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**The Construction of Sustainability in the Cement Industry:  
Audit Culture, Materiality and Affective Processes**

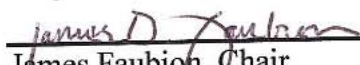
by


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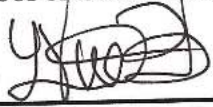
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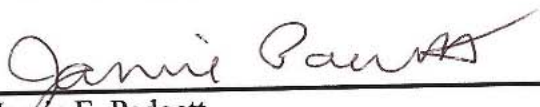
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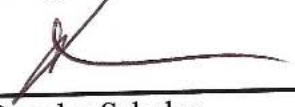
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## ABSTRACT

### **The Construction of Sustainability in the Cement Industry: Audit Culture, Materiality and Affective Processes**

by

**Laura Elena Reséndez de Lozano**

As sustainability is becoming widely adopted and introduced in industry, no single definition prevails and multiple actors interpret Brundtland's abstract notion of "meeting the needs of the present without compromising the ability of future generations to meet their own needs" in diverse ways. This research attempts to describe the complex ecology of interdependent groups of interest and layers of meaning occurring as sustainability is being constructed in the cement industry. Considering sustainability a boundary object that is malleable, I use the construction project metaphor to present my research taking as point of departure the ethnographic research conducted among cement industry employees and external stakeholders as well as academics and government agency representatives.

I begin describing the prevailing landscape of the urban environment pointing to the aesthetic discourses through time as expressions of regulatory, geographic and cultural conditions which allow certain constructions of sustainability. Next, I introduce the main actors who participate in the construction of sustainability as crew members pointing to how they relate to the triple bottom

line. To follow, I track the definition of blueprints that shape the construction of sustainability influenced by expert communities, audit culture, efficiency and the widespread trust in quantification. Then, I explore the material expressions of sustainability that combine the blueprints prescribed by experts with the subjective interpretations of actors within the constraints set by concrete and the plasticity of sustainability. Finally, I discuss the emergence of sustainable subjectivities as individuals incorporate into their mindset sustainability considerations considering the concept of governmentality and affectivity.

The edifice of sustainability is affective and material but also a numerical parameter that reaches all aspects of life and business. It legitimates capitalism through the meta-narrative of sustainability as the triple bottom line that promises to fulfill the desire of progress for all while not really transforming the life-style and consumption patterns of today. As the concept of the triple bottom line enables sustainability to be adopted, it also contributes to the naturalization of market forces.

# Acknowledgments

It is not possible to name all the people who have made a difference and who have contributed to this research project, so I thank all those who were around me while I pursued it. My incredibly supportive husband who listened to my digressions, engaged with my research and even became an anthropologist while I followed my dream; my playful trusting children who introduced humor when I could not find any; as well as my faithful parents who believed in me and my project throughout this long time; their support makes it possible for me to be here today. To the members of my committee James Faubion, Dominic Boyer, Leonardo Dueñas-Osorio, Jamie E. Padgett and Douglas Schuler. I give them most sincere gratitude not just for the intellectual guidance but for their support, patience and encouraging words through all these years. The fieldwork for this dissertation was partially funded by the Humanities Research Center, the Center for the Study of Women, Gender and Sexuality, and the Department of Anthropology at Rice University as well as by the Cemex UK Foundation. I am most grateful to these organizations for their economic support and for the implicit affirmation of my work.

Cemex is a company made by wonderful people. My grateful thanks to all employees in Cemex who accepted to be interviewed by me, who explained kindly even my most ignorant questions and who treated me as one of their own in many ways. They made fieldwork one of the best times in my life; from sharing lunches to being invited to stay with families; from sharing of personal time and offering glimpses of times gone by through storytelling, to teaching me how to drive a



bulldozer or blast a quarry; there was never a dull or lonely moment. The people in Cemex were truly generous and I was very lucky of having had a chance to share with them all a little bit of their day to day both at work and at home. The camaraderie, the intellect, the caring attitude, the discipline, the bright minds and the commitment of the people with the company and with each other were part of my daily experience in Cemex. That makes a treasure of my time working among the Cemex people that continues to inspire me. It has driven me to continue my research and writing as best as I can to deserve all the support I received.

