department and the entire chain.

Figure 7 shows how communication and relationship management with suppliers can contribute strategically to the business when it extends beyond the transactional character. Figure 8, meanwhile, presents a series of practices that can be combined to create a ssupply chain management strategy.

II.2.1.3 Sustainability in the procurement strategy

The figures below reveal what the companies are doing to promote innovation and sustainability in their procurement strategy.

Figures 9, 10 and 11 present the topics and ideas that companies wishing to promote innovation and

FIGURE 6 Supply strategy

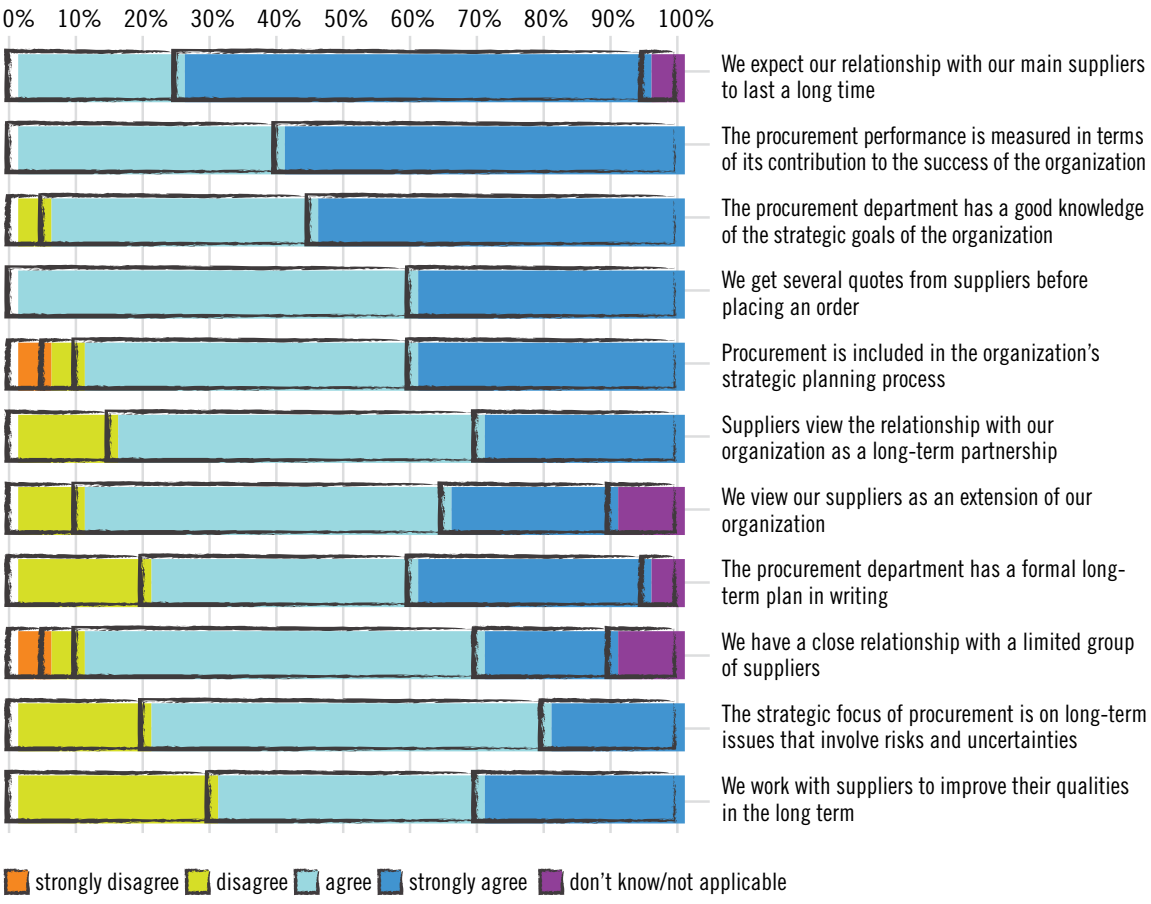


FIGURE 7 **Characteristics of communication and relationship with suppliers**

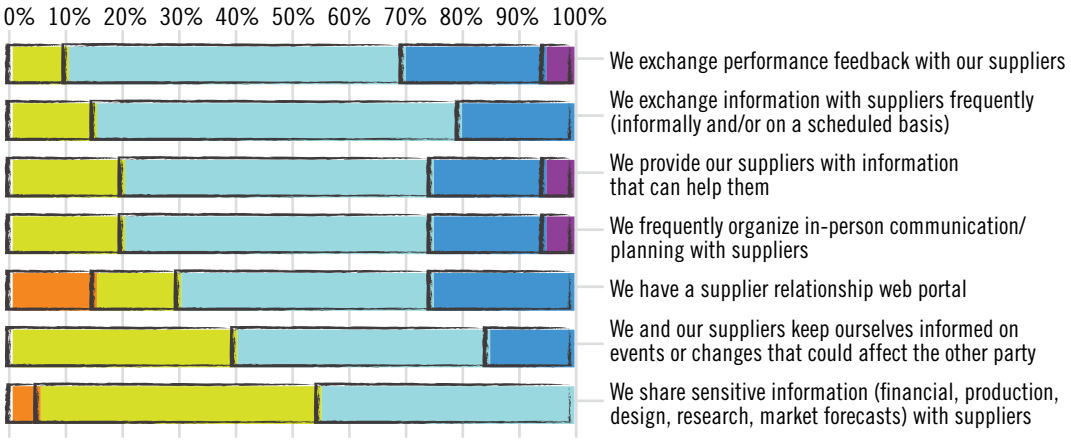
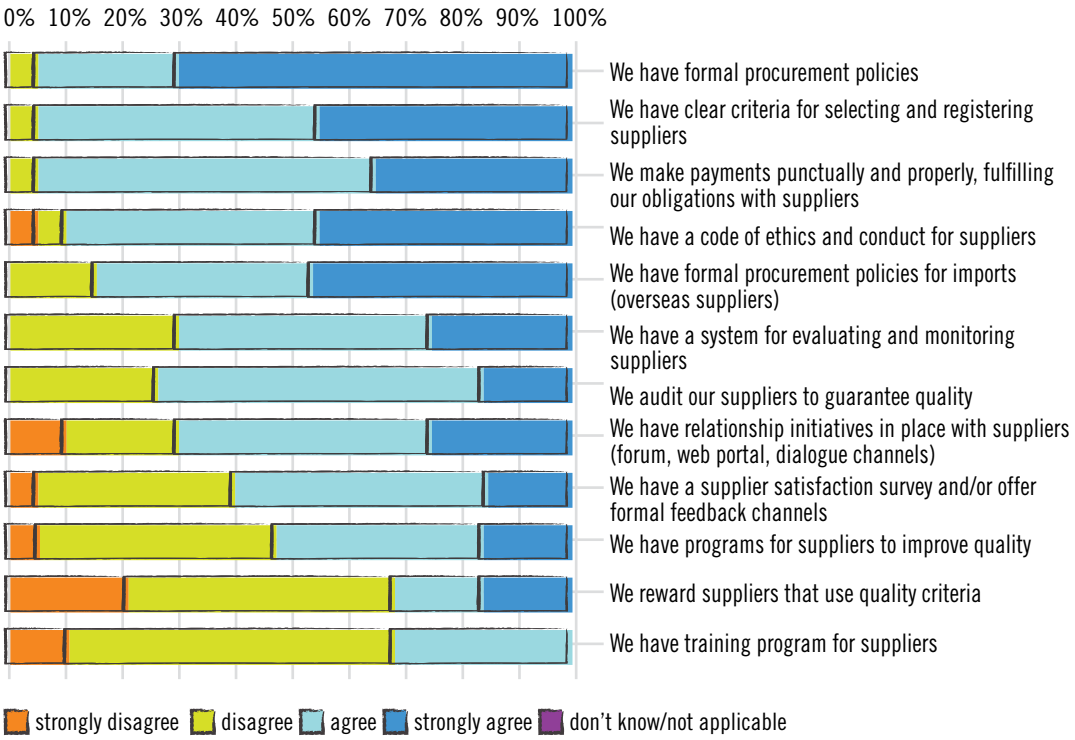


FIGURE 8 **Supply chain management policies and practices**



sustainability in the supply chain ought to consider and evaluate in their own operating contexts. Figures 9 and 10, meanwhile, demonstrate the commitment of the leadership of the companies to the topic. It is noteworthy, as Figure 10 reveals, that even though our sample of companies has been making progress on this topic, 85% of respondents still agree that the triple criteria of quality/price/delivery time play a more decisive role in the selection of suppliers than sustainability criteria. Figure 11 presents a series of practices for promoting innovation and sustainability in the supply chains that could serve as a reference for the development of strategies and action plans. The results presented in this figure demonstrate the huge potential that exists for the inclusion of sustainability criteria in the supply chain management of large companies.

