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# How to conduct a sustainability transition at the company level? The role of impact valuation tools and management instruments

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## Abstract

The practice of monetary valuation of environmental impacts has gained popularity in the private sector in recent years. The underlying assumption of the advocates of these methods is that adopting economic language to talk about environmental impacts helps to accelerate decisions in favor of sustainability in companies. This communication aims to investigate the role of management instruments, particularly those based on the monetary evaluation of environmental impacts, in the sustainability transition at company level. To do this, in order to compare expectations with usage, a survey of thirteen organizations (including three consultancy firms and nine multinationals) was conducted in order to understand this growing practice, to map existing impact assessment tools, as well as the way they are mobilized by companies. We concluded that impact assessment approaches are plural and range from communication to risk assessment, from measurement tools to discussion supports, whether between different departments of companies or with other stakeholders. Indeed, through some examples we illustrate how such tools can serve as a support to enroll decision-makers in the sustainability transition process, as well as the mediation role they play.

**Keywords:** sustainability transition, businesses, impact valuation, management instruments

## Résumé

La pratique d'évaluation monétaire des impacts environnementaux a gagné en popularité dans le secteur privé durant les dernières années. L'hypothèse sous-jacente des défenseurs de ces méthodes est qu'adopter un langage économique pour parler d'impact environnementaux permet d'accélérer les décisions en faveur de la soutenabilité dans les entreprises. Cette communication vise à investiguer le rôle des instruments de gestion, notamment ceux basés sur l'évaluation monétaire des impacts environnementaux, dans la transition soutenable à l'échelle des entreprises. Pour ce faire, afin de confronter les attentes aux usages, une enquête auprès de treize organisations (dont trois cabinets de conseil et neuf multinationales) a été menée dans le but de comprendre cette pratique montante, de cartographier les outils d'évaluation d'impact existants, ainsi que la manière dont ils sont mobilisés par les entreprises. Nous avons conclu que les approches d'évaluation d'impact sont plurielles et vont de la communication à l'évaluation des risques, des outils de mesure aux supports de discussion, que ce soit entre les différents départements des entreprises ou avec d'autres parties prenantes. En effet, à travers quelques exemples nous illustrons comment de tels outils peuvent servir de support pour enrôler les décideurs dans le processus de transition soutenable, ainsi que le rôle de médiation qu'ils jouent.

**Mots-clés:** transition soutenable, entreprises, évaluation des impacts, instruments de gestion

## 1. Introduction

The concept of sustainability transition has attracted increasing attention of scholars and policy makers (Markard, Raven, & Truffer, 2012). It is often associated to a multi-level and long-term perspective, where the conditions of socio-technical and political changes at a sectoral or technological scale, for a broad population of companies, are studied. But very few works have been carried out at the company level although they play a critical role in the sustainability transition by developing new products, services and business models, and contribute to market creation (Berggren, Magnusson, & Sushandoyo, 2015; Planko, Cramer, Chappin, & Hekkert, 2016).

If this question has not been addressed until now, maybe it has to be related to the widespread belief according to which the long-term doesn't count for companies, and that it is outside their managerial scope. In the innovation and evolutionary literature, companies are supposed to be trapped into routines and dominant designs they can hardly escape (Dougherty, 1992; Labatut, Aggeri, & Girard, 2012). Clayton Christensen, for instance, insists on the fact that most disruptive technological innovations that have occurred in the last century have been developed by newcomers rather than incumbents who are incapable of changing their routines and business models (Christensen, 2013). Companies are also supposed to be driven by financial criteria and shareholder value maximization, where the far future is worthless due to the mechanical effects of discounting cash flows (Lazonick & O'Sullivan, 2000). So why and how should they care about sustainability issues?

The purpose of this communication is to analyze the conditions under which a sustainability transition might become a legitimate managerial issue for companies and how they might conduct such transitions. In this perspective, we will emphasize the role of managerial and evaluations tools, seen as cognitive instruments able to impulse a new sensemaking of the future and strategic changes at the company level. More precisely, we will draw attention to impact valuation-based management instruments that seek to monetize sustainability impacts, that are outside the managerial scope (externalities), and are intended to drive strategic change. A widespread belief in the private sector is that monetization is a condition to enroll managers and create the conditions for effective decision-making (True Price, 2014). These tools have become very popular in the business sector and we wish to analyze in which conditions their use can drive strategic changes at the company level.

### *Valuation tools in practice: issues and questions*

In the public sector, monetization of environmental impacts is the basis for Cost-Benefit Analysis, a common calculation that aims to compare between the positive and negative contribution of a project to society, in order to make public investment decisions. However, this practice has spread to the private sector since 1989 when the automotive company Volvo initiated the development of a monetary valuation system (Steen, 1999), and more globally since 2010 when the Group Kering published the first EP&L (Environmental Profit and Loss) (PUMA, 2011).

Several concepts in the grey literature are associated with monetary valuation of externalities (true pricing, shadow pricing, etc.), depending on the way they are presented and the way they are used. Among them the concept of Impact Valuation which is, as defined by the IVR<sup>1</sup>, “[...] the application of welfare economics to determine the positive and negative value contribution of business activities to society in monetary terms.” (IVR, 2017). The aim is to integrate other kinds of capitals such as the natural one but also the social or the human ones, in addition to the financial capital into decision-making.

Today, as shown by the increasing number of companies that have used these methodologies (Figure 1), the specialized consultants that spread them among companies, but also various kinds of

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<sup>1</sup> Impact Valuation Roundtable

collaborations such as the Natural Capital Coalition, and the Impact Valuation Roundtable, Impact Valuation is gaining momentum in the private sector.