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# Nomenclature

ASCE	American Society of Civil Engineers
BRE	Business Research Establishment (UK)
BREEAM	Business Research Establishment Environmental Assessment Method
C2C	Coast to Coast (UK)
CEM2	Cemex Responsible Sourcing Certified Cement
CEMEFI	Centro Mexicano para la Filantropía (Mx)
CI	Conservation International
CO <sub>2</sub>	Carbon Dioxide
CSH	Concrete Sustainability Hub
CSI	Cement Sustainability Initiative
CSR	Corporate Social Responsibility
DOE	Department of Energy (US)
DOT	Department of Transportation (US)
DSI	Dow Sustainability Index
EBIDTA	Earnings before Interest, Depreciation, Taxes and Amortization
Envision	ISI Sustainable Infrastructure Rating System (US)
EPA	Environmental Protection Agency (US)
EU	European Union
EU AMD	European Union Accounts Modernisation Directive
GDP	Gross Domestic Product
GPS	Global Positioning System
GRI	Global Reporting Initiative
H&S	Health & Safety
iLCP	International League of Conservation Photographers
INFONAVIT	Instituto para el Fomento de la Vivienda del Trabajador (Mx)
ISI	Institute for Sustainable Infrastructure
ISO	International Organization for Standardization
ISO 9000	ISO for quality management systems
ISO 14000	ISO environmental management standards
ISO 14001	ISO for environmental management systems
ISO 26000	ISO guidance about social responsibility
ITESM	Instituto Tecnológico y de Estudios Superiores de Monterrey
LEED	Leadership in Energy and Environmental Design
M1	Motorway 1
M25	Motorway 25
MIT	Massachusetts Institute of Technology
MSHA	Mining Safety and Health Administration (US)
NALFX	New Alternatives Investment Fund
NBSRX	Neuberger Berman Socially Responsible Investment Fund
NGO	Non Governmental Organizations
NIMB	Not in my backyard

NINI	Ni estudia ni trabaja (Does not study nor work)
NOx	Nitrogen Oxides
NPR	National Public Radio (US)
NYSE	New York Stock Exchange
OSHA	Occupational Safety and Health Administration (US)
PCA	Portland Cement Association
PPE	Personal Protection Equipment
RSPB	Royal Society for the Protection of Birds
RMC	Ready Mix Concrete Limited
SAP	Systems, Applications and Products in Data Processing software company
SMS	Sustainability management system
SOx	Sulfur Oxides
TIAA-CREF	Teachers Insurance and Annuity Association - College Retirement Equities Fund
TICRX	TIAA-CREF Social Choice Equity Retail Investment Fund
TxDOT	Texas Department of Transportation
TTI	Texas Transportation Institute
UN	United Nations
USGBC	United States Green Building Council
WBCSD	World Business Council for Sustainable Development
WGGFX	Winslow Green Growth Investment Fund
WTO	World Trade Organization

# Chapter 1

## Introduction

Sustainability, according to the United States Brundtland Commission (1987), has been broadly defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.” But how are the needs of the present and the future negotiated and defined by all interested actors in the traditional industrial sector? The cement industry is located at a challenging crossroads: “Concrete is the most widely used man-made material, and the manufacture of cement – the main ingredient of concrete – accounts for 5 to 10 percent of all anthropogenic emissions of carbon dioxide, a leading greenhouse gas involved in global warming” (Patel 2007). Socially, concrete is positively linked to the concepts and practices of development and progress by providing materials for infrastructure building; environmentally, it is responsible for significant negative impacts; and economically it represents a very attractive market. This thesis is the result of an ethnographic study of how the abstract goal of becoming sustainable is

given meaning as it is implemented in Cemex, one of the largest companies in the cement industry at the global level.