FIGURE 9 **Commitment of the companies to sustainability in the supply chain**

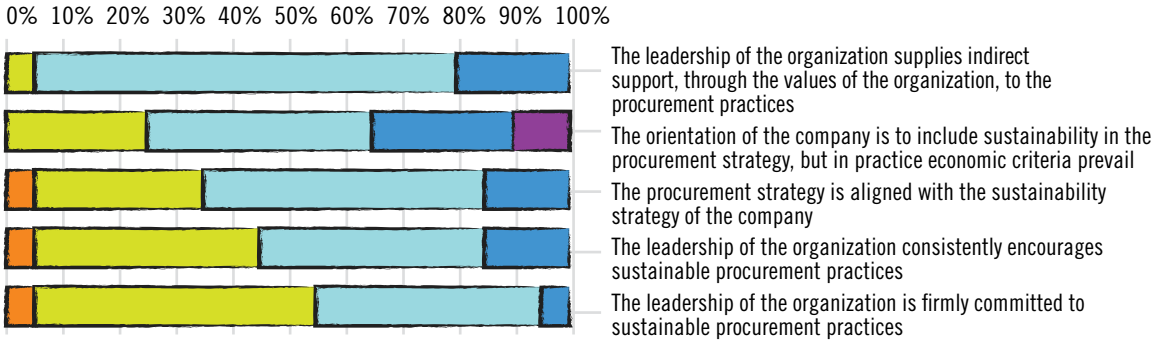


FIGURE 10 **Engagement and mobilization of suppliers around sustainability**

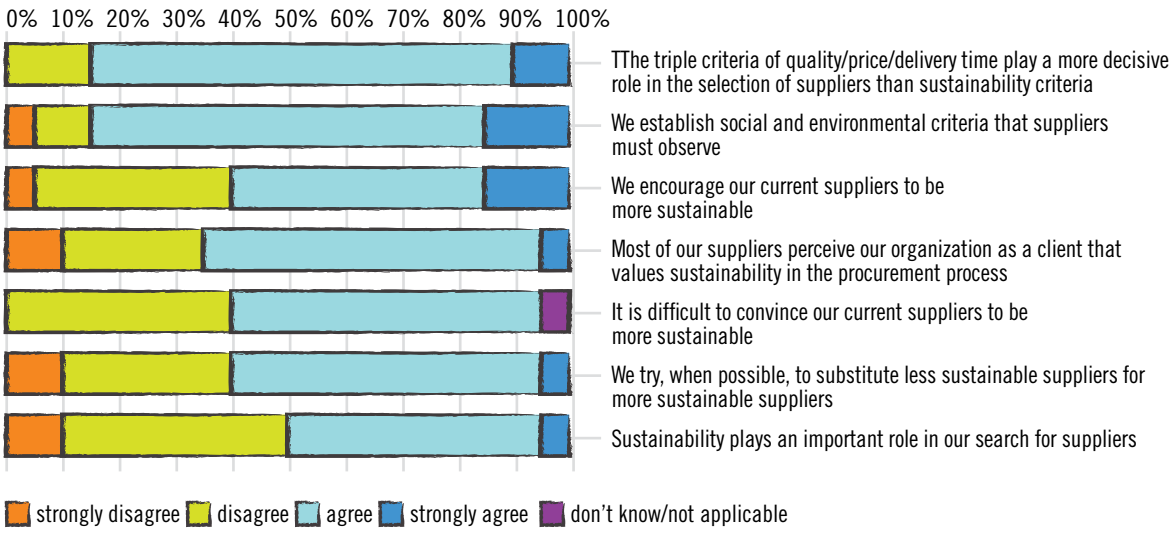


FIGURE 11 **Sustainability policies and practices in supply management**

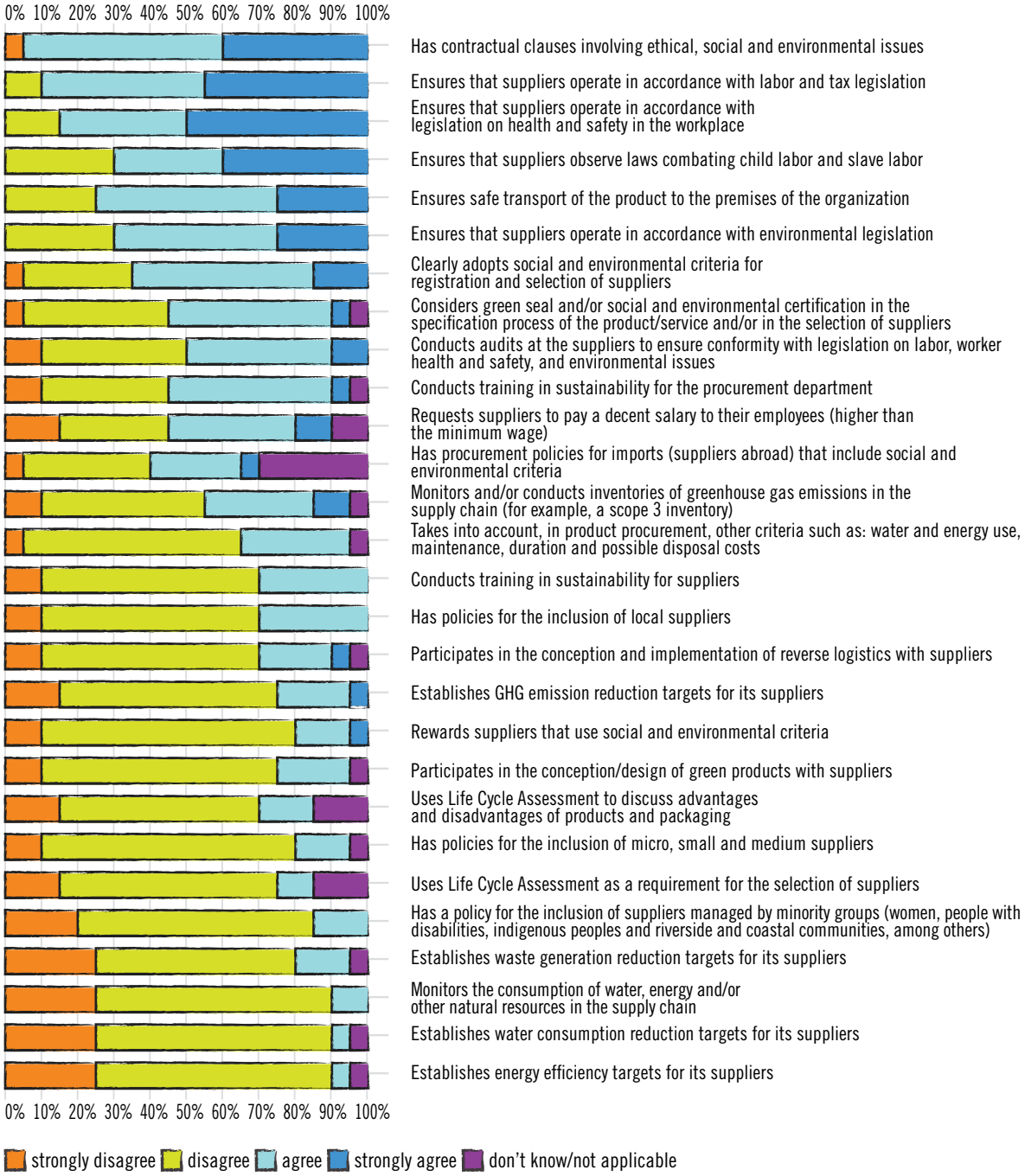


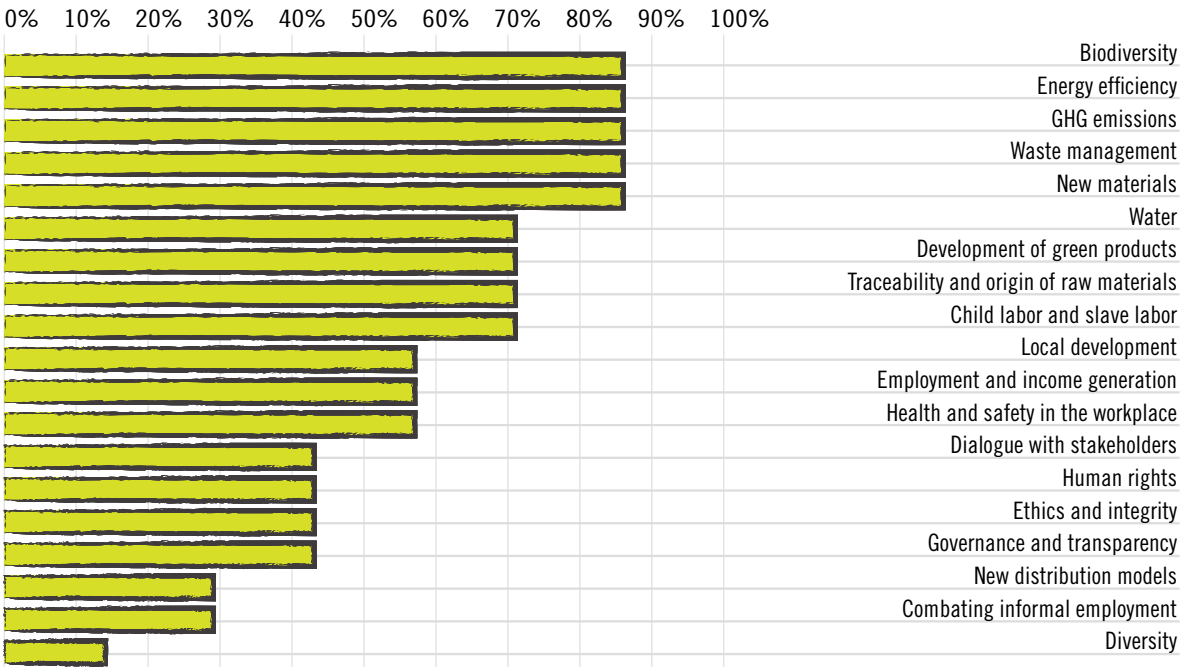
Figure 12 exposes a very important piece of information. More than 80% of the responding companies classify high on the list environmental issues such as waste management, energy efficiency and GHG emissions as those on which suppliers could present risks and/or opportunities for the company. At the bottom of the list, meanwhile, are issues such as ethics, human rights, combating informal employment and other social issues. It could be said that environmental issues possibly top the list because they are more easily perceptible and measurable. A more profound evaluation should be made of the social variables: very often they are less visible in the relationship, and they are also harder to quantify, although this does not mean that they should be treated with less rigor and attention than the environmental variables.

On the results presented in Figure 12, it is also worth highlighting the recent cases of public scandals blaming large companies for illegalities in their supply chains. All these scandals invariably involve social issues for which large companies did not previously consider themselves co-responsible.

There is no path to innovation and sustainability in the supply chain that does not first include an in-depth analysis of how the company conducts and oversees its procurement. When a large company improves its knowledge, its strategy and its procurement practices, innovation and sustainability can evolve and be incorporated by the suppliers.

Companies that decide to address sustainability and innovation in their supply chain ought to develop strategies based on the critical topics and specific characteristics of their chain. Not all the practices need to be implemented for all the suppliers. But this type of diagnostic, as described here, can help companies set priorities and make strategic decisions, since the pro-

FIGURE 12 **Issues that can be positively or negatively impacted by the actions of suppliers**



posed issues provide opportunities for self-evaluation and learning. We hope that, as the results presented here are analyzed, the reader will be able to identify paths and possibilities for promoting innovation and sustainability in production chains.

II.2.2 Good sustainability management practices in the supply chain management

During the workshops that were held, several practices were identified in the supply chain management of the large member companies of the project that illustrate how traditional processes were readjusted to meet the demands of sustainability criteria. Among the identified cases, three were selected for presentation in this publication, and they are described in brief below.

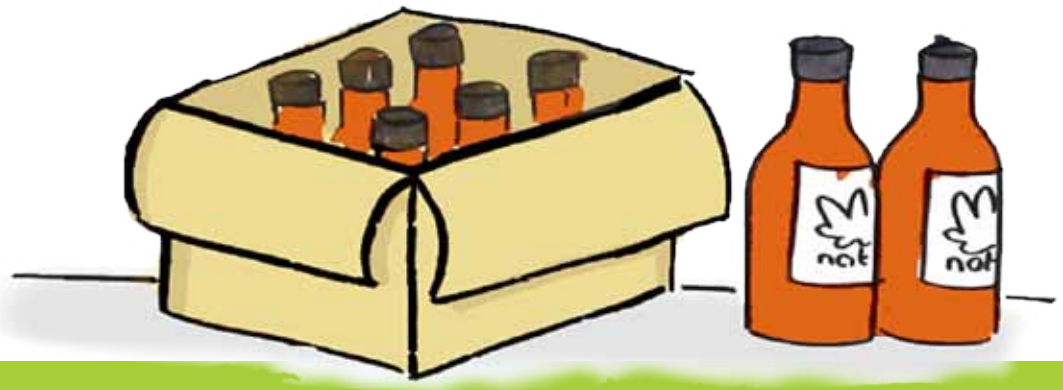
II.2.2.1 Natura Cosméticos
Monetization of Supply Chain Externalities

Natura Cosméticos was founded in 1969 and is the leader of the Brazilian cosmetic, toiletry and fragrance market. The company has always been highly engaged in sustainability and its activities are underpinned by beliefs that include the importance of relationships with stakeholders, the ongoing pursuit of excellence and the commitment to keep innovation at the forefront of its strategies and practices. Natura has always been a pioneering company, especially when it comes to the sound management of its impacts on society.

After months of analysis and research in conjunction with the international consulting firm AT-Kearney, in 2011 Natura announced an initiative to Monetize Supply Chain Externalities as part of its Sustainable Supply Chain Strategy. Based on a brand new methodology, the new initiative allows Natura to consider the positive and negative externalities generated by its suppliers in its procurement decisions, in line with what is proposed by some internationally recognized studies on which the methodology is based, namely TEEB (The Economics of Ecosystems and Biodiversity) [2]. As a result, social and environmental aspects now have a single metric for the process of selecting suppliers, which has already been used for some of the company's strategic purchases.

The initiative, developed with the involvement of suppliers, was supported by mapping potential social and environmental impacts caused by the supply chain and by calculating the value of the prevention or mitigation actions of these aspects. When putting the plan into practice with a select group of suppliers, a total of eight indicators were initially picked, of which three are environmental (carbon emissions, water consumption, waste generation) and five are social (education, training, social inclusion, worker safety and social investment).

Natura has plans to develop a benchmark for other organizations, although to keep this practice working it is necessary to understand what makes it a success. The main lesson learned, according to Natura, is that the education of staff and suppliers is the



key to the implementation of these actions. Moving forward, the company intends to expand the initiative to cover the entire supply chain of production materials and services.

II.2.2.2 EDP Energias do Brasil Supplier Development Index

A leading European company in the energy sector, and considered the world leader in social issues for the second consecutive year by the Dow Jones Sustainability Index, EDP is one of the world's most sustainable energy companies. As far back as 1994, the company published its first Environmental Policy and respective Code of Good Practices. This was followed by the adoption of the Global Reporting Initiative (GRI) framework in 2001 and numerous awards for sustainability over the past decade.

EDP has developed an innovative and robust method of evaluating its suppliers. The Supplier Development Index is a ranking comprised of five indicators: quality, logistics, sustainability, certifications and innovation, through which suppliers are awarded scores. By measuring the performance of its suppliers, it is possible to recognize and value those that follow adequate guidelines in the five aspects and also identify those that still need to improve their performance. In general, this process makes it easier to monitor the progress of the suppliers, as well as being a very important input for decision-makers involved in the supply strategy.

According to EDP, one of the results of the new evaluation method has been an improvement in delivery times and the quality of products supplied to the company. Moreover, the development of the company's suppliers has got significantly better, since their scores clearly reflect the areas in which the suppliers need to focus to improve their processes. The average score obtained by the suppliers rose from 75 to 82 between January and June of 2012 alone.

The future goals of the initiative are to improve the scores of the suppliers that have performed poorly,

thereby increasing the number of qualified suppliers. The company also plans to recognize and certify the suppliers with high scores so they can be eligible for the Assured Quality process, which exempts the supplier from monitored mandatory testing to receive technical materials. To improve the results, EDP is also considering making improvements to the communication channel with its suppliers.

II.2.2.3 Braskem Code of Conduct for Ethanol Suppliers

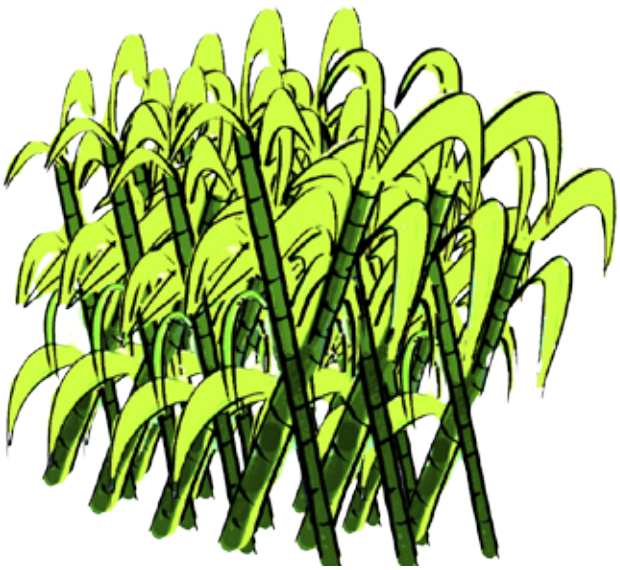
Braskem, a Brazilian petrochemical company, was founded in 2002 following the consolidation of six companies: Copene, OPP, Trikem, Nitrocarbono, Proppet and Polialden, all originally part of the Odebrecht group. Ever since its creation, Braskem has pursued a strategy to integrate sustainability into its business, and one of its products is green plastic. Called green plastic because it is produced from renewable raw materials, it is made using sugarcane ethanol, unlike traditional plastic that is made from naphtha (a petroleum by-product). Braskem is committed to the vision of becoming the world leader in sustainable chemicals by 2020.

A pioneer in the use of ethanol in the production of plastic, Braskem quickly became one of Brazil's lar-

gest consumers of ethanol, using a total of 700,000 cubic meters per year. The market of ethanol suppliers posed a challenge in terms of its management, since the supply of the product in Brazil is currently made up of 430 refineries. In order to provide orientation for all the suppliers of this input and to establish good social and environmental practices to be observed throughout the production chain, in 2010 the company created the Code of Conduct for Ethanol Suppliers.

The document represents the formalization of a partnership between Braskem and its ethanol suppliers for the sustainable development of the production chain, from the origin of the raw material through to the final product. The issues addressed by the code include measures related to burning, biodiversity, good environmental practices, human and labor rights and life cycle assessment of the product.

The Code of Conduct was published in September 2010, and by the end of that same year 61% of Braskem's demand for ethanol came from refineries that observed its guidelines and orientation. By the end of 2011, the number of suppliers adhering to the code had risen by 24 percentage points, to 85% of the refineries. In 2012, the figure stood at 92% at the end of August.



II.3 Lessons and perspectives

The sharing of business practices in the first cycle of the project contributed significantly to the exchange of experiences and to the lessons learned by the group of large companies, as demonstrated by these three examples. In the case of Natura, the group identified the relevance of the practice and its contribution to the valuation of social and environmental externalities, reinforcing the maturity and significance of the practice that can positively influence the entire supply chain. In the case of EDP, the group was struck by the complexity and the challenge of finding a fair measure for evaluating suppliers. And concerning Braskem, the group noted the challenge of replicating standards of conduct in regions where there are no industry-wide agreements with local authorities. The three case studies presented here demonstrate that large companies, working innovatively on the management of their suppliers, have in their hands the power to enhance the positive impacts of their sustainability strategy, influencing their production chains.

Several activities organized over the course of the workshops encouraged the participants to reflect on the current state of their supply chain management as well as the challenges, opportunities and priority issues, both for their own individual companies and for the group as a whole, in order to gain new insight and fresh perspectives that could inspire, guide and motivate the companies to incorporate sustainability criteria into their procurement strategies, particularly in supply chain management.

Some of the results of these activities are presented below, in an attempt to portray an analysis of the rea-

lity and perspectives of supply chain management that is validated by the group of participating companies.

II.3.1 Challenges and opportunities for incorporating sustainability into supply chain management

The participants were invited to reflect on two guiding questions, with the objective of identifying challenges in supply chain management and potential ways to tackle them. The result of the discussion can be found in Table 1 below. The results were grouped into two types of challenges: one strategic and the other related to the improvement of processes

Similar questions emerged during the activities focusing on innovation, aimed at identifying the "blind spots" in the value chain. According to Prof. Wilson Nobre (Innovation Forum – FGV), innovation occurs at a higher level than where the challenge to be overcome is found. Identifying blind spots is to identify that which is outside the field of vision and could take people to another level, advancing innovation. The results are found in Table 2 below.

Tables 1 and 2 above offer numerous possibilities for companies to reflect and make progress on the incorporation of sustainability in their supply chains. These results could serve as input for companies that want to address this issue in their strategies and in the revision of their policies and practices.

TABLE 1 Challenges and Opportunities in supply chain management

Types of Challenges	QUESTION 1 Challenges: Considering the integration of sustainability into the value chains, what are the main challenges for large companies in relation to supply chain management?	QUESTION 2 Opportunities: What can be done to address the identified challenges? What are the potential solutions, courses of action or opportunities?
Strategic	Commitment of the senior management	• Sustainability should not be part of the strategy of the company, it should be the strategy;
		• The culture of sustainability should feature in the target plan of executives, and be considered in their remuneration.
	Incorporate sustainability in the value chain into the short and long-term strategy	• There are emergency issues related to the value chain that need short-term initiatives, such as the creation of policies and codes for specific suppliers;
		• At the same time, long-term initiatives should also be developed with a view to building a new relationship culture with the value chain, aligned with the principles of sustainability.
	Practice consistency	• It is necessary to work internally to improve procurement practices in a way that is aligned with the corporate sustainability strategy, not just demand improvements from suppliers.

Types of Challenges	QUESTION 1	QUESTION 2
Strategic	Define the limit of the company's responsibility	• Establish a limit for responsibility that is suited to the stage of development of the company, for example: is the company only responsible for the performance of the direct supplier, or also for the sub-supplier?
	Local suppliers: develop the economy of small communities	• Invest in local suppliers, balancing involvement and medium and long-term return;
		• TUse the social arm of the company as a development agent for small suppliers, integrating private social investment and development of local suppliers.
	Choose suppliers not based on cost alone	• IInclude social and environmental analysis in procurement strategies as an assessment criterion.
	Address the financial culture of short-term results in decision-making	• Shift from a short-term culture to longer-term corporate and institutional targets;
		• Plan sustainable and long-lasting actions and processes
		• Introduce sustainability criteria to the tools of supplier management.
Process	Create a Supplier Management Process	• Develop policies and/or a code of sustainability management in the supply chain;
		• Create structures and processes for monitoring suppliers (e.g.: integrated system between companies for sharing the results of audits conducted at the suppliers they have in common);
		• Establish sustainability indicators and targets in the procurement department, associated with profit sharing;
		• Engage suppliers to jointly create the criteria, indicators and targets to be established.
	Analysis of the criticality of the suppliers	• Identify and separate the critical suppliers from a sustainability standpoint;
		• Define sustainability criteria to assess suppliers by business sector.
	Deal with large and complex supply chains	• Define criticality criteria and identify the issues and suppliers that ought to be prioritized;
		• Identify criteria considering the triple bottom line.
	Promote good social and environmental practices among suppliers	• Organize events and training for the main suppliers;
		• Include the expected good practices in the agreement.
	Seal partnerships with companies of the same sector to work together on the sustainability of the value chain	• Work with the competition to find solutions for critical issues of the sector (e.g.: retail networks like Walmart and Pão de Açúcar coming together to develop actions and establish criteria for the supply of beef).