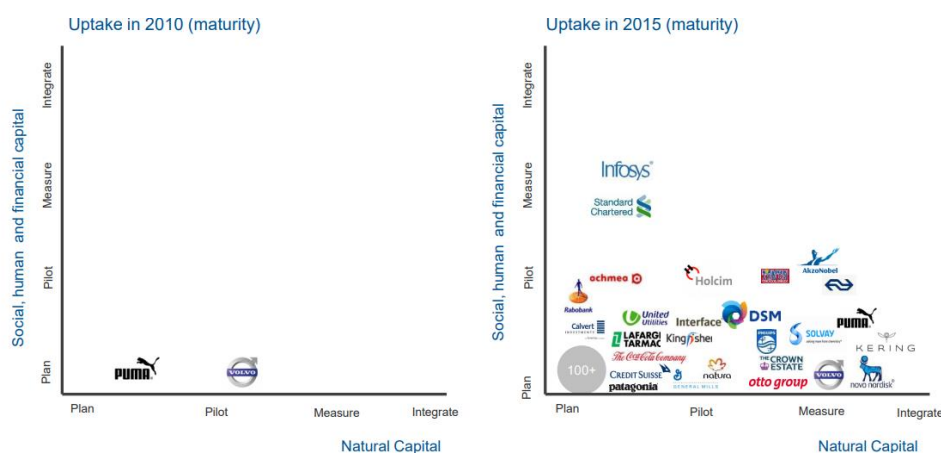


Figure 1: Businesses increasingly measure and value impacts (AkzoNobel, 2015)

Indeed, 3 of the “big four” consultancy firms have designed their impact valuation methods (Table 1), which is a symptom of new expertise and the emergence of new departments within these firms.

Table 1: example of consultants’ impact valuation tools

	Date	Method
<b>PricewaterhouseCooper</b>	2013	-Total Impact Measurement and Management -Environmental Profit & Loss
<b>KPMG</b>	2014	-True Value
<b>Ernest and Young</b>	2016	-Total Value

By moving from qualitative to quantitative “objective” decisions, the promise of these methodologies is to help decision makers compare between different sets of externalities and identify hotspots, but also to integrate them in common metrics such as investment returns, as they are expressed in the same unit (money). The purpose behind that is to improve risk assessment and management, but also to prevent reputation risk by improving transparency and reporting, and stimulate innovation by helping to identify new business models that reduce negative externalities and create positive ones (True Price, 2014).

The aim of this communication is to analyze this emerging management practice from a tool perspective, through a survey of thirteen organizations in various business sectors, including nine multinational corporations, three consulting firms (KPMG, Trucost, True Price) and an international coalition on natural capital (The Natural Capital Coalition).

Indeed, the objective is to map the existing monetary impact valuation tools, but also to identify the underlying rationale behind the use of such methodologies within companies and to highlight some trends in their use in practice. The aim is to address the following research question: what is the role of impact valuation-based management tools in the sustainability transition at the organization level?

Our reflection is informed by several literatures. First, the literature on the sustainability transition (Garud & Gehman, 2012; Geels, 2010; Markard et al., 2012) that analyzes how large sustainability transitions of socio-technical systems happen, by describing their possible pathways (Geels & Schot,

2007) from a multi-level perspective (MLP) (Geels, 2011). Our literature review shows that this literature has neglected until so far how companies address such transitions. For this reason, we question the meaning of a sustainability transition for for-profit organizations, and the way they organize it.

We also draw on the literature on management instruments, which describes how they act as mediators of complex external realities by offering simplified and problematized representations in managerial language (Chiapello & Gilbert, 2014; David, 1998; Moisdon & Hatchuel, 1997), how they support collective action (Moisdon & Hatchuel, 1997), and how they can play a role in organizational change (David, 1998). Our literature review reveals that environmental management instruments used by businesses are rarely analyzed from a management perspective, but rather from an engineering perspective, where their use in practice is not considered (Morel, 2014; Riot, 2014). In this communication, we intend to analyze how impact valuation-based management tools work in practice and how do they drive effective changes at the company level.

This communication is organized as follows. In the following section we describe the main elements of our literature review and the gaps we identified, then we present the methodology we used to address these gaps. This will be followed by a result section describing some findings, and a discussion about the limitations of the study as well as the questions that emerged. To conclude, we discuss the outcomes of our study and some research perspectives.

## **2. Literature review**

According to the literature, sustainability transitions are about relatively rare long-term macro-changes. Therefore, transition studies can't be based on statistical analysis of large databases. They rather need other types of multidimensional theories and methodologies such as the Multi-Level Perspective (MLP), as "it is unlikely that only one kind of causal factor or mechanism can explain entire transition processes" (Geels, 2011). The MLP views the transition as a non-linear process that depends on three levels: (i) niches (protected spaces where radical innovations are developed), (ii) regimes (set of rules that oriented and coordinate the activities in the existing system, such as shared beliefs and cognitive routines) and (iii) landscapes (the wider context, such as political ideologies and demographical trends). This theory also provided an ideal-typical representation of the general dynamic pattern of a sustainability transition: the niche-innovations create an internal dynamic, then changes in the landscape create pressure on the regime, which leads to the creation of a window of opportunity in the regime for niche-innovation. The consequence of that is that there is no single cause or driver to transition, no simple causality.

Moreover, transition scholars have just started to analyze the role of firms and organization in the transition, but they often take a systemic holistic point of view, by focusing on how the activities of businesses impede or contribute to the sustainability transition (Bansal & Song, 2017), which means that the organizational aspects of the transition, requiring a more micro analysis of decision making, are a blind spot in these studies.