For cement, the opposing forces that shape sustainability can be clearly identified: while the growth of the cement industry addresses the economic and social dimensions of sustainability, it has a negative impact on its environmental dimension (Owens and Cowell 2002). In relation to modernity and development, the ideological weight of infrastructure and the discourse that is expressed through it has been studied in the case of Mexican cement by Gallo (Gallo 2005) while Star (Star 1999) studied ethnographically the paradoxes of infrastructure as simultaneously transparent and opaque, relational and ecological. Cemex subscribed to the Global Compact in 2004, a United Nations (UN) sponsored policy group which companies can voluntarily join to address the Millennium Goals (United Nations n.d.). Through this and other similar commitments, Cemex has been involved with sustainability initiatives for some time. However, its systematic implementation started more recently, in 2007.

Sustainability is such a broad concept that it is hard to grasp. Whereas the traditional definition is very abstract, the road to implementation requires far more detailed actions. In the case of the cement industry, the transition towards sustainability has required to find specific pathways to make it concrete and palpable. To learn about them, I conducted research within Cemex, the third cement producer at the global level, interviewing employees in Mexico, the United States and the United Kingdom as well as witnessing their interactions with multiple

stakeholders during 2009 and 2010. As an important complement, I also joined the Civil and Environmental Engineering Professors at Rice University as a graduate research assistant as they participated along with the Environmental Engineers and Project Managers at the Texas Department of Transportation. This allowed me to learn about the evaluation and development of sustainability assessment parameters for infrastructure, which uses concrete heavily, and where I could experience firsthand the role of experts on the emerging field of sustainability and from the perspective of construction related disciplines as well as audit culture when addressing sustainability challenges.

The materiality of sustainability is particularly relevant in the case of cement, given the physical nature of social and environmental impacts as well as the industrial equipments installed to solve them which at times embody sustainability as such, hence providing a particularly interesting case study. The aesthetic interpretations of sustainability in the built environment also have a lasting discursive and material imprint in the communities where sustainable buildings are constructed. The infrastructure created with cement and sustainability itself, have their own agency (Bennett 2010) where they also become actors in the construction process; along other elements of the environment, these non human actors also shape the experience of other stakeholders. Thus, sustainability can be considered to be a complex institutional assemblage (Ong and Collier 2005) that combines elements of discourse, normative ideals, material components and aesthetic values. Due to this combination of elements, sustainability acts as a boundary object (Star and Griesemer 1989) that connects interested parties with distinct experiences and



expectations where sustainability changes shape and meaning accordingly; hence, it can better be studied through as an institutional ecology observing the interactions of multiple actors when negotiating about it. In addition, the importance of neoliberal governing techniques of late capitalism that rely on auditing processes and individual responsibility also shape the understanding of sustainability, leading my attention as a researcher to the production and circulation of documents that respond to auditing requirements (Harper 1998; Star 1999; Strathern 2000b; Fortun 2009b; Agrawal 2003; Whitehead 2009). The ethical and the biopolitical are interconnected (McCarthy 2012) in an ecology that also includes affect. Hence, equally important are the affective mechanisms that surround the production and maintenance of sustainability regimes within society as sources of belonging, citizenship and capitalist value production (Muehlebach 2011; Mazzarella 2009; Stoler 2004; Massumi 2002). These affective mechanisms are intertwined with ethics as there is a drive to make decisions that does not follow rational thinking which seem to influence the development of sustainability prone subjects (Bratton 2004; Winkielman and Berridge 2003; Pfister and Bohm 2008).

Anthropology is well-positioned as a vantage point for understanding how sustainability is given meaning while being constructed by different actors and under these changing material and social conditions<sup>1</sup>. Blum-Kusterer and Hussain

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<sup>1</sup> For those readers not familiar with anthropology, the American Anthropological Association defines anthropology as the study of humans, past and present. The subfield of Sociocultural Anthropology in which this dissertation is inserted, is defined as the examination of social patterns and practices across

(Blum-Kusterer and Hussain 2001) performed a quantitative and qualitative study of the efforts to implement sustainability in the pharmaceutical industry and found that regulation is the first driving force, followed by new technologies and stakeholder dialogue. Anthropological insight can show the processes that lead to these results. Historically, anthropologists have tended to study marginal populations (Vellinga 2005). Following this trend, there have been many studies (Mühlhäusler and Peace 2006; Maida 2007; Casimir 2008; Pfister and Bohm 2008) about the impacts of environmental deterioration in indigenous communities and the difficulties faced by poor uneducated recent migrants in urban settings that point to the need to change the current order and transition towards sustainability. In addition, there have been studies (Choudry and Kapoor 2010; Nash 2005) about the agency of these marginal groups and the emergence of social movements as well as their collaboration with transnational NGOs, also attracting the attention of anthropologists. Among other contributions, these anthropological works have demonstrated the force that these groups have had on introducing sustainability as an element in the political agenda.