II.3.2 Temas relevantes na incorporação de sustentabilidade na gestão de fornecedores

A partir da discussão de desafios, oportunidades e pontos cegos, o grupo evoluiu para a identificação de quais seriam os temas a serem priorizados na gestão de fornecedores, tanto do ponto de vista de cada empresa como do grupo como um todo. Os resultados encontram-se no Quadro 3 a seguir.

TABLE 2 **Blind spots in the Value Chains**

TOPICS	BLIND SPOTS
Lack of knowledge about the chain	• Lack of information and understanding about the chain
	• Difficulty identifying problems and solutions in the chain
	• Distance from the supplier
Market movements	• Difficulty to meet market demands for innovation
Conventional value chain management practices	• Dependence of the supplier on the commercial relationship with the client
	• Lack of incentives and recognition for suppliers that engage with sustainability
	• Procurement decisions based on price
	• Sustainability considered a cost, not a business opportunity
	• Lack of long-term perspective (win-win relationship)
	• Internal decisions taken based on cost alone
	• Lack of sustainability criteria in contracting suppliers
Internal alignment between the management processes of the company	• Lack of control of the processes
	• Isolated and fragmented decisions inside the organization – different mental models in the procurement and sustainability departments
	• Lack understanding by the senior management of the role of the company as a catalyst of change in the value chain
	• Lack of a simple and reliable metric to assess and report impacts
	• Lack of engagement of internal buyers and approvers
	• Culture of distrust, which prevents collaboration and co-creation
	• Belief that innovation has to come from academia or highly-qualified people, not from suppliers
	• Lack of training of procurement staff to integrate sustainability into their decisions
Lack of communication and exchange between parties in the chain	• Lack of dialogue between large companies in the same sector
	• Lack of dialogue between MSEs in the same sector
	• Lack of commitment to training SMEs in sustainability
	• Lack of understanding of the reality and the demands of suppliers
	• Need to establish more partnerships with suppliers
	• Need to engage suppliers in the sharing of good practices
	• Lack of communication and understanding of the importance of supplier management
	• Lack of creation of shared value with industry suppliers
	• Lack of partnerships with suppliers

II.3.3 Dialogue between SMEs and large companies

The in-person activities, initially designed for large companies to hold discussions on their supplier management strategies, also provided an opportunity for these companies to engage in dialogue and develop closer ties with the small companies selected for the project (the process of selecting these companies is described in Part 3 of this report).

The lessons learned from this dialogue between the large and small companies are presented in Tables 4 and 5 below, which sum up the discussions on the diagnostic of the relationship between large companies and SMEs, as well as their proposals for joint actions.

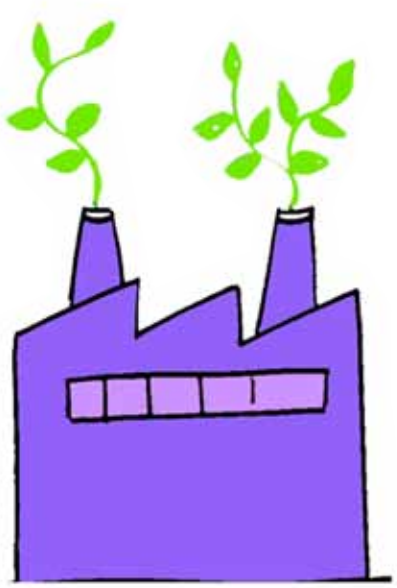


TABLE 3 Priority issues and potential actions

PRIORITY TOPICS	What can we do innovatively to make headway on the selected issues?
Align corporate sustainability and procurement strategies	• Identify to what extent the companies actually have a clear sustainability strategy and how much the procurement office has already done to meet the organization's sustainability targets.
	• Establish a system of bonuses and a program to raise awareness among the senior management.
	• Create a platform with information on the topic and share case studies with the leadership to create references.
	• Make sustainability tangible through models that are applicable in the day-to-day activities of procurement departments. E.g.: guidelines for the selection of suppliers.
Map the chain and identify critical suppliers	• Create a network/platform for sharing information on suppliers qualified based on sustainability criteria.
	• Create a risk matrix by category of critical suppliers. E.g.: define the social and environmental criteria necessary for the selection of suppliers in the transport sector.
Align the triple criteria of price/ quality/delivery time with social and environmental criteria	• Train procurement staff to have a vision of sustainability and thereby improve their supplier management practices.
	• Upon preparing the annual budget, try to consider the possible costs of sustainable procurement (together with the establishment of targets for the inclusion of social and environmental criteria in procurement).
	• Establish targets to develop suppliers, in order to expand the database of

	suppliers that use sustainability criteria.
	• Implement a procurement policy wherein the whole company adopts a preference for sustainable suppliers and purchases, in order to involve all the departments that deal with suppliers and not just the procurement department.
Partnerships with suppliers in innovation for sustainability	• Prepare procurement notices intended specifically for suppliers, describing the challenges faced by the company for which it is looking for solutions through innovation with a focus on sustainability.
	• Make use of tax incentives and organizations that promote innovation (e.g.: FINEP, BNDES, etc).

The result of this brief dialogue demonstrates the way forward for production chains to strengthen the relationship between the client and supplier companies, and the potential of innovation programs to overcome sustainability challenges and provide opportunities. The following chapter looks at the vital and innovative role played by small suppliers that are incorporating sustainability criteria into the value chains to which they belong.

[1] The book ***Compra Sustentável:*** *a força do consumo público e empresarial para uma economia verde e inclusiva* (Sustainable Procurement: the power of public and business consumption for a green and inclusive economy), to be released at the end of 2012 by the Sustainable Consumption Program of GVces, briefly

TABLE 4 Diagnostic of the relationship between large companies and SMEs

GUIDING QUESTION: **What are the main factors facilitating or impeding the relationship between large companies and SMEs, and also sustainability innovation by SMEs in the supply chains of large companies?**

Facilitating Factors
• Punctual payment by large companies
• Support from the sustainability department of large companies
• Processes to qualify suppliers (level up, leading to improvements in products and processes)
• Reference from another large client
• Social pressure for large companies to act responsibly (complaints and activism)
• New leadership at large companies that prioritize sustainability
• Matching values between small and large companies
• Transparency and well-structured management of the SME
• SMEs with long-term thinking (not "fly-by-nighters")
• SMEs that innovate and surprise the client
• Joint investments in innovation
• Open innovation programs
• Agility of small companies to cater to new demands
• Tax policies that encourage innovation

Impeding Factors
• Capacity of the SME to meet the demands of large companies
• Lack of a communication channel and differences in language
• Procedures to qualify suppliers that use the same rule for large and small suppliers
• Savings (cost reduction targets practiced by the procurement departments)
• Tendency of large companies to always buy from the same suppliers
• Rotation of employees in large companies, making it difficult to form lasting relationships
• Procurement department driven exclusively by lowest cost of business transactions
• Resistance to change by large companies (embedded culture)
• Vision of price, not total cost, when making the purchase
• SMEs that are unable to comply with legislation
• Difficulty of SMEs to demonstrate their competitive edge
• Difficulty of SMEs to access financing and lack of credit
• SMEs without the production capacity to cater to large companies
• Lack of effective public policies providing incentives for SMEs

TABLE 5 **Proposals for joint actions between large companies and SMEs**

GUIDING QUESTION: **What can we do to strengthen the relationship between large companies and SMEs, and to promote innovation in sustainability by SMEs in the supply chains of large companies?**

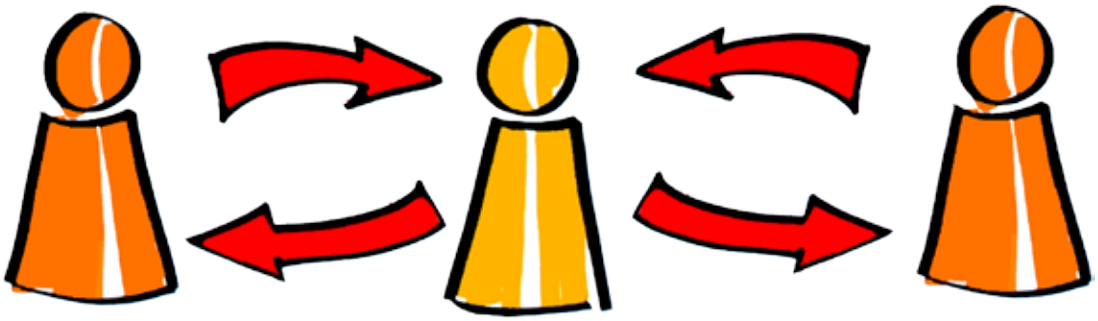
Large companies should identify and map the small and medium enterprises in their supply chain
Large companies can develop ongoing channels, forums, events and online platforms for communication with supplier SMEs
Large companies can develop partnerships for the development of SMEs in their supply chain
Large companies can give preference to SMEs as a deciding criterion
Large companies should evaluate the impact of terminating contracts with small suppliers, considering their contribution to the revenue of the supplier
Large companies can have an exclusive channel for purchases from micro-enterprises and small businesses
Large companies can involve different departments to assess the supplier, not just the procurement department
Large companies can pay routine visits to suppliers
Large companies can have one person in the procurement department working exclusively on prospecting SMEs that could become suppliers
Large companies can develop indicators and targets for contracting new suppliers or developing innovations in partnership with suppliers
Large companies can try to place orders with the supplier with less restrictive conditions, offering the supplier the opportunity to propose innovative solutions
Large companies can create innovation programs with incentives for SME suppliers
Large companies can stage innovation forums to share ideas with suppliers

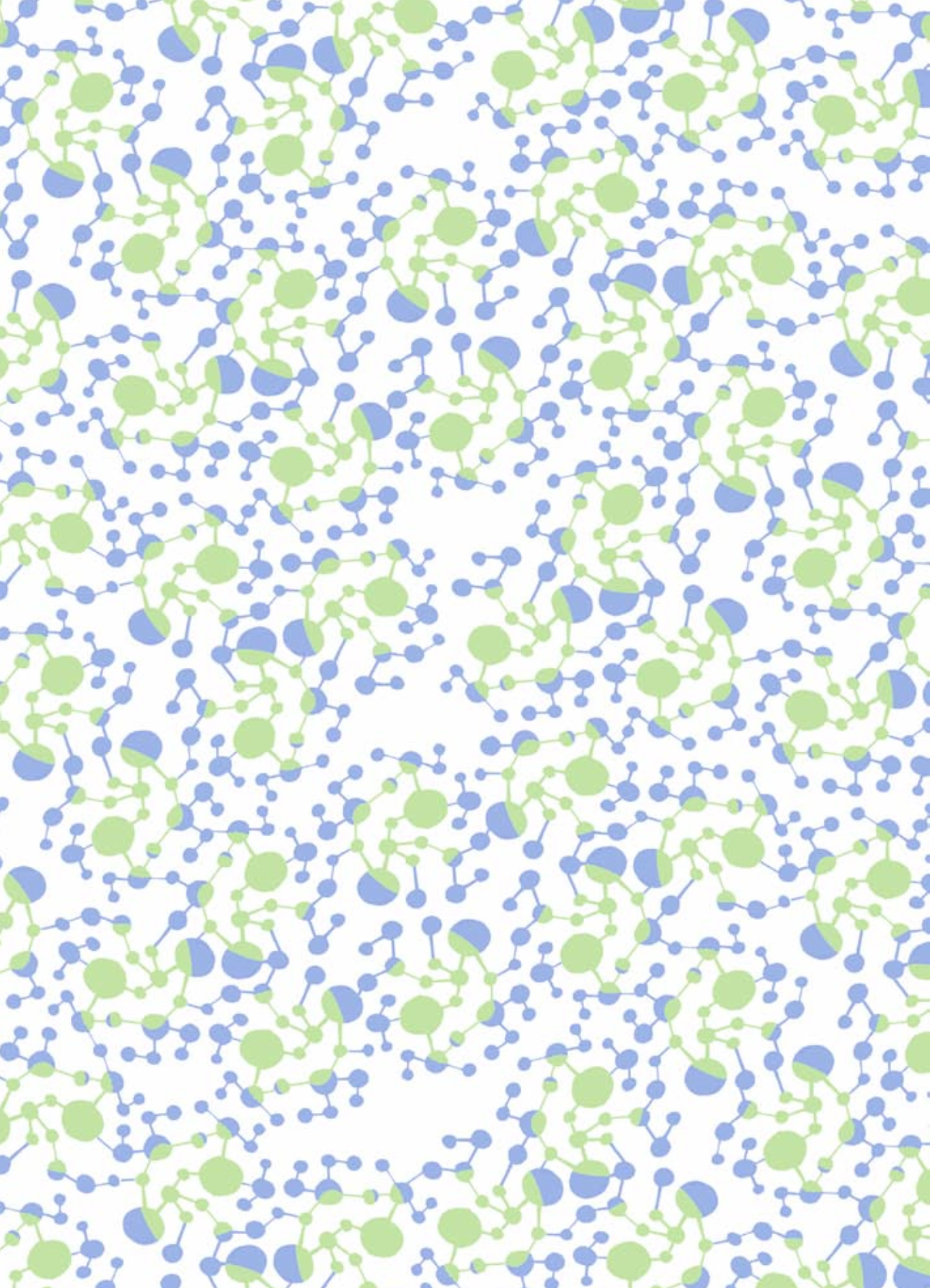
GUIDING QUESTION: What can we do to strengthen the relationship between large companies and SMEs, and to promote innovation in sustainability by SMEs in the supply chains of large companies?

Large companies can set up an internal award system to promote innovation in partnership with SMEs
Large companies can identify their needs and publish procurement/bidding notices to let suppliers propose innovative solutions
Large companies can provide training and guidance for procurement staff and managers to give SMEs the opportunity to present their products
SMEs and large companies can develop partnerships with universities and incubators
SMEs should try to understand large companies better and identify their needs
SMEs should be well prepared to "convey their message" – developing good institutional material and a good presentation – as this will instill confidence in the large company
SMEs should not risk their reputation by accepting orders beyond their capacity

presents the public and business context on the topic of embedding sustainability into supply management and presents examples and propositions on how to embed sustainability into supply management, with the intention of guiding policy and promoting sustainable consumption practices in Brazil, both by companies and by government. As such, in addition to proposing guidelines for embedding sustainability into supply management, the process of preparing this book extended the application of the "Diagnostic of Supply Management" to other business and public institutions.

[2] International initiative to study and capture the value of global economic benefits of biodiversity. Available at: http://www.teebweb.org/.





CHAPTER III:
Innovation and Sustainability in Small Companies

This chapter addresses in more depth the context of micro, small and medium enterprises in Brazil and their innovation potential. As such, it emphasizes the importance of companies of this size in the domestic economy and in the transformation of business models in response to the challenges of sustainability. The chapter also presents the innovations developed by micro and small enterprises (MSEs) in the value chains of large organizations, through a description of the successful practices implemented in nine MSEs selected for the project.

III.1 Micro, small and medium enterprises in Brazil

The size of business enterprises in Brazil can be defined either in terms of revenue or number of employees. When measured in terms of employees, the number varies depending on the economic activity, as illustrated in the table below:

TABLE 3.1 [**SOURCE:** IBGE, 2010 (adapted)]

Size	Sectors	
	Industry	Commerce and Services
Micro-enterprise	up to 19 employees	up to 9 employees
Small Company	from 20 to 99 employees	from 10 to 19 employees
Medium Company	from 100 to 499 employees	from 50 to 99 employees
Large Company	500 or more employees	100 or more employees

The classification of company size by gross operating revenue, defined by the Brazilian Development Bank (BNDES), has the following categories:

Size	Gross annual or annualized operating revenue
Micro-enterprise	up to R$2.4 million
Small Company	between R$2.4 million and R$16 million
Medium Company	between R$16 million and R$90 million
Medium-Large Company	between R$90 million and R$300 million
Large Company	more than R$300 million

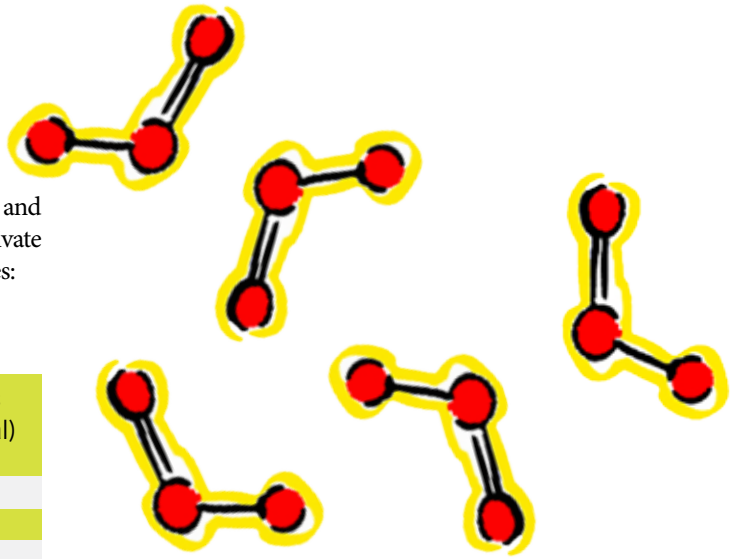
TABLE 3.2 [**SOURCE:** IBGE, 2010 (adapted)]

In recent years, Brazil has witnessed the growth of micro and small enterprises (MSEs), demonstrated by the rising number of businesses and employees in the sector. In addition to producing 20% of the country's GDP in 2010, micro, small and medium enterprises also

represented more than 99% of all companies in Brazil and absorbed more than half of formal employment in private non-farm establishments, as the table below illustrates:

TABLE 3.3 [**SOURCE:** IBGE, 2010 (adapted)]

Size	No. of companies (% of total)	Employees (% of total)	Salaries (% of total)
Micro	95.27	37.94	16.17
Small	4.03	18.90	16.52
Medium	0.57	14.27	17.72
SUBTOTAL	99.87	71.11	50.41
Large	0.13	28.89	49.59



III.2 Innovation as a catalyst of economic and socio-environmental change

As we have already seen in chapter 1, innovation permits the development of creative solutions for the challenges of sustainability. Aware of the risks that their activities involve, companies have become more demanding with their suppliers, and this has meant that small supply enterprises with sustainable practices, products and services are growing more competitive and distinctive on the market.