By contrast, research in organizational studies has long been interested in how innovation, change and organizational stability are achieved and maintained in organizations. One of the central notions in this literature is that of organizational routines, which correspond to any regular and predictable behavior resulting from the firm's history (Nelson & Winter, 2004). This literature consider thus routines as basic components of organizational behavior, which amplify the cognitive biases of the organizations. Drawing on evolutionary theories, this literature traditionally adopts a meso scale of analysis to model the behavior of populations of organizations, but it evolved towards a more comprehensive approach to routines (Labatut, Aggeri & Girard, 2012). This has partly resulted in the emergence of management tools approaches, in particular the French school which was driven by collaborative research with industry stakeholders, and a strong inking in the field and in organizations.

Management tools are here defined as all the reasoning and knowledge that feeds the three acts of management: predict, decide, control (Moisdon & Hatchuel, 1997; Aggeri & Labatut, 2010). Indeed, because of this proximity to the field, management researchers were able to observe the frequent discrepancy between the intentions associated with a management tool and the way in which it is appropriate by users, which gave rise to several studies on the appropriation of management tools, and design-use duality (Vaujany, 2006).

Nevertheless, when it comes to environmental management tools, little research has been conducted on the life of tools in organizations and on the phenomena of appropriation by users (Riot, 2014). On this subject, we can find studies on the typologies of existing tools (Ness, Urbel-Piirsalu, Anderberg, & Olsson, 2007), on the improvement of existing assessment methodologies in terms of exhaustiveness, robustness or uncertainty (Herva, García-Diéguéz, Franco-Uría, & Roca, 2012), or the creation of new ones (Jolliet et al., 2003), but rarely on the integration of these tools into organizations and their impact on decision-making. Regarding the literature on monetarization by companies (not on the principle and methods of monetarization itself, which are at the crossroads of several literatures such as welfare economics and ecology), it consists of grey literature produced by organizations such as consultancy firms (KPMG, 2018; True Price, 2014), corporate reports or other institutions reports (Global Nature Fund, 2017; Weidema, Brandão, & Pizzol, 2012). Thus, there is a lack of vision on the life of these monetary valuation tools in organizations, and their effects on decision-making.

Keeping these gaps in the literature in mind, our objective is to study the practice of impact valuation through its management tools, focusing on their own attributes, but also on how they play a role of mediating instruments and they contribute to sensemaking in businesses and are used to legitimize long-term issues in companies.

### 3. Method

Our study involved semi-structured interviews followed by quantitative questionnaires with thirteen organizations in various sectors of activity (Figure 2): among them 9 multinational companies (Table 2), three consultancy firms (Table 3) and an international collaboration on natural capital (Table 4). The selected companies have in common the use of publicly communicated impact valuation-based tools, and the three consulting firms surveyed have contributed to the development of the latter. The interest in interviewing consultants as well as the other companies is to have two different perspectives on the practice of impact valuation: those who promote the tools and those who adopt them, and the discrepancies between the two.