The anthropological study of sustainability is important to achieve a better understanding of it as a social phenomenon. The interconnection between the evolving corporate ethic that drives the sustainability movement within companies and in dialogue with key stakeholders following transparency and accountability

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cultures, with a special interest in how people live in particular places and how they organize, govern, and create meaning (American Anthropological Association n.d.).

ideas in accord to current trends of standardization and audit culture can benefit from anthropological inquiry. There are multiple tensions that wait to be studied anthropologically including the relationship between environmental, managerial and social sciences experts towards the goals of sustainability. The power dynamics between global corporate experts in the field of sustainability and local experts who possess traditional knowledge about nature and social organization can be studied through anthropology focusing on the lens of the triple bottom line that sustainability leaders endorse. The aim of this research has been learning through anthropology and sharing results with responsible leaders about sustainability dynamics as well as with academics and anyone interested in the topic. Anthropological methods help identify the ways in which people effectively engage with sustainability, commit to teamwork, and cope with the regulatory frameworks as well as standardization systems that have become the norm when implementing sustainability.

### 1.1. Background and methodology

The research that supports this dissertation had two components. The first was within Cemex, one of the largest cement corporations at the global level; and the second was through my participation with experts from the Department of Civil and Environmental Engineering at Rice University in combination with the Texas Department of Transportation. The ethnographic research took place within Cemex, between May, 2009 and December, 2010. At the time this research was conducted Cemex was facing changing market conditions and financial trouble related to a

recent acquisition; however, the Sustainability area was interested in the potential benefits of qualitative research that would complement the information provided by established key performance indicators to better communicate the sustainability initiatives and engage employees and external stakeholders through it. The project was made possible thanks to the open door policy of the company towards stakeholders, and specifically, to academics interested in it. It turned out that I was able to establish a trusting relationship with the company and the head of Sustainability at Cemex supported my doctoral dissertation project that would provide insight into organizational processes regarding sustainability implementation while also supporting my academic endeavors.

The company allowed me to conduct interviews, participate in meetings and observe daily tasks in multiple facilities located in three countries: Mexico as a country that emphasizes social problems and where environmental regulation enforcement has been mostly postponed; the United States as a country with important economic and technological strength, where the political agenda started to include sustainability fairly recently; and the United Kingdom as a country that also has economic strength and where policy has included sustainability parameters for a long time. The methodological steps for conducting fieldwork followed by Fortun (Marcus 1999): tracking, triangulating, accounting for paradox and power are replicated for the three countries.

Cemex provided office space and meeting rooms endorsing all communications and providing me with technical and safety training to properly

participate in all business areas. My aim as a researcher was to unveil the meaning making process that employees followed when faced with new policies regarding sustainability implementation. To this end, it was necessary to balance this goal with the company's interests. I acted as a member of the Sustainability Team while also explaining to interviewees my independent status and the confidential treatment of all information. In order to provide the company with measurable deliverables compatible with management expectations, I reported partial findings to each country's management team after spending time with employees in the different business units while maintaining continued communication with the corporate headquarters.

Given that executives and employees were not familiar with this kind of investigation, a research guide was created describing the nature of information that would be gathered through open ended interviews and participation in multiple operating activities. In this way, they could feel informed about the process taking place and any potential suspicions could be addressed through transparency. At the same time, it was important to convince informants and colleagues to co-participate and co-produce the project (Beers, Stinson, and Yeager 2011). Hence, the research design was a collaborative effort where the employees at the highest level would suggest which facilities, members of each team and activities or meetings within the next few days would be particularly rich or representative of sustainability in their area of responsibility. From there, the employee in the following hierarchical level would do the same, and then the next one until ready mix truck drivers, kiln operators and quarry shovel drivers would be reached. The interpretation of

sustainability that each person had became evident through their suggestions and their points of view shaped the direction of the research while minimizing the risk of the researcher shaping the results of the investigation. By conducting ethnography at the interface (Garsten 2010) beyond temporal and spatial definitions, the point of interaction of the employees with the stakeholders with whom they regularly deal, the opportunity to witness the key interests that drive a negotiation were maximized providing a showcase of the negotiation between bottom line reasoning, markets and moralities (Garsten and De Montoya 2004).