This trend, imposed just as much by society as by the regulatory framework and the consumer market, has already mobilized a significant portion of MSEs to incorporate more sustainable practices and offer more sustainable products and services. The survey "What do micro and small enterprises think about sustainability", conducted by Sebrae (a small business support service) with 3,912 micro and small enterprises reveals that environmental impact reduction practices are embedded in the operations of these companies.

According to the survey, 75.2% of respondents recognize the importance that companies ought to attach to environmental matters. Moreover, more than 70% of the companies implement selective waste collection, control the use of paper and properly register the consumption of water and energy in their operations. Just as the survey reveals the high degree of embeddedness of acceptable and efficient environmental practices in the companies, it also illustrates a proactive posture by the respondents, since 46% of them view the environmental issue as a business opportunity and 79% recognize that programs related to the preservation of the environment can attract more customers to their business.

Nevertheless, although the survey provides a positive overview of the sustainable practices of Brazilian MSEs, these companies need to do more to incorporate sustainability as a marketing strategy and competitive advantage. The way to achieve these new business models, regardless of the size of the organization, is through innovation.

III.2.1 Main dimensions of an innovative organization

The Innovation Forum of the Getulio Vargas Foundation's Business Administration School of São Paulo (FGV/EAESP) was conceived to encourage research and disseminate knowledge on and between innovative organizations. Since part of its activities consisted of conducting an inventory of innovations through the examination of case studies, the forum defined six main dimensions of an innovative organization to guide the development of diagnostics. They are:

1) Innovation process: the existence of a process known to everyone for the development of any innovative idea;

2) Management model for innovation: elements in the management practices of the company that encourage the generation of ideas, the facing of risks and learning;

3) Leadership and strategic intent for innovation: consistency between discourse and practice.

4) Culture for innovation: presence of cultural elements that foster innovation, such as encouragement for learning, facility to share ideas and criticisms, addressing conflict resolution openly and the lack of fear to make mistakes;

5) Interpretation of signals: actions and mechanisms to receive and interpret, well in advance, market signals that indicate opportunities or changes and use these signals for innovation;

6) Predisposition for partnerships and alliances: ability of the company to look outside its walls for partnerships and alliances to develop the desired innovation.

These are the dimensions in innovation that served as a reference – when the relevant information was available – for analyzing the innovation for sustainability in value chains developed by the MSEs selected for the ISVC project. The case studies will be presented in detail later in this chapter.

III.2.2 General overview of innovation

Micro, small and medium enterprises represent an abundant source of ideas and solutions that reflect the creative and enterprising profile of the Brazilian population. Nevertheless, in many cases the route taken by entrepreneurs to transform their ideas into innovation is fraught with challenges that, without partnerships and the necessary financial support, can make it impossible to develop these ideas. In this respect, we present below the profile and status of the innovations developed by companies in Brazil, in particular by small enterprises, emphasizing the factors that either facilitate or impede their implementation.

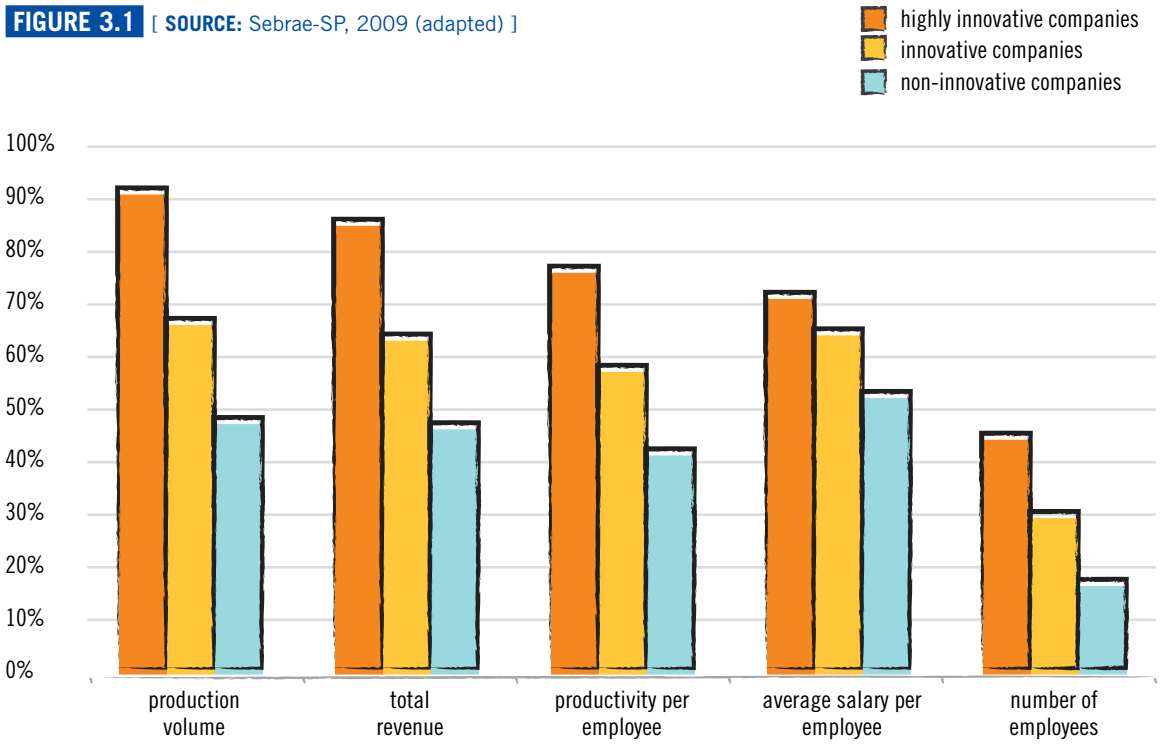
The survey "Technological Innovation", conducted in 2008 by the Brazilian Statistics Institute (IBGE), reveals a close correlation between the size of the company and the amount and the type of innovation. For example, 71.9% of large industries and 67.2% of services companies innovated their products or processes, while the figure for the same type of innovation among MSEs ranged between 35% and 40%. Although innovation is more frequent in large companies, a significant and growing number of small enterprises are developing innovation in one form or another.

The survey "Innovation and Competitiveness in Brazilian MSEs", conducted by Sebrae in 2009, analyzes aspects of innovation and competitiveness among Brazilian MSEs in six dimensions of competitiveness and three types of innovation: new processes or methods, new products or services, and new markets. The survey revealed that 54% of companies did not realize any type of innovation in the 12 months prior to the survey. In contrast, 43%

realized some form of innovation and 4% realized all three forms of innovation over the same period.

The main benefits of innovation for companies, according to the IBGE study, include better market positioning and improvements in the process and the quality of the products and services they provide. Concerning MSEs specifically, innovative companies report a stronger social and economic performance than non-innovative companies, as illustrated in the graph below:

FIGURE 3.1 [**SOURCE:** Sebrae-SP, 2009 (adapted)]



On the matter of what contributes to innovation, 46% of the MSEs pointed to the initiative of the business owners themselves as the main driver of innovations and improvements, while none of them mentioned government incentive as a reason. This result reflects that lack of support from public sources for innovation in companies of this size, which was also confirmed in the IBGE survey. This study reveals that 36.8% of large companies obtained some form of benefit from government programs to develop their innovations, while the figure was just 22.8% among MSEs.

The IBGE study also reveals a significant difference between where the product innovation and where the process innovation is developed. According to the data in the table below, the company itself develops most of its product and service innovation, while a company's process innovation is developed mainly by other companies or institutes.

TABLE 3.4 [**SOURCE:** IBGE, 2009 (adapted)]

Activity	The implemented innovation was developed primarily (%)		
	By the company	Through cooperation with another company or institution	By another company or institution
Industry	PRODUCT		
Services	84.2	7.8	6.4
	86.7	5.8	4.7
Industry	PROCESS		
Services	12.2	3.4	83.4
	25.1	9.2	65.1

Concerning the sources of information and cooperative relationships for the development of innovation, both surveys identified digital information networks (such as the internet and other external sources), clients and suppliers as the main sources. Trade fairs and exhibitions, meanwhile, were revealed to be less expressive sources of information and relationships for MSEs than for large companies.

The importance attributed by innovative companies to other companies and institutes with which they have cooperative relationships varies depending on the sector of the company. The IBGE survey, for example, illustrates that industries and service companies identify clients, suppliers and consumers as the main parties in the relationship for innovation, while R&D companies [1] consider universities and research institutes their main partners. Regardless of the variations in the primary sources of information and partnerships for innovation between companies of different sizes and business sectors, a predisposition for partnerships and alliances is essential for these companies to innovate.

The IBGE survey also demonstrates that the main obstacles to innovation, for innovative companies, are: the high costs of innovation, the excessive economic risks, the lack of sources of financing, and the lack of qualified personnel. The surveyed companies that did not realize any innovation, meanwhile, cited market conditions as the main obstacle. In addition to these factors identified in the survey, other challenges were (and still are) encountered by innovative micro and small enterprises, and these are described in the case studies selected by the project and presented later in this chapter.

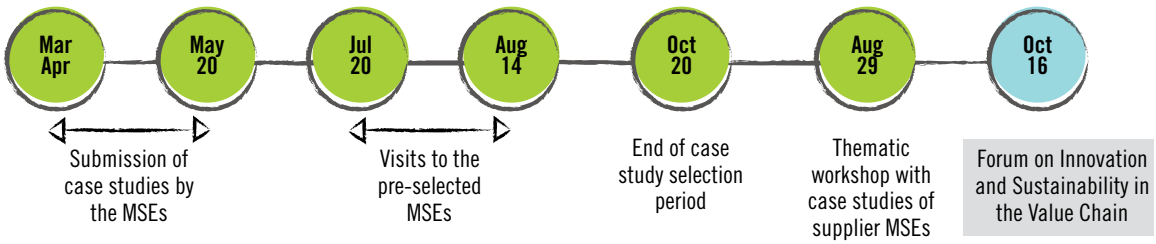
III.3 The process and criteria for selecting SMEs for the project

Considering the important role that micro, small and medium enterprises play in the Brazilian economy and in innovation for sustainability, their involvement in the ISVC project was intended to achieve the following goals:

- Produce and disseminate knowledge on innovative sustainability practices in the value chain;
- Recognize and incentivize innovation for sustainability in small and medium enterprises;
- Create venues to share experiences and to network, engaging social actors around the topic of innovation and sustainability in the value chain.

The part of the project developed with MSEs was conducted in various stages, ranging from identification and selection of case studies to

participation in a thematic workshop with the large member companies of the project, as described in the schedule below:



In order to identify innovative sustainability practices in the value chain, the project staff prepared a form requesting information about the company and a description of the practice consisting mainly of descriptive questions. The form was sent to various contact networks of GVces, including the project's supporters, and also to the large member companies for them to forward to their suppliers.

The process to select innovative sustainability practices developed by MSEs from the value chains of large corporations was conducted in three stages:

Stage one
Conformity analysis

The eligibility of both the company and the practice were verified using the following pre-established criteria:

Criteria for the eligibility of the company:

1) Be a micro, small or medium enterprise, in accordance with the criteria adopted by Sebrae on the number of employees;

2) Demonstrate that it operates in the supply chain of at least one large-scale company, serving as a supplier for at least one year;

3) Have been in operation for more than two years.

Criteria for selecting the company's practice:

1) Be a formal project or process preferably operating for more than a year;

2) Demonstrate a significant improvement on the social, environmental and economic impact of the company business (triple bottom line);

3) The practice must be linked to the core business, i.e. it must directly influence the products and/or services that the company offers the market.

In this stage, the project staff analyzed 24 forms submitted by micro, small and medium enterprises.

Stage two
Pre-selection

The project staff evaluated and classified the case studies in accordance with the following point system:

1) Integration with the core business and the strategic value of the practice to the company (2 points);

2) Degree of innovation of the practice,

defined based on the concept of new products, services, processes, functionalities or management models, including results obtained for the company and for its chain (2 points);

3) Extent to which the practice contributes to the sustainability of the company, integrating the economic, social and environmental dimensions (3 points);

4) Extent to which the practice contributes to the sustainability of the production chain(s) to which the company belongs (4 points);

5) Degree of maturity of the practice – stakeholders involved, monitoring and evaluation processes, planning and budget (2 points);

6) Future prospects for the practice – potential for consolidation and growth, and to impact and influence the production chain (1 point);

7) Replicability of the practice and relevance of the lessons learned, and whether they are transferrable to other contexts (1 point).

In this stage, 11 companies were pre-selected

Stage three
Selection

The final selection of the case studies was made based on the following actions:

1) Technical visits made to the pre-selected companies to collect additional information;

2) Reassessment of the 11 case studies after the visits;

3) Evaluation of the 11 case studies, with a focus on innovation, by the professor and collaborator in the FGV/EAESP Innovation Forum, Prof. Wilson Nobre.

In this stage, six companies were selected to participate in the project. The innovative sustainability practices of these companies, together with those of the other three MSEs that were selected in advance and announced at the launch of the project, will be presented below.

III.4 Innovative SME case studies

The nine practices selected and described below are presented in accordance with the type of innovation they represent and also in virtue of the solutions they provide for the sustainability challenges faced by the company.

III.4.1 **Product and process innovations** (Pack Less case)

The Oslo Manual is an international source of guidelines for collecting and interpreting data on innovative activities by industry. According to this document, there are two types of technological innovations: product innovations or process innovations.

The Manual defines technological product innovation as the implementation and commercialization of an improved good or service that delivers better performance to the consumer or client. Technological process innovation, meanwhile, is defined as the adoption of new production or delivery methods that involve changes in: equipment, human resources, working methods or a combination

of these. It is important to emphasize that product innovation launched by a company can generate a process innovation in another.

According to the FGV/EAESP Innovation Forum, product and process innovations consist of three stages: the generation and selection of ideas, their development and implementation, and the obtainment or sustainment of results. The case study of the company Pack Less clearly illustrates this innovation process, where the perception of an opportunity for improving the logistics and transport processes of some sectors of industry led to enhancements and adaptations to a product, which is now being incorporated and accepted by the market.

Pack Less developed a flexible and recyclable polypropylene pallet, nearly eight times lighter and nearly five times smaller than equivalent wooden or injectable plastic pallets on the market. The benefits of its use in storage and cargo transport have been proven by a Life Cycle Assessment (LCA) study [2] conducted by the Espaço Eco Foundation (see box for details). The assessment confirmed the following advantages of the innovative product compared to convention pallets:

- increase in dynamic load transport capacity;
- reduction in pallet weight;
- longer durability (useful life);
- fewer trips/year;
- proper final disposal after use or reuse.

The Organization for Economic Co-operation and Development (OECD) proposes a model of innovation known as the "linear" or "science push" model, whereby innovation is induced by new scientific discoveries. However, there are other types, namely the "reverse linear" or "demand pull" model, whereby innovation is induced by operational and market demands. In the case of Pack Less, the idea for the flexible polypropylene pallet emerged from a commercial vision by its creators to produce a more efficient innovative model at a competitive price, given the concerns of the petrochemical market in relation to the use of wooden pallets.