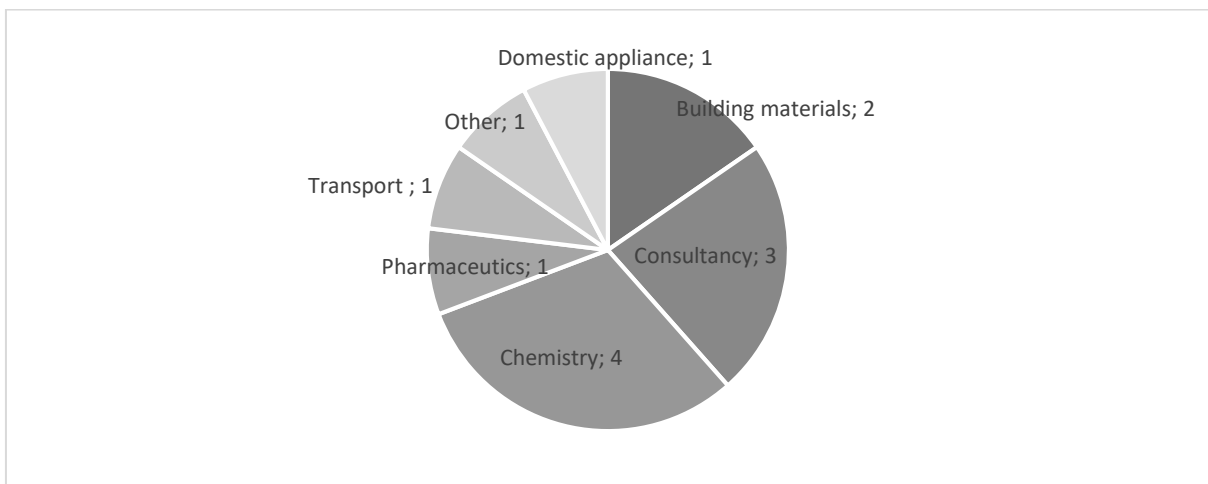


Figure 2: business sectors of the surveyed companies

Table 2: surveyed companies and their tools

	<b>Company</b>	<b>Period</b>	<b>Respondent(s) status</b>	<b>Tool</b>
<b>Company 1</b>	Philips	June 2018	-LCA expert -Sustainability expert	<b>EP&amp;L</b>
<b>Company 2</b>	Solvay	November 2018	-Sr Officer Sustainable Portfolio Management (SPM)	<b>SPM</b>
<b>Company 3</b>	Novo Nordisk	November 2018	-Associate Director & Senior Advisor, Corporate Sustainability	<b>EP&amp;L</b>
<b>Company 4</b>	Dow Chemical	December 2018	-Director, Sustainability Programs	<b>NPV</b>
<b>Company 5</b>	Lafarge Holcim	December 2018	-Head of Sustainability Performance and Tools	<b>IP&amp;L</b>
<b>Company 6</b>	AkzoNobel	December 2018	- Social Sustainability Manager	<b>4D P&amp;L</b>
<b>Company 7</b>	Volvo Buses	December 2018	-Director Business Solutions	<b>TrueTCO</b>
<b>Company 8</b>	Cementos Argos	December 2018	-Sustainability Valuation Manager	<b>VAS</b>
<b>Company 9</b>	BASF	February 2019	-Director Sustainability Methods	<b>Value to Society</b>

Table 3: surveyed consultancy firms

	<b>Company</b>	<b>Period</b>	<b>Respondent(s) status</b>
<b>Consultant 1</b>	KPMG	November 2018	<ul style="list-style-type: none"> <li>• Senior auditor, Sustainability Services</li> <li>• Sustainability Services Associate</li> <li>• Senior Consultant</li> </ul>
<b>Consultant 2</b>	Trucost	November 2018	Account Director
<b>Consultant 3</b>	True Price	December 2018	Co-founder

Table 4: other organizations surveyed

<b>Organization</b>	<b>Period</b>	<b>Respondent(s) status</b>
<b>Natural Capital Coalition</b>	December 2018	Associate, Redefining Value – Natural Capital

In order to highlight the expectations of companies regarding these management tools, but also the way they mobilize impact valuation methodologies in the process of building sensemaking and enrolling decision-makers, the qualitative interviews were based on an interview guide which included three parts:

- **The context:** the companies were asked what are, according to them, the context in which the idea of developing impact-based valuation tools emerged in their organizations, and the way

these elements of context have made it easier to enroll decision makers towards these methodologies.

- **The design and use of tools:** the interviewees were asked what the tools are made of, but also at what levels they are applied (a corporate level, a project level or a product level) and what decision-process they feed.
- **The added-value:** what are according to the interviewees the added value and the interest they have derived from the design and use of these tools, in addition to the observed effects on their companies.

The questionnaire followed the same pattern, but with additional quantitative questions such as the frequency of use of the tools, the duration of the evaluation...Etc. Data collection and analysis were informed by the transcribed interviews and by the answers to the questionnaire.

## 4. Results

Our discussions with the companies and consultants allowed us to highlight some factors influencing the adoption of impact valuation-based instrument by the companies in the private sector (section 4.1), but also the way these tools are built and presented (section 4.2), and above all, the way they can be support for sensemaking and decision-makers enrollment towards sustainability (section 4.3). Moreover, interviewing the consultants allowed us to go further on some points than just based on the sample of companies included in the survey.

### 4.1. The context

Our discussions revealed that the most obvious point is that the growing expectations of stakeholders, whether investors (the finance community in general), or the society, encouraged them to interest to impact valuation-based instruments. Moreover, the willingness of companies to go beyond the definition of value creation can also be a way of relativizing their negative impacts in relation to the services they offer to society, and to justify their business model. Moreover, integrated reporting has been promoted by institutions such as the GRI<sup>2</sup> and the IIRC<sup>3</sup>. The latter proposes a framework that extends the definition of capital by considering other kinds of capitals such as the natural, the human, the intellectual... Etc. (IIRC, 2013). Furthermore, according to interviewees, these tools contribute to assure investors that the risks associated with their investments are known, measured and managed. Indeed, the foundation of institutions like the Task Force on Climate-related Financial Disclosure (TCFD) illustrate the increasing expectancies of finance sector regarding the long-run reliability of businesses (TCFD, 2017).

Another factor is that of crises that act like decision accelerators. Indeed, crises and contestations are also the opportunity to highlight some long-term issues, which raises new expectations and demands and leads businesses to put these issues into their agenda: “So, at the time that we were doing this work in 2010 and 2012, Texas was in a very large drought. [...] And so, the leaders of our company were very interested in hearing this kind of scenarios because they were feeling the impacts of the drought, and they understood this” Dow Chemical.

Some respondents described their initiative as the result of a willingness to understand and mitigate risks related to sustainability: “the main question was really «what sustainability means» and how it can impact the business. So, it was more of a risk assessment, and this with the intuition that the need to be compliant with the regulation was no longer sufficient to make decisions. As we can see now, the consumer market sometimes decides before regulations.” Solvay.

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<sup>2</sup> Global Reporting Initiative

<sup>3</sup> International Integrated Reporting Council



Through our questionnaire, companies and consultants were asked to rank proposals on different issues. The Table 1 shows the ranking of these motivation factors in terms of importance, from company's perspective and consultants' perspective.

*Table 1: motivations from companies' and consultants' perspectives, from the most important to the less important*

<b>Companies' perspective</b>	<b>Consultants' perspective</b>
1. To show to customers the positive impact of your company on society	1. To show to customers the positive impact of their company on society
2. To improve their CSR ranking	2. To legitimize their business model
3. To enrich their CSR report	3. To enrich their CSR report
4. To attract investors	4. To improve their CSR ranking
5. To legitimize their business model	5. To attract investors
6. To comply with the regulation	6. To comply with the regulation
7. To respond to criticism	7. To respond to criticism

#### 4.2. The design and use of tools

One of the questions we wanted to address is whether impact valuation-based tools are homogeneous or diverse, and in what forms they are presented. Our questionnaire showed that among the nine multinationals interviewed, all consider environmental impacts in their impact valuation tools (most of the time those related with the company's own operations and with its direct customer), five also consider social impacts (especially direct impacts related to the company's own operations). The tools are all quantitative and express the impacts in monetary terms, but they differ in the way they account for externalities, as explained in the following.