Overall, a total of 220 interviews were conducted. 60 employees were interviewed in Mexico in various locations around the city of Monterrey including those in the global headquarters of the company. Another 60 employees were interviewed in the US in several facilities, mostly around the Houston area where the US headquarters are located. 110 interviews took place in the UK, in multiple locations mostly in England and including some external stakeholders representing environmental organizations, journalists, government officials and neighbors though mostly focusing on employees. In addition, abundant field notes were taken about the participation in meetings and training sessions, informal conversations and detailed observations of the different sites.

The interviews were recorded and usually lasted between 30 minutes and one hour. Key informants had more than one interviewing session and their input was transcribed in its entirety. The rest of the interviews were summarized and coded according to their content, only transcribing the fragments that displayed the

selected codes annotating the time during the interview when they were presented to be able to go back to them easily in case needed. The coding system was developed after listening to the interviews conducted during the first phase of the research, which took place in Mexico, and it was adjusted after presenting the preliminary results to the company pointing to the meaning logics followed and to the kinds of interests mentioned during the interview.

In order to gain access into Cemex, it was necessary for me to sign a confidentiality agreement and to agree on maintaining contact with corporate officers to share results and obtain feedback from them. These conditions to do research contain some limitations while also providing clear advantages. Given that my intention was never to confront or expose the company, the limitations I faced were seriously outweighed by the advantages, since I learned firsthand about the priorities and conceptions of those directly involved with my research interests as well as allowing me the opportunity of experiencing the organizing framework, its governing structures and its social dynamics directly.

For the second part of the research, I joined a multi-disciplinary group of experts to develop a Social Sustainability Index where I worked closely with members of the academic community, as well as with environmental engineers and project managers at the Texas Department of Transportation (TxDOT). This part of the research did not include interviews as such but my total immersion in the work of the team while producing knowledge in the form of measurable indicators to assess social sustainability in small infrastructure projects.

## 1.2. Relevant studies in the field of sustainability

Sustainability has also been called a synonym of corporate social responsibility (CSR) (Evans 2010; Pojasek 2009) and there have been some anthropological studies in this field following various approaches. Welker (Welker 2009) analyses the contrasting stakeholder dynamics of contemporary capitalism in the mining industry when CSR policies are implemented in a small Indonesian town. Rajak's study of social investment by a mining company (Rajak 2011) explores how CSR holds out the promise and vision of mutual independence and self-sustainability while reinscribing the older relations of patronage and clientelism. Garsten and De Montoya (Garsten and De Montoya 2004) depict the field of CSR as defined by conference venues and the discourse that mingles 'things social' and 'things economic' by tracking keywords such as accountability, transparency and partnership. Garsten (Garsten 2010) proposes to study the field of 'corporate social responsibility' (CSR) by positioning the researcher at the interface of the linkages and connections of corporate interests with collective concerns and interest. Koh (Koh 2010) approaches CSR within a gift exchange network that transforms capitalism in America. Hamlet (Hamlet 2001) explores the links between philanthropy and business goals in Canadian oil industry. Garcia-Johnson (Garcia-Johnson 2000) focuses on the flow of ideas, values and strategies regarding environmentalism of US based chemical companies into Mexico and Brazil and their effects in NGOs, communities and policy.

All these studies inform this dissertation since they deal directly with my object of study. This research also builds on my master's thesis about Cemex's sustainability public discourse (Reséndez Malo 2008). Overall, my work is strongly influenced by



Foucauldian<sup>2</sup> inspired research projects that touched on the topic of sustainability before the word sustainability became widespread, such as the work on governmentality to describe how it shapes the emergence of the environmental subject (Agrawal 2005) and the work on how environmental knowledge is produced (Whitehead 2009). Both works also relate to the creation of policies and the influence of audit culture. In addition, I take from multiple social theory works (Latour 1988; Latour 2005; Callon 1986; Warner 2002; Bennett 2010; Stoler 2004; Mazzarella 2009) to guide my work about sustainability as I describe later.