Pack Less

The origin of Pack Less Desenvolvimento & Inovação Ltda comes from the professional experience of Wander Montesso and José Roberto Durço, the founding partners and current directors of Pack Less, who worked for many years in the petrochemical sector. The company was founded based on a project developed for the petrochemical sector and it was later expanded to supply the demands of other sectors of industry.

The types of plastic pallets available on the market were physical copies of wooden pallets and they were not particularly competitive given their high tooling and process cost, since they were injectable pieces that needed expensive molds and large amounts of material. Wooden pallets, meanwhile, although they are cheaper than their plastic equivalents, are less durable and have low levels of reverse logistics, in addition to requiring a complicated fumigation certification process when used for exports.

Once the demand and the gap in the market had been identified for the introduction of an innovative product, and after the product had been conceived, the next step was to develop the product on an industrial scale. During this stage, the machinery to manufacture the product was developed, a round of testing of the product application was conducted and, finally, the product was commercialized. All this

was done with the partners' own funding and the application tests were conducted at Braskem. Pack Less currently develops and sells different lines of this product to various industrial sectors, but it always maintains the original concept of a light and flexible pallet.

Based on know-how acquired over the course of years on the logistics and transport of different kinds of materials and products, the company has also incorporated logistics solutions consulting into its business. This consulting service develops structural changes to enable each company to use Pack Less pallets – such as the modification of a packaging line – and in different ways, whether through the one-way process or with guaranteed reuse and recycling, which requires the implementation of reverse logistics.

In relation to the challenges faced by the company, besides resistance to change and the lack of acceptance of new products, Wander Montesso also cites the fact that sustainability is not a decisive factor when doing business with large corporations. Few have an internal department geared towards embedding sustainability into procurement management. The sustainability departments of most companies that Pack Less has contacted are dissociated from the procurement departments and, even when they are aligned with the concept of the product, they do not have enough sway to influence procurement decisions. This is why Montesso stresses the importance of the top-down approach, since he claims it is impossible to introduce a new product without first convincing the leadership.

III.4.2 **Organizational Innovation** (Nord case)

According to the Oslo Manual, organizational innovation is not developed in the technological sphere, but instead in the management and in the administrative process of the company. This type of innovation includes the implementation of advanced management techniques, strategic orientations and changes in organizational structures. Organizational innovation often makes the business environment conducive to product and/or process innovation, since organizational factors such as values, goals, structures and relationships can positively or negatively influence the emergence of technological innovations. One of the conclusions drawn at the FGV/EAESP Forum was that only people can innovate, but they need a conducive environment so their innovative ideas can be developed and be successful.

Of the companies selected for the project, Nord Eletric represents the most emblematic case of constructing an organizational context that is participative and conducive to change, and that establishes good relations with stakeholders. The company, a supplier of products and services in industrial automation and energy management, implemented a new management system that aims to integrate sustainability through strategic planning that establishes actions and targets intended to strike a balance between economic, social and environmental dimensions (*see box for background and details*).

The strategic planning streamlined the company in various aspects of organizational innovation, namely:

- How decisions are taken: a sustainability committee was created that, in periodic meetings, analyzes the market by identifying opportunities and threats, proposes solutions and defines strategies and targets for balanced growth;

- Allocation of resources: social investment in the surrounding communities (10% of the profit), construction of a new head office using eco-efficiency, and development of new products and services in partnership with other companies and teaching institutes;

- Attributes of responsibility: development of a "living" organizational chart that represents a human being, symbolizing the synergy and interconnection between the various departments of the company and the responsibility they all share for the results obtained;

- Distribution of benefits to employees: Nord Profit Sharing Program (*see box for details*);

- Incentives for high performance and continued learning: in 2010, R$47,216.47 was invested in scholarships (vocational, graduate and postgraduate courses) for employees. In the same year, 40% of the employees took part in outside courses (not including training in health, safety and working procedures).

Nord

The catalyst for the organizational changes at Nord occurred in 2008, when the company was invited to participate in the program "Partners for Sustainability", developed by one of its clients, the construction firm Camargo Corrêa. During the program, the company had access to technical knowledge via the consultants, case studies, exchanges of experiences and guidance. However, since innovation requires not only access to knowledge, but also a corporate culture and interpersonal relationships, the founder and director of Nord, Nelson Akimoto, was largely responsible for the success of the

organizational changes at the company, by disseminating values such as integrity and social awareness, which have been incorporated into the culture of the company.

As part of the strategic planning, Nord's Profit Sharing Program was adapted and brought in line with the company's new organizational culture. In this program, half the bonus comes from the profitability of the company and the other half comes from the performance of employees in five areas: 'for me', in which the employee establishes a personal goal; 'for others', which focuses on voluntary services; 'top marks', a kind of report card for employees who are evaluated on items such as complaints, delays, etc.; 'good idea', which consists of the presentation of a simplified action plan of an idea that delivers better results and/or improvements for the client, and finally; 'guaranteeing the client', which is an evaluation of the employee by the client.

The organizational innovation at Nord has also permitted innovation in technology, which is reflected in the portfolio of products/services offered by the company, as well as partnerships with other companies and teaching institutes. According to Akimoto, Nord has always sought to develop its internal technology with a view to the continual improvement of its products and processes, such as the launch of products using LED light bulbs (used internally and offered as a service), the monitoring of the use of water and energy via web and the implementation of wind and solar energy generation systems.

The company also recently created an innovation department with an electric engineer contracted specifically to work on issues such as renewable energies and the use of microelectronics to improve products and services. However, since it is difficult for a company to innovate on its own, it has formed a number of partnerships. The latest step taken by Nord in this respect is the joint venture established with OPTOI, an Italian microelectronics company.

Since OPTOI has microelectronic technology solutions for immediate application, Nord is seeking, through this partnership, to learn more about this technology and envisage versions of its applications for its own clients. For example, the application of complete measurement systems and smart electronic interfaces (both solutions offered by OPTOI) on construction sites, with a view to eliminating errors and maximizing the accuracy of data collection. The partnership is not limited only to the two companies, as it also involves other parties, including the municipal government of Chapecó, three universities and interested local businesses.

III.4.3 **Innovation in waste treatment** (Trampo and Estação Resgate cases)

In effect since 2010, the law that created the National Solid Waste Policy addresses the objectives, instruments and guidelines on the management and administration of solid waste for government, companies and the population. The policy also establishes general targets, such as the elimination of refuse dumps and landfills throughout Brazil by 2014, as well as specific targets for different industries.

However, there is still much to be done to assure that the targets established by the law are observed and the guidelines are followed. According to the National Information System on Sanitation (SNIS), there are still 2,906 refuse dumps in Brazil, 98% of which are located in small municipalities and 57% are in the Northeast region. Moreover, the recycling rate of this waste in Brazil's state capitals is very low. For example, while San Francisco, in the United States, recycles 77% of its solid waste, São Paulo recycles just 0.5% and Recife, which has the highest result in Brazil, recycles 4%.

Construction is an important Brazilian industrial sector and a major consumer of natural resources and generator of waste. Construction waste can represent anywhere from 50% to 70% of all urban solid waste, and the city of São Paulo produces some 18,000 tons of rubble per day. Of all the rubble produced and properly disposed of, only 20% is recycled, while large amounts are improperly disposed of and are not included in this calculation. In an attempt to rectify this situation, the law delegates to the municipal governments the job of establishing targets on collection, treatment and proper disposal of construction waste, as well as raising awareness in the sector about the wasted resources.

Given this context, Estação Resgate identified the recycling of rubble as an opportunity it could seize in the sector. In addition to being specialized in construction waste recycling, the company also provides post-industrial waste management services. (see box for background). After receiving, separating and crushing the waste, the company makes both raw materials, such as gravel and sand, and higher value products, such as pipes, brick flooring and curbstones for use in the construction sector. Besides giving rubble a more valuable destination, the products sold by Estação Resgate also save natural and financial resources.

In addition to setting targets for industry, the National Solid Waste Policy also specifies the types of waste that must use reverse logistics. Reverse Logistics is defined in the policy as: "the instrument of economic and social development characterized by a set of actions, procedures and means to enable the collection and recovery of solid waste from the business sector for reuse in its own cycle or in other production cycles, or some other environmentally appropriate disposal". In other words, it consists of managing the flow of materials from the point of their consumption to the point of their manufacturing origin. Among the types of waste requiring reverse logistics under the terms of the policy are fluorescent sodium and mercury vapor light bulbs, with mercury being considered potentially the most dangerous component of light bulbs.

In Brazil, only 3% of light bulbs are recycled. The rest are disposed of in landfills and end up

contaminating the soil and waterways. The presence of mercury in the water, even in small quantities, causes a high degree of contamination due to its bioconcentration, which means its concentration increases in animals along the food chain. Mercury intoxication can cause severe symptoms, such as breathing difficulties, fatigue, fever and chills, and also chronic symptoms, such as liver failure and neurological damage.

Motivated by the size of the problem caused by the improper disposal of light bulbs and by the need to bring consumers on board with the shared responsibility established by the National Solid Waste Policy, Tramppo provides innovations in light bulb recycling. The company decontaminates fluorescent bulbs using a newly developed technology that extracts the mercury present in phosphorus dust (*see box for details*).

Once decontaminated, the waste from the process is turned into subproducts that supply the production chains of other industries, such as ceramic, paint and metalworking.

Since none of the waste resulting from this process end up in landfills, Tramppo and Estação Resgate go beyond compliance with the National Solid Waste Policy, as the services they offer not only guarantee proper disposal, they also recover and return all the waste back into the production chain.

Tramppo

Tramppo began its life in 2003, in the Innovation, Entrepreneurship and Technology Center (CIETEC), in the headquarters of the Energy and Nuclear Research Institute (IPEN) of the University of São Paulo (USP). For six years, the company was incubated at the center, where the fluorescent lamp decontamination technology was developed, and in 2008 it began to operate commercially with the help of the funding received since 2006 from the Small Company Investment Program (PIPE) of the São Paulo State Research Institute (FAPESP), at which point it also moved to its current premises.

It was after the appointment of Carlos Alberto Pachelli, the current commercial officer, that the company started to make headway in planning and sales. With a background in marketing in the pharmaceutical industry, Pachelli became a partner of Tramppo in 2007, taking responsibility for the commercial and technology department, and began to manage the company together with Elaine Menegon Chermont, partner since 2005 and responsible for the financial and regulatory affairs department.

The funding provided by PIPE permitted the company to set up its experiment laboratory, build prototypes and invest in logistics and quality management. The technical side of the business benefited from the participation of Atsuko Kumagai Nakazone, a researcher with a PhD in biochemistry who received a federal grant to oversee the development of the research.

The company currently has 600 clients and has been performing well since it first began operating commercially. In 2008, its first commercial year, revenues stood at R$220,000.00 and last year the figure reached R$2,100,000.00. For this year, forecasts are for revenues of around three million reais.

In 2003, when the technology first started being developed, Brazil was only just beginning to address fluorescent lamp disposal. The innovation, motivated by a business opportunity and an environmental cause, established a production process that enabled contaminated waste, in this case fluorescent mercury lamps, to be converted into raw material. Although the company's revenues are

almost entirely derived from the sale of a service, the subproducts of the decontamination process are also sold to industry:

- The glass and decontaminated phosphorus dust goes to the ceramic industry;
- The metal goes to the metalworking industry;
- The mercury is sent to a research institute.

One of the obstacles identified by Tramppo is the absence of clear and standardized legislation, particularly concerning the transportation of lamps. This occurs because, in addition to the lack of standardization for the process, the requirements for transporting used lamps are far more stringent than for new lamps, even though they contain the same amount of mercury. The result is higher costs that make the disposal of small quantities of bulbs commercially impractical. However, given the reverse logistics regulations established for fluorescent bulbs by the National Solid Waste Policy, Pachelli believes that this lack of definition and standardization will eventually be resolved.

Estação Resgate

With a background in the mining sector, where he spent years working and investing in an explosives factory, Gilberto Meirelles has always had an enterprising streak. After feeling the urge to work with something more related to sustainability, he spent three years in the Amazon, where he was involved with the Peabiru Institute in projects to generate income for traditional communities and where he started to come up with the idea of Estação Resgate.

Back in São Paulo, Meirelles founded the company in 2007 and began commercial activities in 2009 from what was, at the time, the city's first private construction waste recycling plant. These days, the company has eight such plants in the states of São Paulo, Minas Gerais, Rio de Janeiro, Pernambuco and Goiás, and it has plans to increase this number over the next three years to 28 plants. Since the success of the business depends on the replicability of the model, the company has a set of guidelines for installing new units called the "Estação Resgate tripod".

One of the legs of the tripod involves identifying a local manager who understands the context of the municipality where the plant will be installed. This person will become a partner in the enterprise and manage the plant. The second leg consists of developing good relations with the local authorities, including the exchange of ideas and collaboration, particularly concerning the preparation of the Municipal Solid Waste Management Plan. The final leg involves implementing the expertise and methodology of Estação Resgate.

Following the creation of the National Solid Waste Policy, demand by companies for waste management has grown so much that Estação Resgate started to offer consulting services on the development and deployment of the waste management plan for the civil construction industry. In addition to increasing the range of solutions the company offers, the consulting service has contributed to improving the quality of the disposal of this waste and, consequently, reducing the time needed in the stage to separate the garbage from the construction waste.

The main challenges experienced by Estação Resgate and pointed out by Meirelles include the lack of inspection (by the public authorities) of waste disposal and the resistance of the civil construction sector to the changes imposed by the new waste policy and also to the new recycled products.

"Innovation does not always have to involve new technologies. Innovation is at the service of a necessity in the day-to-day activities of companies, introducing simple ingredients and combining them with a vision to make the processes more efficient," explained Meirelles.

III.4.4 Innovation in the biodiversity product chain (Atina and Ouro Verde casest)

From the oldest civilizations through to contemporary society, man has been using substances extracted from plants and animals for a wide range of purposes, such as food, clothing and medicine. One example of this is salicin, a substance obtained from willow bark, used since Roman times for its analgesic effect and later synthesized by the pharmaceutical industry to make the popular pain relief drug aspirin.

Through bioprospecting (the study of biological resources for economic gain), numerous research projects are conducted with ingredients extracted from species from around the world to find cures for diseases and for use in cosmetics, new materials, gastronomy and other applications. Although not particularly diversified, the basis of the human diet depends on biodiversity, since the species we consume and cultivate live in constant interaction with one another, whether through cooperation, predation or competition, thereby forming an extensive and complex integrated system.

Besides the intrinsic value of man's contact with nature, these are the main reasons that illustrate, from the viewpoint of modern Western societies, the importance of conserving biodiversity for human well-being. However, even when the importance of certain species of biological diversity is recognized, they are very often still commercially explored in an informal, predatory or unlawful manner, without the least concern for sustainability.

The third edition of the Global Biodiversity Outlook, a report published by the United Nations Environment Programme (UNEP) and released in May of this year, reveals that the current rate of biodiversity loss is the highest in human history. Data from 2009 from the Brazilian Statistics Institute (IBGE) reveal that the rate of informal employment in Brazil is 16%, while in the North and Northeast regions the figure exceeds 20%. Moreover, according to the Ministry of Labor and Employment, the states of Pará and Mato Grosso, where the public authorities are less effective, are the two states with the highest incidence of slave labor in the country. It is no coincidence that both have large tracts of Amazon forest and the highest rates of deforestation in Brazil.

This is the context in which the companies Atina and Ouro Verde operate, developing innovative solutions in their respective production chains.

For seven years, Atina (*see box for background*) has been producing essential oil of candeia, which has a high concentration of alpha-bisabolol, a substance frequently used by the pharmaceutical and cosmetics industry for its anti-inflammatory, bactericidal and antimycotic properties. Candeia is a tree native to Brazil's Atlantic Forest, commonly found in the highland areas of Serra da Mantiqueira and Espinhaço. In 2000, due to charges of illegal production of bisabolol from candeia, the cosmetics company Natura suspended its purchases of this substance and replaced it with a synthetic equivalent. Atina was created in 2004 specifically to regularize the candeia production chain, through transparency, formal work contracts and exploration using sustainable management practices, with the origin monitored and certified by the Forest Stewardship Council (FSC).