##### 4.2.1. Typology of tools

Based on the sample of tools studied, three different impact valuation-based tools categories emerged:

##### **i- Extended financial accounting tools (corporate level application)**

An example of that is the EP&L (environmental profit and loss), which is a company's monetary valuation and analysis of its environmental impacts. The idea is to complete the traditional profit and loss account by including figurative revenues and costs associated to the environmental impact of business activities (Arena, Conte, & Melacini, 2015).

This accounting can also include other impacts in addition to the environmental impact. The Integrated profit and loss accounting of LafargeHolcim includes the social impacts (IP&L) (LafargeHolcim, 2017), and the four-dimensional profit and loss of AkzoNobel also includes human impact (AkzoNobel, 2015).

##### **ii- Extended management accounting (project or product level application)**

Like management accounting tools, impact valuation tools are intended to better inform managers before they decide matters within their organizations. An example of that is the NPV (Net Present Value) that includes water shadow cost used by Dow Chemical at a site level (Natural Capital Coalition & Dow Chemical, 2017): "That is how we calculated the NPV, we use the shadow costs, and that shadow cost means that a certain option becomes more profitable than another option, and so the example that I used earlier is making a capital investment that will save water and provide a more efficient use of water" Dow Chemical.

##### **iii- Portfolio management tools**

These tools are closer to strategic management tools than accounting tools. An example of that is the Solvay's Sustainable Portfolio Management tool (Figure 3), which is presented in matrix form and evaluates each representative product (in a certain application) according to the ratio of its monetized environmental footprint over its sale value (y-axis), to market signals of sustainability benefits and roadblocks (x-axis), and the turnover associated with the product (color) (Solvay, 2017).

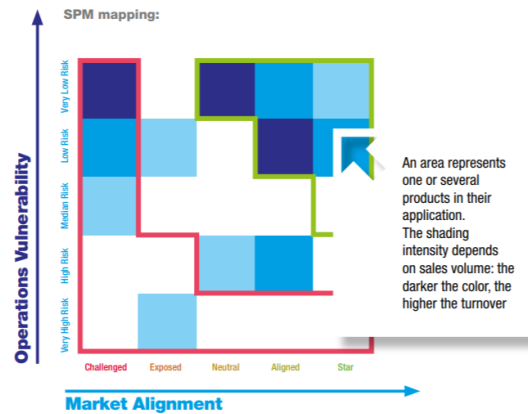


Figure 3: Solvay's Sustainable Management Portfolio. Source: Solvay, 2017

The Figure 4 shows the type of tools used by the companies surveyed.



Figure 4: distribution by type of tools of the companies surveyed

### 4.3. Common applications

According to the interviewed consultants, the scope of impact assessment tools is wide in terms of applications, as shown by the Figure 5. It ranges from communicating with stakeholders to managing the company's internal performance (hence the internal-external dimensions), but also to assess the company's impacts or make future investment choices (which explains the retrospective-prospective dimensions).