Based on this guarantee of origin, in 2005 Natura resumed its purchases of bisabolol from candeia and, in 2007 it launched the *Diversa* line, which uses candeia as its main active ingredient. In 2011, bisabolol from candeia was included as an ingredient in the Kronos line, Natura's most sophisticated product line.

In addition to all its work in the candeia production chain, Atina has been making ongoing investments in research and development, both in new products and in new uses for the production waste. To obtain the oil, the trunks and branches of the trees are ground and steam distilled, extracting the essential oil from the wood in a process with a very low yield, at around 1% of the mass. The waste from this process is candeia sawdust, some of which is burned by Atina to generate steam for the extraction process. The rest is sold in the region and used to make organic compost. More recently, Unilever has expressed an interest in purchasing this biomass to

fuel a new boiler at its factory in Pouso Alegre.

However, in order to find a more valuable use of this material, Atina has developed, in partnership with the Federal University of São Carlos (UFSCar) and a recycled polymers company, the production of polypropylene composites and candeia fiber, which are currently being tested by Rexam, a packaging company, for use in one of Natura's make-up lines.

Not unlike Atina, Ouro Verde emerged 10 years ago with an innovative proposal to commercially explore Brazil nuts. The company is focuses on two fronts: conducting research and development to improve the quality and nutritional value of its products; and working closely, through the principles of fair trade, with the traditional supplier communities of the Amazon to improve collection and storage techniques. Ouro Verde also provides support for the formation of cooperatives in the communities in partnership with NGOs and government bodies working in the region (*see box for details*).

Atina

Eduardo Roxo is a biologist and the founding partner of Atina. His history of involvement with candeia began in 2000 when, working as a consultant specializing in planning and environmental management, he was hired by Natura to conduct a sustainability assessment of the biodiversity ingredients used by the company, among them alpha-bisabolol. After identifying illegal activities in the production chain of candeia, Natura suspended its use of bisabolol and replaced it with a synthetic equivalent.

Encouraged by the unique characteristics of candeia and the properties of bisabolol, and intrigued by the lack of structure in the candeia production chain, Roxo saw an opportunity to produce bisabolol with guaranteed traceability. The idea sounded so good that he managed to enlist his friend Cristina Saiani, an agronomist who had been working in the marketing department of a large company. The two partners developed a business plan, presented their idea to investors and were finally able to implement the project. In 2005, Atina began production of bisabolol from candeia with FSC certification, and Natura was its first client.

Despite a promising start, the company soon came across a complex and discouraging situation: the market was dominated by European distributors that purchased the Brazilian product without any traceability or sustainability requirements. Bisabolol was considered a commodity, forest origin was not recog-

nized as value and the cosmetic industry was not prepared to pay a premium for the guarantee of origin.

Despite the efforts of the investors and executives to push the idea forward, the company was unable to pay for the high cost of legality and certification, to the extent that it became commercially unviable and business was suspended late in 2009. After frustrated attempts at restructuring and six months of inactivity, Atina was poised to be sold at auction. It was at this point that Roxo and Saiani managed to attract another partner, who was prepared to buy the holdings of the two partners and invest in the business, with a focus on diversifying the portfolio. In May 2010, Atina resumed its production of bisabolol and added the Ecocert organic certification, which the cosmetic market takes more seriously, and began a series of investments in structure, equipment and personnel.

These days, Atina is recognized as a reference in the production of bisabolol from candeia, and it continues to be the only company in the sector to offer the product with certification. Recently, it has launched the first innovations of its portfolio, most notably extract of jucara, another threatened species from the Atlantic Forest that is known for its delicious and unrivaled palm hearts.

Ouro Verde

Luis Fernando Laranja da Fonseca originally pursued an academic career, lecturing for 10 years at the Veterinary School of the University of São Paulo (USP), on the Pirassununga campus. In 2002, Fonseca and his wife, Ana Luisa Mancini da Riva, decided to visit the Amazon to look into the Brazil nut market, which, despite a long history of exploration, has an asymmetric relationship between the parties in the chain and involves informal purchases and agreements.

The husband and wife team opened the company Ouro Verde Amazônia in the municipality of Alta Floresta, in the northern part of the state of Mato Grosso, with just R$30,000 withdrawn from their savings and with the challenge of adding more value to the product, while avoiding the informalities and asymmetries in the Brazil nut production chain.

Ouro Verde began researching to develop by-products of Brazil nuts, a process that was made possible by a federal grant from a technology incentive program for MSEs in the Amazon. With this money, it also signed a technical cooperation agreement with the Luiz de Queiroz Agricultural College (ESALQ-USP) and installed the prototypes necessary for production. Two years later, the company launched on the market the first line of Brazil nut products, which consisted of extra virgin oil, crumb and cream.

Meanwhile, the company was also investing in a different kind of relationship with its suppliers. A year after the pilot experiment with a harvest collected in 2003, Fonseca participated in the Integrated Brazil Nut Program, an initiative of the United Nations Development Program (UNDP) that worked with six traditional communities to

strengthen the Brazil nut supply chain. His involvement was twofold: first as a consultant to improve the quality of the harvest and second as a commercial partner, agreeing to pay between 40% and 50% over the market price for the Brazil nuts picked by the communities.

The success of the partnership with the communities is, to a large extent, the result of the balanced posture adopted by Fonseca to break with paternalism and demonstrate that a win-win commercial relationship is possible. Another important factor in the relationship between Ouro Verde and the communities is the support of other intermediary organizations in the formal establishment associations and cooperatives. Since the company does not establish commercial relations with individuals, the nut pickers need to come together in associations.

In the six communities that have started to supply Ouro Verde, the UNDP assisted both with the formation and registration of the associations, and with the preparation of invoices. As the work of the company with the communities grew more popular, other institutions came forward offering to form partnerships to assist with this formalization process. These were: Socioambiental Institute, Imaflora, Kabu Institute, Floresta Protegida Institute, Association of Zoró Indigenous People, Projeto Pacto das Águas and GIZ. The company currently has 10 supplier associations, involving nearly 400 families from more than 40 different traditional communities, among them indigenous and riverside communities and family farmers.

The organizational and process innovation of Ouro Verde has attracted the attention of various institutions and partners. In 2009, Orsa, a large pulp, paper and packaging group, acquired a 50% stake of the company. After taking on this group as a partner, Ouro Verde expanded and opened another unit in the region of Jari, between the states of Pará and Amapá. The job of formalization and promoting social inclusion in the region is the responsibility of the Orsa Foundation, the social arm of the Orsa group.

Despite the success and prominence the company is currently enjoying, Fonseca points to a series of hurdles encountered by Ouro Verde over the years, namely:

- The inefficiency of government bodies;
- High taxes;
- Logistics of transporting the products from the place of origin to the factory;
- Relations with retailers and the financial sector.

In relation to this last item on the list, Fonseca emphasized the high cost of working capital loans. Concerning the retail sector, relations have been so difficult and contentious that Ouro Verde decided to stop supplying large retail chains, with which the relationship was extremely imbalanced and unfavorable for small companies.

III.4.4 **Innovation in cleaning and treatment of air and effluents** (RL, Terpenoil and Brasil Ozônio cases)

Over 70% of the Earth's surface is covered by water, but only 0.007% of the water on the planet is potable, since 97.5% is ocean water and 2.493% is submersed and difficult to access. Added to this, fresh water is unequally distributed around the globe, and South America is the continent with the most abundance.

Besides the limited availability of potable

water, urban and industrial pollution is having an increasingly negative impact on its quality. According to the 2012 edition of the "Progress on sanitation and drinking-water" report, published by the World Health Organization (WHO), every day some 2,000 tons of human waste are disposed of in potable water courses. Furthermore, according to forecasts made in the report, by 2015 there will be 2.7 billion people in the world without access to basic sanitation.

Although the data reveal an improvement in access to treated water, there are still many disparities between regions and the situation is far from ideal. According to a report by the São Paulo State Environmental Protection Agency (CETESB) released in 2011, there has been a 14% rise in the population with access to basic sanitation over the past five years, but the discharge of untreated domestic sewage is still the main cause of water pollution in the state of São Paulo. This problem contributes to the increased occurrence of illnesses caused by contact or ingestion of contaminated water. The lack of sufficient investment in basic sanitation is justified, in part, by the high cost of installing water treatment stations.

In addition to domestic sewage, industrial waste is another major source of water contamination. In a comparison of the cost to industry of obtaining and treating water, countries such as Sweden and Denmark pay nearly 100 dollars per cubic meter of water, while industry in developing countries pay around 10 cents per cubic meter.

This is the situation in which Brasil Ozônio sought to develop innovative solutions for the treatment of water. The company provides applications for sanitization, sterilization, oxidization and treatment of water, sewage, gases, food and surgical materials with the use of ozone. The technology allows the company to generate ozone from atmospheric air with a high production capacity and low electric energy consumption (*see box for details*).

Together with water contamination, air pollution is the other main environmental impact aggravated by human activity. There are three main sources of air pollution: stationary, released by industry and landfills; mobile, which originate from motor vehicles; and farming/forestry, caused by agricultural activities, such as burning and deforestation. According to the Program to Control Motor Vehicle Pollution (Proconve), industrial activities, energy generation, motor vehicles and agricultural burning are the main human causes of atmospheric pollution.

Terpenoil is another small company that offers innovative air treatment solutions. It develops and commercializes cleaning, air purification and odor neutralization products using blends of terpenes, a substance extracted from the peels of citrus fruits (*see box for background and product details*). The blends, which are 100% natural, are used to formulate its own products and also to make the ecological cleaning products of other companies. The solution for the microbiological treatment of the environment is comprised of air cleaning equipment and odor neutralizing products.

The market need to provide more natural cleaning products comes from both pressure from society and regulatory agencies, such as the health regulator Anvisa, given the risks of human intoxication and environmental contamination caused by the chemical composition of these products. A study conducted in 2003 by Greenpeace UK reveals that many chemical compounds existing in cleaning products are linked to the cause of various diseases, such as formaldehyde, which in addition to being carcinogenic also impairs embryonic development.

In addition to Brasil Ozônio, which uses air as a raw material, generating oxygen as waste, and Terpenoil, whose products are atoxic and approved by Anvisa, RL Higiene also stands out in the field of cleaning products with sustainable attributes. The company produces and commercializes hygiene and cleaning products that use natural and organic ingredients, and it is also a pioneer on the market for supplying FSC certified paper towels and for using life cycle assessment to improve its products in partnership with the Polytechnic School of the University of São Paulo (USP) (*see box for details*)..

RL Higiene

In addition to developing product innovations, RL Higiene has introduced organizational innovations that guarantee its competitiveness in the cleaning product market. The company was founded in 1977 by the parents of the current directors, as a distributor of cleaning products inside the production chains of industries and service companies (business-to-business). When its distinguishing qualities in logistics became mandatory characteristics in the sector, RL was forced to reinvent itself.

This was when, in 2000, the company began to apply the principles of Corporate Social Responsibility (CSR). First through social actions and, later, by incorporating social and environmental practices into its management, underpinned by the guidelines and tools developed by the Ethos Institute. To do this, the company created the program 'Innovation & Sustainability', which introduced the concept of eco-efficiency to all the cleaning products, services and processes the company releases on the market.

The company began to implement a series of actions that contributed to the supply of products with sustainability attributes, namely:

- Prioritize, in its purchases, products and processes that reduce the consumption of water, energy, packaging, time and transport;
- Create products without aggressive chemical ingredients; train and raise awareness of all users to avoid wastage;
- Supply more durable tools, with longer life cycles.

In 2007, the company released its Vert line of products that have less of an environmental impact. In addition to being developed entirely with plant-based raw materials, with their origin certified by Brazil's Instituto Biodinâmico (IBD) and by the FSC, they also incorporate the results of a life cycle assessment conducted by the Group for the Prevention of Pollution of the Polytechnic School of USP.

Although relations with large companies have been described as fragile and complex, RL points to its partnership with Suzano as a success story. It was Suzano that, as a supplier of RL, paved the way for the supply of more sustainable paper by obtaining the FSC certificate. The partnership was crucial to the success of the new line which, in 2008, consisted of five products, two of which were FSC certified papers and three were chemical products. The Vert line now has 13 products, of which 10 are FSC certified papers. Moreover, the company reported a sales growth of 298.6% in Vert products between 2009 and 2011.

Despite the success of the organizational and technological innovations, RL has had to negotiate various obstacles along the way, namely: multi-stakeholder management, which involves mobilizing various partners and mediating the relationship between them in order to eliminate distrust among the parties involved; and the unwillingness of customers to pay a premium for more sustainable products, meaning the risks and the high investment for the project were faced exclusively by the company and with few mitigation opportunities.

Terpenoil

José Luiz Majolo used to work at Banco Real and it was shortly after the bank merged with ABN AMRO Bank that he made the decision to work more closely with sustainability. After building a "pousada" (a small hotel or boarding house) following the principles of sustainability in the heart of the Atlantic Forest, Majolo discovered cleaning products made using terpene after trying unsuccessfully to remove the damp from his pousada using conventional cleaning materials. Amazed by the effectiveness of the product, Majolo sought out his mentor, Professor Raul Correa, who developed the product at the Technological Development Park of the Federal University of Ceará.

After some tests, Majolo decided to open a business to develop, produce and commercialize the products made from terpene. A few years later, his colleague Marcelo Ebert also left his job at the bank and joined Majolo in the business, with the goal of placing their natural and innovative products on the market to compete with conventional cleaning products.

Terpenes, explains Majolo, are the ingredients found in abundance in the essential oils of plants and they are responsible for the asepsis of nature, serving three basic functions: solvency, odor neutralization and bactericidal action. The company's product lines perform precisely these three functions and the terpenes are extracted from orange peel. This choice was made due to the abundance of the fruit in Brazil that, since it is the world's largest exporter, guarantees the availability of the raw material even if the company should experience exponential growth in productivity. The peels undergo a physical process that produces the specific blends with solvent, odor neutralization and bactericidal properties.

Despite the expansion of the product line and the addition of more clients, Terpenoil lists some challenges it has faced since it started doing business, such as enabling industrial scale production, ensuring raw material supply, developing the surfactants in the products and testing them to confirm their efficiency, low toxicity [3] and competitiveness compared to other synthetic competitors. Moreover, Majolo explains that the company faces the daily challenge of selling innovative cleaning products under the stigma that they are weaker and less effective.

"We are a technology company. For us, sustainability and innovation are intrinsically linked," said Majolo. "Our mission is to improve people's lives with natural products and innovation guided by a sustainable vision."

Brasil Ozônio

After spending years streamlining a technology to create ozone molecules from atmospheric air, Samy Menasce and a friend applied to Sebrae and CIETEC in São Paulo to open a company and sell the technology as a cleaning solution. With the support of specialized researchers, the two partners managed to adapt the laboratory developed technology into compact models and launch them on the market. This is how Brasil Ozônio was founded.

Menasce and the company experienced difficulties following the death of his friend and business partner. Financial instability led him to raise funds from bodies such as the National Council for Scientific and Technological Development (CNPq), the São Paulo State Research Institute (FAPESP) and the Brazilian Development Bank (BNDES). However, his management experience at large companies made him more sensitive the needs of large corporations and how best to convince them to test his solution.

In order to reduce the uncertainty and risks involved in purchasing such new technology, Menasce proposed partnerships with the companies, wherein they would initially rent the product temporarily for a given amount, which would then be deducted from the final amount if they decided to keep the product. To date, there have been no cases of products being returned. Menasce admits that it has been difficult to find companies willing to accept the risk, but that sales were made easier after articles about the product were published in newspapers and magazines.

Despite being well positioned on the market and having secured some major clients, such as DOW, Yara, MacDonald's, Hilton and Bunge, as well as its close relations with several multinationals, Menasce lists a series of obstacles encountered by Brasil Ozônio over the years. They are: the difficulty obtaining the initial investment for the development of the technology, since most of the available credit is offered to large companies; and the gap existing between academic knowledge and business application.

III.5 The need for scale

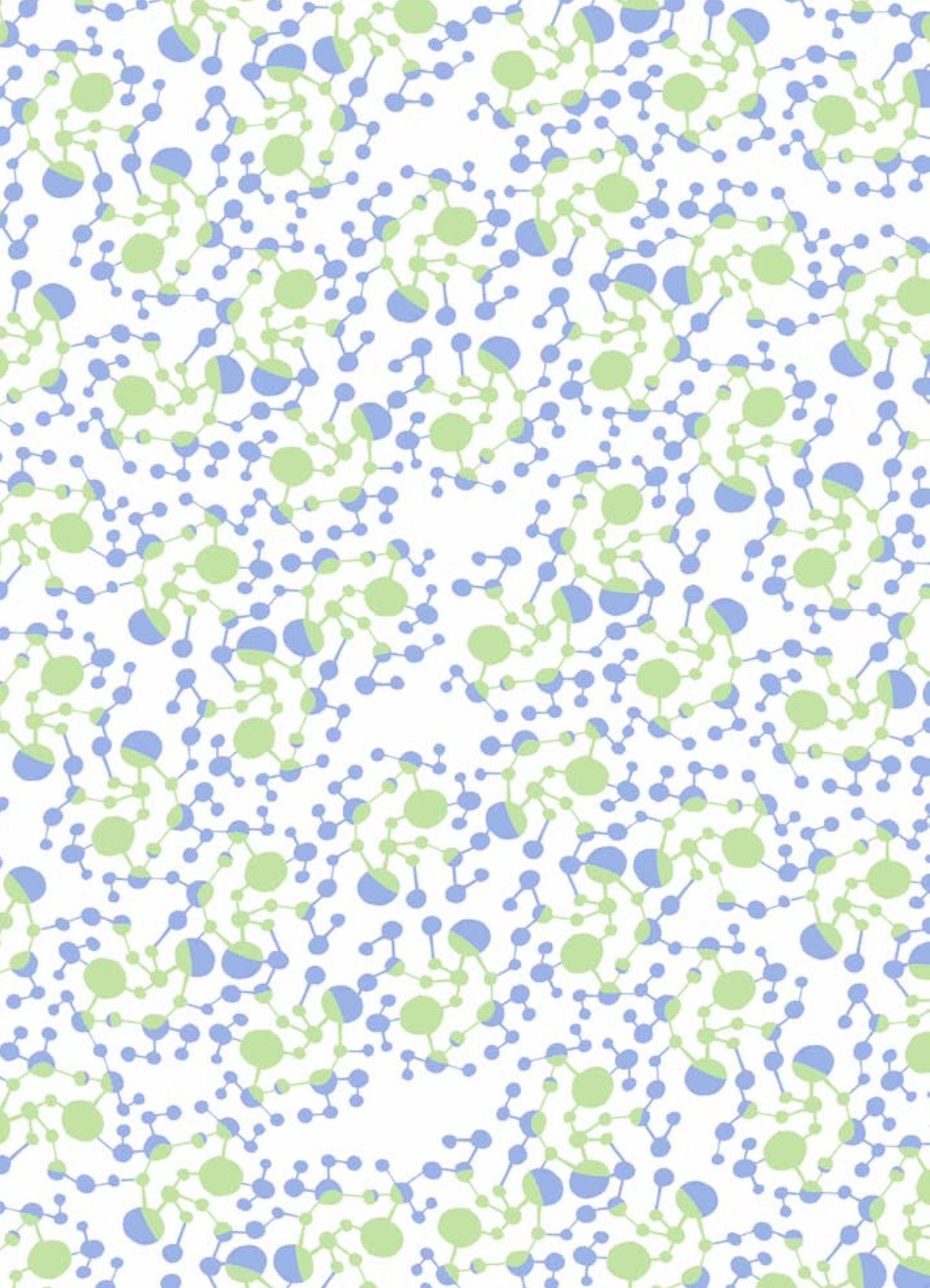
The case studies presented here illustrate the competence and the persistence of the entrepreneurs to transform their ideas into reality, which has been a source of inspiration for this project. At the same time, however, they are isolated initiatives that are subject to numerous obstacles and risks. This explains the efforts of the ISVC project to identify, select and give visibility to these initiatives, which is also in line with a broader goal to help these types of practices multiply, gain scale and connect with one another, thereby strengthening the transition to a sustainable model of development.

It is precisely with a focus on strengthening these networks that the next chapter presents reflections and proposals not just from the small and large companies, but also from other parties with which they interact.

[1] Correspond to professional, scientific and technical activities, in accordance with Division 72 of the National Classification of Economic Activity (CNAE), version 2.0.

[2] LCA is a technique for compiling energy and material inputs and environmental releases and assessing the potential impacts of a product throughout its life cycle. LCA permits a comparison not only of functionally equivalent products, but also different processes, with a view to minimizing environmental impacts.

[3] Its products do not contain acidic, alkaline, phosphorous or corrosive substances.



CHAPTER IV:
Final Considerationst

This report was intended to disseminate knowledge on innovation and sustainability in supplier management, by presenting and analyzing conceptual references and, most of all, by sharing the lessons learned from the activities conducted throughout the work cycle. Based on the experiences, we shall now present some recommendations for companies that wish to create and strengthen the innovation ecosystems to which they belong and make changes to the traditional system in which the value chains operate. The stages of the next cycle of the project shall be presented at the end of the chapter.

IV.1 Proposals

Concerning the pitfalls encountered by the participants when incorporating sustainability into supplier management and the challenges faced by supplier SMEs when developing sustainability innovation, some proposals are presented below. They address not only the policies and practices of large companies for their value chains, but also the other parties that play important roles in the innovation ecosystems, namely funding agents, government and research institutes.

IV.1.1 Recommendations for large companies wishing to incorporate innovation and sustainability into supply chain management

As we have already seen in the first two chapters of this report, there is a great deal of room for growth and development of supply chain management by large companies if they create an environment conducive to innovation and sustainability in their supply chains. Large companies have the opportunity to incorporate sustainability criteria into their supply chains and, in doing so, benefiting their business. Based on the presented concepts, the analysis of good market practices and the experience accumulated throughout this cycle, the following steps are recommended for companies that want to evolve in this field:

- **Diagnostic of the current supplier management situation** – identify the existing policies and practices, and define the processes already in place and the needs, in order to discover the starting point for the desired improvement;

- **Assessment/benchmarking of supply chain management** – find out about good business practices in supplier management, in order to create references to serve as a model for analysis and learning for the company;

- **Incorporation of sustainability criteria in supply chain management** – evaluate to what extent the company is prepared to review its supplier management strategy to incorporate sustainability and implement viable changes;

- **Training of employees** – develop the competencies (knowledge, skills and attitudes) of the managers and buyers that combine efficiency, competitiveness and sustainability in negotiations and relationships with suppliers, so these professionals can identify risks and opportunities in the company-supplier interface;

- **Streamlining of relationships with SMEs** – identify the SMEs in the supply chain and develop specific policies to minimize risks and capitalize on opportunities in this relationship, both common in this category of suppliers;

- **Development of SMEs in the production chain** – implement training and development programs for SME suppliers, allowing for the establishment of partnerships for innovation and sustainability;

- **Promotion of innovation for sustainability in the supply chain** – develop a posture within the company that is more receptive to new developments in products and services presented by suppliers and create affirmative policies that promote innovation for sustainability in the relationship with these business partners;

- **Partnerships for the development of sustainable supply chains** – as the company starts to implement a sustainability strategy in its own supply chain, it can broaden its scope of activity through sector-wide, regional or other such partnerships; as a result, it can enlist different actors to work together on improving the conditions in the chains that impact its business;

- **Leadership** – by improving its knowledge and progressing with the implementation of these strategies and practices, the company can assume a leadership role in incorporating sustainability into value chains, serving as a driver of change in other actors and helping provide scale to the innovations that meet the challenges of sustainable development.

IV.1.2 Accessible financing for SMEs

As described in chapter III, the shortage of sources of financing is the third major obstacle to innovation, according to the survey "Technological Innovation" conducted in 2008 by the IBGE. The survey revealed that only 22% of micro and small enterprises cited bank loans as the main type of support they received to conduct product and process innovations. Moreover, nearly all the small companies selected for the ISVC project started their innovations using the savings of the business partners due to the lack of access to financing and the high cost of working capital loans charged by banks. Given the shortage of capital in the majority of micro, small and medium enterprises, access to credit is a fundamental condition for investments that seek to embed sustainability into different types of innovation.

The self-regulation instruments existing on the market for the financial system demonstrate the growing concern in the sector to incorporate sustainability as a means of reducing risks and adding value to its institutions. The Green Protocol is one of these instruments, which establishes various principles and guidelines for banks to offer loans that promote the quality of life of the population and the sustainable use of natural resources[1]. The signatory institutions undertake to establish credit lines and programs with competitive rates, durations, criteria and eligibility, thereby enabling the creation of credit facilities for small businesses seeking to incorporate innovation and sustainability into their activities.

As an example of this, the Brazilian Development Bank (BNDES) recently reformulated its credit lines for innovation, combining the three existing lines into one, which it calls "Support for Innovation", to concentrate proposals in one place and encourage companies that apply for loans to draw up a more com-

prehensive plan in the area of innovation. Although this means presenting the bank with a lengthier proposal that is aligned with its commercial strategies, the companies can benefit from lower interest rates, set at 4% per year. Beforehand, rates fluctuated between 4% and 6.5% per year [2].

In addition to the loans for innovation, credit for MSEs offered by the financial agents [3] of the BNDES has been experiencing strong growth. According to the 2011 performance report of the BNDES, loans for micro, small and medium enterprises totaled R$49.8 billion that year, the highest on record. Besides the BNDES, three state development banks, 16 development agencies and 69% of banks with a commercial portfolio have commercial relationships with small businesses, according to the report "Financing sustainability in micro and small enterprises", released in 2012 by Sebrae.

Two other types of investment that have been featuring prominently in Brazil, due to the country's rapid growth in recent years, are private equity and venture capital (PE & VC). While the former consists of investments made in companies that are still not listed on the stock exchange to boost their development, the latter involves investments in newly created companies (startups) or in the expansion of small businesses. From 2005 to 2009, these two types of investment experienced growth both in the number of management companies and in the amount of allocated capital, which rose from US$6 billion to US$34 billion – the equivalent of 2.2% of GDP – according to data from the Center for Studies in Private Equity and Venture Capital of the FGV/EAESP. Despite this growth, it is important to improve the sustainability credentials of these types of investments and check to what extent sustainability is taken into account in the investment of the capital.

Concerning traditional credit lines and programs, the participation of MSEs in the total volume of loan disbursements is still quite low considering their representativeness in the economy, due primarily to the high tax burden and excessive bureaucracy that encumber transactions. According to the Sebrae survey, specific credit lines and programs linked to the sustainability of MSEs are still basically restricted to federal public banks and state-run development institutions.

Establishing credit portfolios for SMEs and offering low-interest loans based on sustainability criteria represents an opportunity for financial institutions to support and strengthen small innovative businesses in Brazil, and also a way to add market value to these lenders.

IV.1.3 Public policies that promote innovation and sustainability in SMEs

The regulatory framework of policies that support SMEs in Brazil is the Micro-Enterprise and Small Company Law, also known as "Simples", which was ratified in December 1996 and established a distinct tax treatment for small companies. It was also towards the end of the 1990s that the government started to reform its policies that support innovation, with a view not only to encourage technological modernization, but also to create a favorable environment for partnerships and cooperation between the business sector and public institutions in the field of science and technology.

These reforms established a number of credit lines and programs for technological development run by the Funding Agency for Studies and Projects (FINEP), an arm of the Ministry of Science, Technology and Innovation, including some that are intended specifically for small enterprises. Examples of some of these credit lines and programs are:

- PRONINC - the National Program for Technology Incubators of Grassroots Cooperatives;

- Prime - the First Innovative Company Program supports budding enterprises less than two years old with economic subsidies, for a period of 12 months;

- • Pappe Integration – this program supports micro and small enterprises in the North, Northeast and Mid-West regions of Brazil, with a view to adding value to their business and sharpening their competitive edges.

Some of the small companies selected for the project, such as Ouro Verde and Tramppo, received support from the programs of FINEP, and many others are supported each year by public funding agencies and other institutions, such as universities and technology incubators. According to the FINEP Management Report 2011, the institution's participation in business spending in R&D in 2010 was 8.7%.

However, the role of the government as a promoter of innovation in micro and small enterprises leaves a lot to be desired, as the data in the Sebrae survey "Innovation and Competitiveness in Brazilian MSEs" clearly demonstrates. As we saw in item 2.2 of chapter III, not a single respondent to this survey cited government incentives as a reason driving innovation. There is no doubt that the government is an essential actor in promoting innovation and a powerful driver of change in business models. However, support for technological innovation with a view to sustainability should not be limited to isolated actions, but instead

be the premise for the conception and implementation of public policies.

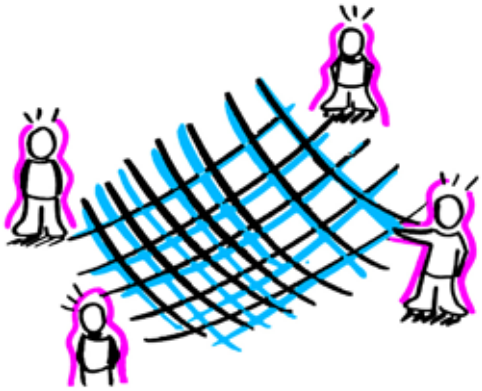
IV.1.4 Establishment of partnerships

The complexity of the issues and challenges encountered in the business environment has demonstrated that working together in search of more sustainable practices and relationships is more effective than working alone. The establishment of partnerships can occur in a number of ways: between large companies; between small companies; between large and small companies; between companies of the same sector, supply chain or region; or between companies and other public or private organizations. The sum of the efforts around a common challenge leads to the development of new competencies and innovative solutions.

As already mentioned in this report, the capacity of a company to look outside its walls for partnerships to develop new processes, products, services or competencies constitutes one of the main characteristics of an innovative organization. Although it is essential, the predisposition of SMEs to form partnerships should not be limited to their large clients. The concept of open innovation also applies to small enterprises, whereby cooperative interaction between SMEs can generate innovation and collective efficiency.

t

One of the longest-standing agencies supporting the development of micro and small companies in Brazil is Sebrae, which, through partnerships with the public and private sector, promotes association and innovation. More recently, the Sebrae Sustai-



nability Center was created as a national unit of the Sebrae system that specializes in generating and disseminating knowledge and promoting the idea that a culture of sustainability represents a competitive advantage for small businesses in the face of new market conditions.

Another interesting example of partnerships are the Credit Guarantee Societies, which are local and regional organizations paid for with public and private funding that help in the interaction between small companies and financing agents. These societies not only assist in the relationship between lenders and MSEs, but they also assist small companies structure financing projects. Unlike in Argentina, where this kind of initiative is very popular, it has only existed in Brazil since 2003, when there was a single society operating in the state of Rio Grande do Sul. The initiative began to grow in 2008 after receiving support from Sebrae, and there are now six societies in the country with more than 300 members [4].

Partnerships between SMEs and teaching or research institutes are also important, since they narrow the gap between academic and business knowledge, inasmuch as they provide practical applications for the research of these organizations. Of the nine small supplier companies selected for the ISVC project, seven mentioned the involvement of teaching institutes in their innovative practices.

When it comes to large companies, numerous organizations such as business associations and the so-called "S System" of training and services institutes (Senai, Sesi and Sesc) have been the stage of collective initiatives that are intended not only to improve commercial conditions, but also to share the management of the social and environmental risks and opportunities of the business. These organizations have worked together to achieve a new level of sustainability in the relationship between companies and their stakeholders. There are countless examples of this in the textile, financial, construction, agricultural and chemical sectors, to name a few. Moreover, when large companies assist with the development of their suppliers, joint initiatives can maximize the efforts of different companies behind the promotion and development of innovation ecosystems.

IV.1.5 Continued learning

The proposals presented here are the fruit of the work and experiences accumulated in this cycle of activities throughout 2012. They reflect the lessons learned by this group of participating companies, specialists and organizations, but they do not purport to encompass all the issues related to the promotion of innovation and sustainability in value chains. This learning process is complex, ongoing and challenging, and new contributions will certainly be made in the upcoming cycles of this project.

IV.2 The next cycle of the ISVC project

The Innovation and Sustainability in the Value Chain project aims to introduce changes to the relations and practices that are traditionally observed in value chains, and which do not always favor cooperation and win-win. As such, the planning re-

quires a long-term approach that concentrates on the various links in the chains, enabling the co-creation of solutions between all the actors involved.

Based on this premise of taking a broad view of the value chain, while the 2012 Cycle focused on the management of suppliers that are located upstream from the large companies, the 2013 Cycle will focus on the downstream activities, addressing the post-consumption stages. The post-consumption topic will encompass issues such as waste management, reverse logistics, closed loop and industrial ecology, among others. The supply management topic will continue to be studied in parallel, examining in more depth and further developing the issues and lessons learned so far. Furthermore, the next cycle of the project will include a field trip, during which the participants will have direct contact with the issues addressed throughout the year.