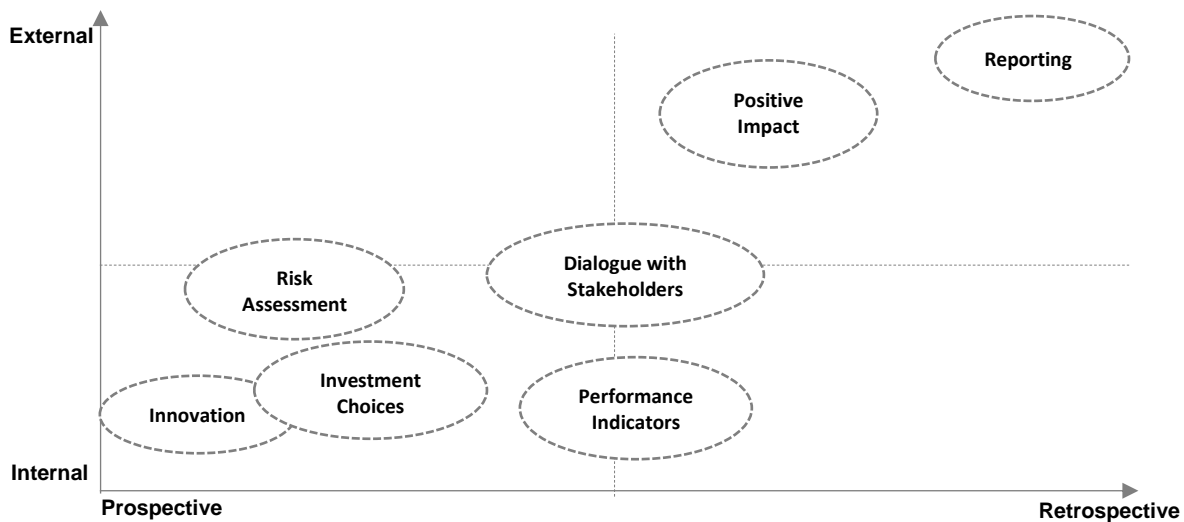


Figure 5: common application of impact valuation tools according to consultants

By highlighting these four dimensions (internal-external and prospective-retrospective), this figure illustrates the role of management tools as mediating instruments that link different domains, actors and temporalities (Miller & O’Leary, 2007). Indeed, through internal retrospective use of management tools, the organization relies on its past activities to assess its performance according to various criteria, which combined with internal prospective tools that envision a future, contributes to building the company’s strategy. This illustrates the mediation role between the retrospective and prospective point of views. Moreover, through retrospective external use of management tools, the company provides stakeholders (investors, regulators, customers, markets, etc.) with information on its results and past performance, while through prospective external management tools, the company shares its intentions and vision of the future. These two uses allow to send and receive signals to capture stakeholder expectations and compare them with the company’s activity, which illustrates the role of mediation between different actors. These four dimensions of management tools reveal the necessity for companies to build a strategy of the arrangement of these tools, in order to ensure these two mediations. This would contribute to enhance sensemaking in organizations regarding sustainability issues (Weick, 1995), legitimize the subject in companies and lead to decision-making.

Besides, the companies’ answers to the questionnaire revealed that, in the sample of tools studied, five are used in a retrospective manner, once a year, at a corporate level, which corresponds to the extended financial accounting tools. One of the three remaining tools is used to make investment choices in plants (the Net Present Value including water shadow cost), the second to make investments, research projects and portfolio decisions (the Sustainable Portfolio Management) and the third to promote electric buses (the TCO<sup>4</sup> including external costs).

Consultants and companies agree that the most common use is reporting (Table 2). It appeared that according to companies and consultants, impact valuation tools are today rarely mobilized to support discussion and negotiate with the stakeholders.

Table 2: common applications of impact valuation tools from companies’ perspective and consultants’ perspective

Companies’ perspective	Consultants’ perspective
1. Reporting	1. Reporting
2. Positive impact assessment	2. Risk assessment
3. Investment decisions/ Risk	3. Innovation / Investment decisions

<sup>4</sup> Total Cost of Ownership

assessment	
4. Innovation	4. Positive impact assessment
5. Negotiation with stakeholders	5. Negotiation with stakeholders

#### 4.4. The value-added

The aim of this section is to illustrate how impact valuation tools can be used to enroll decision-makers or stakeholders towards sustainable alternatives. The interviewees were asked to share their vision on the value added and the effects induced using impact valuation tools, to allow us to identify the underlying enrollment strategies.

For instance, these tools have contributed to the promotion of some solutions that induce more direct financial costs, but less environmental impacts, by considering the “value of nature”. An example of that is the Volvo Buses with the True TCO of electric buses. Indeed, this method consists in comparing the TCO of electric buses and thermal buses by considering the monetized negative and positive environmental and social externalities. The company aimed to use this tool to convince their clients (municipalities and transport authorities) to consider electric buses in their city planning: “The results of this analysis have the potential to change perceptions, influence decision makers and ultimately to transform urban environments worldwide.”(Volvo & KPMG, 2015).

Another strategy is to present these tools as a measure of risks to the business, by capturing weak and strong signals from the market and customers. An example of that is the Solvay’s SPM, which interprets the ratio of the monetized environmental footprints of its products over their sales values as an indicator of future risk or opportunity. The SPM includes two additional dimensions: the turnover associated with the product, and a “market alignment” indicator. The SPM assessment is conducted by a group of experts who base their analyses on business managers and marketing managers feedbacks for the market alignment dimension, and on the industrial technology managers feedbacks for the environmental dimension. The results allow to classify products from “challenges” to “solutions”. This assessment links the environmental dimension to business and allows the discourse towards business units to be structured around the risk for the business: “And in fact it's always related to business: what is at risk in business, and so it is the information we give to the business lines. [...]. It gives an overview of a Business Units’ portfolio in terms of sustainability. It is clear that when I am in the “challenges” area, it is likely that at some point I will hit the bottom, touch a rock, and when I say touch a rock it means losing turnover and losing business.” Solvay

Moreover, these impact valuation-based tools have been described as a mean to imply different departments in the discussion about sustainability: “More and more companies are getting interested, it is a way for them to communicate environmental issues, in a really powerful way to imply all the departments within the business, like finance. [...] lots of companies do say that one of the strongest findings is that it allowed them to communicate with other audiences, they weren’t able to before.” Natural Capital Coalition. Indeed, in some cases the use of economic indicators provided access to other types of contacts within the company: it created new connections between the engineering sphere and the management sphere: “by putting money on every single dimension, it translates into language that the higher level understands.” Akzo Nobel

Finally, the use of externalities assessment tools can be a way to highlight some hotspots and emerging critical issues, to alert on the need for better resource management: “the VAS showed us other topics in which we should work on, one of those topics was water consumption, so we started realizing that water was a very critical topic that was emerging and we started so work more on water; and our water management plants, and our water modeling” Cementos Argos.

Moreover, the Table 5 shows the ranking of observed effects from the most important to the less important, from companies’ perspective and from consultants’ perspective:

Table 5: the observed effects after using Impact Valuation tools from companys' perspective and consultants' perspective

<b>Companies' perspective</b>	<b>Consultants' perspective</b>
1. Acquiring new valuable knowledge and insights	1. Acquiring new valuable knowledge and insights
2. Intensifying dialogue between the different departments of your company	2. Intensifying dialogue between the different departments of companies
3. Appearance of new performance indicators/decision criteria	3. Appearance of new performance indicators/decision criteria
4. Expanding and diversifying your network externally	4. Change in communication strategy
5. Participating to academic publications and conferences	5. Expanding and diversifying their network externally
6. Change in communication strategy	6. Obtaining labels or awards
7. Obtaining labels or awards	7. Participating to academic publications and conferences

## 5. Discussion

Our study aimed to explore the practice of impact valuation in the private sector, from a management tool perspective, based on discussions with a sample of pioneering companies. We wanted to highlight how these tools contribute to enroll decision-makers and contribute to a transition towards sustainability.