The post-consumption topic raises an extremely important global discussion, one that has become even more relevant in Brazil since the National Solid Waste Policy, instituted nearly two years ago, established targets and guidelines for the management and administration of solid waste for government, companies and the population. The shared responsibility imposed by the law, its ambitious general targets – such as the elimination of refuse dumps and landfills throughout Brazil by 2014 – and specific industry-wide targets, together with the situation in the country, where solid waste recycling rates are very low, points to the need for cooperation between the three sectors.

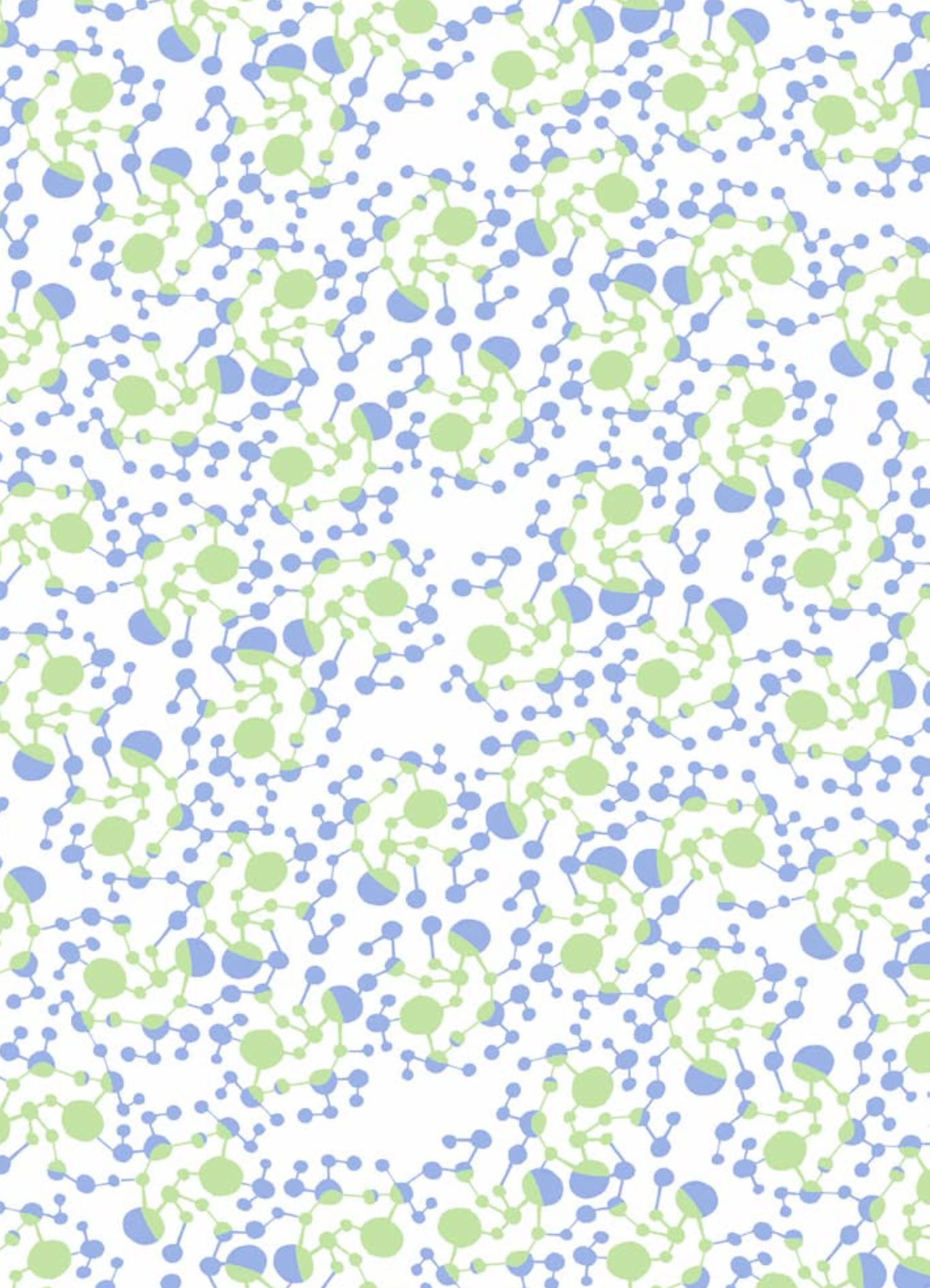
It is in view of this need that the next cycle of the ISVC project will attempt to contribute to the promotion of a systemic vision of waste management, in addition to identifying innovation opportunities in the relationship between the actors involved and in the sustainability practices along the post-consumption chain.

[1] The Green Financing Platform, developed by GVces as part of its Sustainable Finances program, is a mapping of the main credit lines with social and environmental criteria, which can be used to promote a green economy. The information was obtained from surveys conducted with Brazil's main financial institutions, both public and private, and public funds. The search for financial products can be made by financial institution (banks or funds), by topic of interest (energy, civil construction, new equipment, etc,) or by the profile of the borrower (individual or by company size). The platform can be accessed at: **http://www.financiamentosverdes.com.br/**

[2] MARTINEZ, C. BNDES concentra linha para boas ideias. **Valor Online**, São Paulo, September 27, 2012. Available at: http://www.valor.com.br/empresas/2845754/bndes-concentra-linha-para--boas--ideias. Last accessed on: September 29, 2012

[3] Federal and private banks may act as financial agents in the intermediation of BNDES credit.

[4] SIMÕES, K. SGC têm dificuldade para deslanchar. **Valor Econômico**, Especial, Pequenas e Médias Empresas, G6. São Paulo, September 28, 2012.



BIBLIOGRAPHIC REFERENCES

- ACCENTURE. **CDP Supply Chain Report 2012**: A New Era: Supplier Management in the Low-Carbon Economy. p. 1-82, 2012.

- ADNER R. and KAPOOR, R. Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. **Strategic Management Journal**, v. 31, n. 3, p. 306–333, 2010.

- BARBIERI, J. C. **Organizações Inovadoras: Estudos e Casos Brasileiros**. 2. ed. Rio de Janeiro: Editora da Fundação Getulio Vargas, 2004.

- BARBIERI, J. C. (Org.); SIMANTOB, M. A. (Org.). **Organizações inovadoras sustentáveis: uma reflexão sobre o futuro das organizações**. 1. ed. São Paulo: Editora Atlas S/A, 2007.

- BETIOL, L.S.; UEHARA, T.H.K.; LALOE, F.K.; APUGLIESE, G.A.; RAMOS, L.; ADEODATO, S.; MONZONI NETO, M.P. **Compra Sustentável: a força do consumo público e empresarial para uma economia verde e inclusiva**. São Paulo: S.I., 2012.

- BRASIL. Lei nº 12.305, de 2 de agosto de 2010. Lei dos Resíduos Sólidos. Presidência da República. Casa Civil, Aug 2010.

- BRASIL. Lei nº 9.317, de 05 de dezembro de 1996. Lei das Microempresas e das Empresas de Pequeno Porte "SIMPLES". Poder Legislativo. Brasília, Dec 1996.

- CARBON DISCLOSURE PROJECT. Available at: www.cdproject.net. Last accessed on: July 12, 2012.

- CDP. **SUPPLY CHAIN Liderança, Inovação e Colaboração 2010 Report Guidelines**. p. 1-4, 2012.

- CETESB. **Qualidade das águas superficiais**. São Paulo: CETESB. 2011.

- CHIARAVALLOTI, R. M. **Escolhas Sustentáveis - Quatro Temas Importantes (Biodiversidade, Uso da Terra, Água e Aquecimento Global)**. Dissertação de mestrado da Escola Superior de Conservação Ambiental e Sustentabilidade - ESCAS/IPE, 2011.

- CHRISTOPHER, M. **Logística e gerenciamento da cadeia de suprimentos**. Translation: Mauro de Campos Silva. – 2. ed. São Paulo: Thomson Learning, 2007. Translation of: Logistics and supply chain management.

- DELOITTE. **Instituições financeiras no Brasil**: O Posicionamento para um novo cenário. São Paulo, 2010.

- DIEESE. **Anuário de Trabalho na Micro e Pequena Empresa 2010-2011**. São Paulo: SEBRAE, 2011.

- DIEESE. **Anuário do Sistema Público de Emprego e Renda - Mercado de Trabalho**. São Paulo: Ministério do Trabalho e Emprego, 2011.

- ECOVADIS. Available at: www.ecovadis.com. Last accessed on: July 12, 2005.

- FINEP & IBGE. **Pesquisa de Inovação Tecnológica**. Rio de Janeiro: IBGE , 2008

- FINEP. **Relatório de Gestão Finep - 2011**. Rio de Janeiro, 2011.

- GAWER, A., and CUSUMANO, M. A. How companies become platform leaders. **MIT Sloan Management Review**, Cambridge, v. 49, n. 2, p. 28-35, 2008.

- GREENPEACE BRASIL. **Impactos na Saúde Humana de Substâncias Sintéticas, 2004**. Available at: http://www.greenpeace.org/brasil/PageFiles/4904/pops_impactosaude.pdf. Last accessed on: August 22, 2012

- GRI. **The GRI boundary protocol**. Amsterdam: Global Reporting Initiative (GRI). 2005.

- HANDFIELD, R. B.; NICHOLS, E.L. **Introduction to supply chain management**. Upper Saddle River: Prentice Hall, 1999.

- HART, S. L.; MILSTEIN, M. B. Creating sustainable value. **The Academy of Management Executive**, v. 17, n. 2, p. 56-69, 2003.

- IBGE. **Pesquisa de Inovação e Tecnologia – 2005**. Ministério do Planejamento, Orçamento e Gestão. Rio de Janeiro, 2010.

- ILANSITI M.; LEVIEN, R. Strategy as ecology. **Harvard Business Review**, Ipswich, v. 82, n. 3, p. 68-78, 2004.

- MARTINEZ, C.. BNDES concentra linha para boas ideias. **Valor Online**, São Paulo, September 27, 2012. Available at: http://www.valor.com.br/empresas/2845754/bndes-concentra-linha-para-boas---ideias. Last accessed on: September 29, 2012.

- MORAIS, J. M. **Programas especiais de crédito para micro, pequenas e médias empresas**: BNDES, PROGER E Fundos Constitucionais de financiamento em De Negri, J. A. (Comp.) Políticas de Incentivo à Inovação Tecnológica, Brasilia. 2008.

- MTE. **Manual de combate ao trabalho em condições análogas às de escravo**. Brasília, Ministério do Trabalho e Emprego. 2011.

- MORAIS, J. M. de. **Uma avaliação de programas de apoio financeiro à inovação tecnológica com base nos fundos setoriais e na lei de inovação**, in De Negri, J. A. & Kubota, L. C. (orgs), Políticas de incentivo à inovação tecnológica no Brasil. Brasília: Ipea, 2008.

- NARETTO, N.; BOTELHO, M. DOS R.; MENDONÇA, M. **A trajetória das políticas públicas para pequnas e medias empresas no Brasil: Do apoio individual ao apoio Planejamento e políticas públicas**, n. 27, 2004.

- NIDUMULU, R.; PRAHALAD, C. K. and RANGASWANI, M.R. Why Sustainability is Now the Key Driver of Innovation. **Harvard Business Review**, v. 87, n. 9. p. 56-64, 2009.

- OECD. Oslo Manual: **Proposed Guidelines for Collecting and Interpreting Technological Innovation Data**: OECD, 2004.

- PETILLO, S. V. L.; PHILIPPI JR., A. A prevenção da poluição química de interiores e o uso de produtos de limpeza. **Anais XXVIII Congresso Interamericano de Engenharia Sanitaria e Ambiental**. Cancún, 2002.

- POIRIER, C. C. **Supplier Relationship Management: An Advanced Supply Chain Management Technique**. CSC Proprietary. 2003.

- PORTAL BRASIL. **Técnicos recebem treinamento sobre produtos de limpeza clandestinos**. 2010. Available at: http://www.brasil.gov.br/noticias/arquivos/2010/8/20/tecnicos-recebem-treinamento-sobre-produtos-de-limpeza-clandestinos. Last accessed on: October 9, 2012.

- PORTER, M. Competitive Advantage: Creating and Sustaining Superior Performance. **London, Free Press**, p. 120, 1985.

- SAUAYA, T.; ALLI, S.; GONÇALVES, B. S. **Como Fortalecer a Responsabilidade Social nas Relações entre Grandes e Pequenas Empresas**, São Paulo: Instituto Ethos, 2004.

- SEBRAE. **Inovação e Competitividade nas MPEs Brasileiras**. São Paulo: SEBRAE, 2009.

- SEBRAE. **O Que Pensam as Micro e Pequenas Empresas Sobre Sustentabilidade**. São Paulo: SEBRAE, 2012.

- SECRETARIA DO MEIO AMBIENTE-ESTADO DE SÃO PAULO. **Meio Ambiente Paulista - Relatório de Qualidade Ambiental**, São Paulo, 2011.

- SEDEXGLOBAL. Available at: www.sedexglobal.com. Last accessed on: July 12, 2012.

- SINDUSCON-SP. **Gestão Ambiental de Resíduos da Construção Civil**, São Paulo, 2005.

- SIMÕES, K. SGC têm dificuldade para deslanchar.

Valor Econômico, São Paulo, September 28, 2012. Especial, Pequenas e Médias Empresas, G6. Available at: http://www1.valor.com.br/financas/2847520/sgc-tem-dificuldade-para-deslanchar. Last accessed on: September 29, 2012.

- SRIVASTAVA, S.K. and SRIVASTAVA, R.K. Profit driven reverse logistics. **International Journal of Business Research**, v. 4, p. 53–61, 2005.

- SRIVASTAVA, S. K. Green supply-chain management: A state-of-the-art literature review. **International Journal of Management Reviews**, v. 9, n. 1, p. 53-80, 2007

- STOCK, J. R. **Reverse Logistics Programs**. Illinois: Council of Logistics Management, 1998

- TEEWEB. **The Economics of Ecosystems and Biodiversity**. Available at: http://www.teebweb.org/. Last accessed on: July 10, 2012.

- THE DANISH COUNCIL ON CORPORATE SOCIAL RESPONSIBILITY. **Guidelines for sustainable supply chain management**. 2010.

- THÉRY, H.; MELLO, N. A. D.; HATO, J.; GIRARDI, E. P. **Atlas do Trabalho Escravo no Brasil**. São Paulo: Amigos da Terra - Amazônia Brasileira, p. 80, 2009.

- UNEP. **Global Biodiversity Outlook 3**. Quebec, Canada, 2010. Available at: www.mma.gov.br/portalbio. Last accessed on: August 15, 2012.

- UNICEF and WHO. **Progress of Drinking Water and Sanitation - 2012 update**. UNICEF and World Health Organization. 2012

- UNIDO. **Sustainable Supply Chains-Learning Forum**. p. 1-90, 2005.

- UNITED NATIONS GLOBAL COMPACT and ACCENTURE. **A New Era of Sustainability**: UN Global Compact-Accenture CEO Study 2010, p. 1-60, 2010. Available at: http://www.unglobalcompact.org/docs/news_events/8.1/UNGC_Accenture_CEO_Study_2010.pdf. Last accessed on: August 18, 2012.

- UNITED NATIONS GLOBAL COMPACT and ACCENTURE. **The Sustainable Supply Chain**, p. 1-6, 2009.

- UNITED NATIONS GLOBAL COMPACT and BSR. **Supply Chain Sustainability: A practical Guide for Continuous improvement for Small and Medium Enterprises, 2010**. Available at: <http://www.unglobalcompact.org/docs/issues_doc/supply_chain/Supply_Chain_Practical_Guide_SMEs.pdf>. Last accessed on: September 10, 2011

- WBCSD. **Business Guide to a Sustainable Supply Chain: A Practical Guide**. New Zealand Business Council for Sustainable Development. Nov. 2003. Available at: http://www.wbcsd.ch/DocRoot/YY1tsTDsnuA1M3v1kfdA/NZBCSD%20Supply%20Chain%20Guide%20Final.pdf. Last accessed on: August 18, 2012.

- ZANIECHELI, C.; PERUCHI, I. B.; MONTEIRO, L. A.; SILVA JOÃO, S. A.; CUNHA, V. F. **Reciclagem de Lâmpadas: Aspectos Ambientais e Tecnológicos**. Campinas, PUC Campinas, p. 21, 2004.