Rather than trying to characterize impact valuation tools as having generic properties compared to classical environmental impact tools, it is more relevant, in an organizational perspective, to focus on the role they can play in the mediation between different domains, and different actors and different time horizons. In particular, we have stressed how their mobilization by environment or CSR experts can help the enrollment of decision-makers, which is their main added value as drivers of change. This mediation can take place between the experts in charge of the tools and the decision makers (such as business units), but also between the company and other stakeholders (such as investors or the society).

We illustrated some enrollment strategies with some examples of companies interviewed, but some others were briefly mentioned by the consultants and could not be associated with a specific tool. Indeed, it would be interesting to investigate how this type of tool can be used to stimulate innovation, including disruptive innovations. Moreover, the level of analysis and the format of our discussions (a onetime interview) didn't allow us to fully understand the change processes and the role of different actors (initiators, mediators) for each tool developed. A research perspective would be to deepen the understanding of how change process is conducted in specific companies by means of valuation tools.

Indeed, the simple adoption of economic language is not enough to break the locks of decision-making for sustainability, but it is all about the way in which they serve as a basis for discussion, interest and sensemaking: "It all depends on the using. [...] this exercise will not change anything in the company because you have done it alone. The idea of this is involving everyone to understand, to discuss" LafargeHolcim. A research perspective would be to analyze how valuation tools are used in combination with non-monetary environmental tools (qualitative or quantitative) to maximize potential effects on strategic change and decision-making.

The mapping of different valuation tools used in companies (Figure 5) seems to indicate that CSR experts mobilize a range of tools for different transitional uses (reporting, innovation, exploration,

decision-making, dialogue, etc.). The question that arises is: to what extent tools are combined in coherent manner? Are there generative combinations that can be identified to drive change and stimulate disruptive innovations? The assumption we would like to work on is the fact that experts combine different types of tools in a coherent setting to obtain certain strategic effects. For that purpose, we need to conduct more in-depth empirical research within one or two pioneering companies that have developed interesting uses of these tools in change processes.

## 6. Conclusion and research perspectives

Our work aimed to investigate the role of management tools, more specifically impact valuation-based management tools in the sustainability transition. To this end, we conducted a survey with some companies that have publicly known impact valuation tools, in order to highlight how they contribute to sensemaking within businesses. We concluded that impact valuation approaches are plural, and range from communication to risk assessment, and from measurement tools to discussion supports, whether between different departments in businesses or with other stakeholders. They can be at the heart of a strategy to enroll decision makers towards sustainable initiatives, as illustrated by some examples in the section 4.4, by using them as a way of enhancing the value of projects with better environmental performance (electric buses for Volvo Buses or water efficient plants for Dow Chemical), or a way to capture the sustainability related business risks (Solvay's SPM).

Moreover, there is an important potential to continue to investigate this area of research, at the intersection of the two fields of sustainability transition studies and organizational studies. One rationale for future research is the interest to investigate how management tools can steer product and business model innovation, how they can support eco-design. Another avenue of research would be to extend field of analysis to sets of instruments of a different nature, in order to highlight the way in which these instruments are brought into coherence with a view to a sustainability transition strategy.

## References

- Aggeri, F., & Labatut, J. (2010). La gestion au prisme de ses instruments. Une analyse généalogique des approches théoriques fondées sur les instruments de gestion. *Finance Contrôle Stratégie*, 13(3), 5–37.
- AkzoNobel, T. P. (2015). *AkzoNobel 4D P&L*. Présenté à World Forum on Natural Capital. Consulté à l'adresse [https://naturalcapitalforum.com/docs/092\\_426\\_\\_a6casestudies\\_michelscholte\\_akzonobel\\_1450174752.pdf](https://naturalcapitalforum.com/docs/092_426__a6casestudies_michelscholte_akzonobel_1450174752.pdf)
- Arena, M., Conte, A., & Melacini, M. (2015). Linking environmental accounting to reward systems: the case of the Environmental Profit and Loss Account. *Journal of Cleaner Production*, 108, 625-636. <https://doi.org/10.1016/j.jclepro.2015.07.068>

- Bansal, P., & Song, H.-C. (2017). Similar But Not the Same: Differentiating Corporate Sustainability from Corporate Responsibility. *Academy of Management Annals*, 11(1), 105-149.  
<https://doi.org/10.5465/annals.2015.0095>
- Berggren, C., Magnusson, T., & Sushandoyo, D. (2015). Transition pathways revisited: Established firms as multi-level actors in the heavy vehicle industry. *Research Policy*, 44(5), 1017-1028.  
<https://doi.org/10.1016/j.respol.2014.11.009>
- Chiapello, È., & Gilbert, P. (2014). *Sociologie des outils de gestion*. 3.
- Christensen, C. M. (2013). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Harvard Business Review Press.
- David, A. (1998). Outils de gestion et dynamique du changement. *Revue Française de Gestion*, N°120(Les organisations face au changement), 44-59.
- Dougherty, D. (1992). Interpretive Barriers to Successful Product Innovation in Large Firms. *Organization Science*. <https://doi.org/10.1287/orsc.3.2.179>
- Garud, R., & Gehman, J. (2012). Metatheoretical perspectives on sustainability journeys: Evolutionary, relational and durational. *Research Policy*, 41(6), 980-995.  
<https://doi.org/10.1016/j.respol.2011.07.009>
- Geels, F. W. (2010). Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective. *Research Policy*, 39(4), 495-510. <https://doi.org/10.1016/j.respol.2010.01.022>
- Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1(1), 24-40.  
<https://doi.org/10.1016/j.eist.2011.02.002>
- Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. *Research Policy*, 36(3), 399-417. <https://doi.org/10.1016/j.respol.2007.01.003>
- Herva, M., García-Diéguez, C., Franco-Uría, A., & Roca, E. (2012). New insights on ecological footprinting as environmental indicator for production processes. *Ecological Indicators*, 16, 84-90. <https://doi.org/10.1016/j.ecolind.2011.04.029>
- IIRC. (2013). *The International <IR> Framework*. IIRC.

- IVR. (2017). *Operationalizing Impact Valuation/ Experiences and Recommendations by Participants of the Impact Valuation Roundtable*.
- Jolliet, O., Margni, M., Charles, R., Humbert, S., Payet, J., Rebitzer, G., & Rosenbaum, R. (2003). IMPACT 2002+: A new life cycle impact assessment methodology. *The International Journal of Life Cycle Assessment*, 8(6), 324. <https://doi.org/10.1007/BF02978505>
- KPMG. (2018). Valuing your impacts on society: How KPMG True Value can help measure and manage your impacts. *Business Decisions*., 6.
- Labatut, J., Aggeri, F., & Girard, N. (2012). Discipline and Change: How Technologies and Organizational Routines Interact in New Practice Creation. *Organization Studies*, 33(1), 39-69. <https://doi.org/10.1177/0170840611430589>
- LafargeHolcim. (2017). *LafargeHolcim: Integrated Profit & Loss Statement*. Consulté à l'adresse [https://www.lafargeholcim.com/sites/lafargeholcim.com/files/atoms/files/04062018\\_lafargeholcim-sustainability-report-integrated-profit-loss-2017.pdf](https://www.lafargeholcim.com/sites/lafargeholcim.com/files/atoms/files/04062018_lafargeholcim-sustainability-report-integrated-profit-loss-2017.pdf)
- Lazonick, W., & O'Sullivan, M. (2000). Maximizing shareholder value: a new ideology for corporate governance. *Economy and Society*, 29(1), 13-35. <https://doi.org/10.1080/030851400360541>
- Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research Policy*, 41(6), 955-967. <https://doi.org/10.1016/j.respol.2012.02.013>
- Miller, P., & O'Leary, T. (2007). Mediating instruments and making markets: Capital budgeting, science and the economy. *Accounting, Organizations and Society*, 32(7-8), 701-734. <https://doi.org/10.1016/j.aos.2007.02.003>
- Moisdon, J.-C., & Hatchuel, A. (1997). Du mode d'existence des outils de gestion. *Actes du séminaire Contradictions et Dynamique des Organisations-CONDOR-IX*, 6.
- Morel, S. (2014). *L'empreinte environnementale à l'ère de la société collaborative: de l'Analyse du Cycle de Vie comme outil expert à une instrumentation collaborative pour conduire une transition organisationnelle* (PhD Thesis). Ecole Nationale Supérieure des Mines de Paris.



- Natural Capital Coalition, & Dow Chemical. (2017). *Natural Capital Protocol: Case Study for Dow Chemical*. Consulté à l'adresse <https://naturalcapitalcoalition.org/natural-capital-protocol-case-study-for-dow-chemical/>
- Nelson, R. R., & Winter, S. G. (2004). *An evolutionary theory of economic change* (digitally reprinted). Cambridge, Mass.: The Belknap Press of Harvard Univ. Press.
- Ness, B., Urbel-Piirsalu, E., Anderberg, S., & Olsson, L. (2007). Categorising tools for sustainability assessment. *Ecological Economics*, 60(3), 498-508.  
<https://doi.org/10.1016/j.ecolecon.2006.07.023>
- Planko, J., Cramer, J. M., Chappin, M. M. H., & Hekkert, M. P. (2016). Strategic collective system building to commercialize sustainability innovations. *Journal of Cleaner Production*, 112, 2328-2341. <https://doi.org/10.1016/j.jclepro.2015.09.108>
- PUMA. (2011). *Annual and sustainability report*.
- Riot, J. (2014). Construire l'innovation durable - Presses des Mines. Consulté 7 juin 2018, à l'adresse <https://www.pressesdesmines.com/> website:  
<https://www.pressesdesmines.com/produit/construire-l-innovation-durable/>
- Solvay. (2017). *Sustainable Portfolio Management guide: driving long-term sustainable growth*.
- Steen, B. (1999). *Environmental priority strategies in product development*. 67.
- TCFD. (2017). *Recommendations of the Task Force on Climate-related Financial Disclosure* (p. 74). Consulté à l'adresse <https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-TCFD-Report-062817.pdf>
- True Price. (2014). *The Business Case for True Pricing: Why you will benefit from measuring, monetizing and improving your impact*.
- Vaujany, F. X. D. (2006). Pour une théorie de l'appropriation des outils de gestion : vers un dépassement de l'opposition conception-usage, Abstract. *Management & Avenir*, (9), 109-126. <https://doi.org/10.3917/mav.009.0109>
- Volvo, & KPMG. (2015). *True Value case study, Volvo Group*. Consulté à l'adresse <https://assets.kpmg/content/dam/kpmg/pdf/2015/10/volvo-group-kpmg-true-value-case-study.pdf>

Weick, K. E. (1995). *Sensemaking in Organizations*. SAGE.