A phenomenological approach<sup>3</sup> (Husserl 2012) not only allowed me to emphatically connect with my informants, but was also a condition for the success of my research where it was necessary to achieve Gadamer's 'fusion of horizons' (Gadamer 2004) as I position my context and life-world in conversation with my informants' in order to understand their horizons and standpoints, particularly powerful informants. As Marcus has described, when conducting fieldwork with this kind of informants, the relationship with them is different and requires considering that they might continue to influence and work with me in the future (Faubion and Marcus 2009).

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<sup>2</sup> Michel Foucault was a social scientist and philosopher who studied social institutions, power and knowledge transforming the approach of many disciplines to such topics (Foucault and Rabinow 2001).

<sup>3</sup> A thorough review of anthropological works using the phenomenological approach has been performed by Desjarlais and Throop who present examples that deal with some of the relevant issues of my research such as subjectivity, empathy, morality, aesthetics and political relations (Desjarlais and Jason Throop 2011).

### 1.3. Key business concepts that guide the implementation of sustainability: Stakeholder theory and the triple bottom line

A particularly helpful concept when approaching sustainability in industry is stakeholder theory, which was developed as a managerial approach and is widely accepted by informants and their interlocutors. A stakeholder can be defined in a wide or narrow sense; the wide sense of stakeholder is used in this research: “Any identifiable group or individual who can affect the achievement of an organization’s objectives or who is affected by the achievement of an organization’s objectives” (Freeman and Reed 1983: 91). Hence, the stakeholder theory of management states that the firm should be managed in the interests of the firm’s stakeholders (Bowie 2008: 11), accepting the moral obligations toward the stakeholders on ethical grounds. It is the approach which is most popular among companies implementing sustainability programs. Following this theory, firms might achieve sustainability through stakeholder dialogues to develop trust and engage with involved actors in a practical and financially viable way.

Stakeholder theory, though it implies a normative guideline and an ethical position, offers a particularly useful analytical framework for this research since it allows the introduction of multiple actors working together at the juncture of negotiation and/or domination. The stakeholder theory acts as a theoretical framework that explains the introduction of policy makers, experts, bankers, NGOs and others as important actors who participate in giving meaning to sustainability recognizing the potential capabilities of different publics (Warner 2002),

constituted as stakeholders. In this case, treating publics as stakeholders implies that they share a discourse regarding a particular interest regardless of how active the group is at a certain point in time. Similarly, it is assumed that stakeholders can be constituted, spatially and discursively, only in relation to sustainability concerns who derive their existence through the dominant narrative around it.

Tracking the interactions with the relevant stakeholders for the corporation was thus a useful way of tracking sustainability that enriched and complicated the ethnographic approach. For ease of communication with the business audience and to establish rapport with informants as well, the analysis has been framed as a case of stakeholder engagement where stakeholder theory is here used as an analytic. In this way, the stakeholder approach acts as a theoretical framework and at the same time, as a discourse that was deployed and performed to engage informants. Similarly, the engagement with policy makers, experts, bankers, NGOs and others can be explained in terms of stakeholder theory, linking the views of informants with those of researchers.

Stakeholders act representing a broad spectrum of interests though are often disconnected from the scope and scale of sustainability as a concept, given that day to day tasks, deadlines, performance criteria and short term gains make themselves present. The tempo and scale of sustainability are effectively hard to grasp for the actors involved when their imaginations, the economic structure and the business environment privilege immediate and measurable results.

Additionally, the aim of meeting economic, social and environmental goals or triple bottom line as explained by business authors (Savitz and Karl Weber 2006; Slaper and Hall 2011) is a relevant idea since policy and management strategies followed by informants are influenced by this concept and allows the combination of works in the anthropology of ethics, environment, economy and development. Figure 1-1 shows the triple bottom line, which informs the sustainability strategies and mission statements of multiple companies and governments across the world.

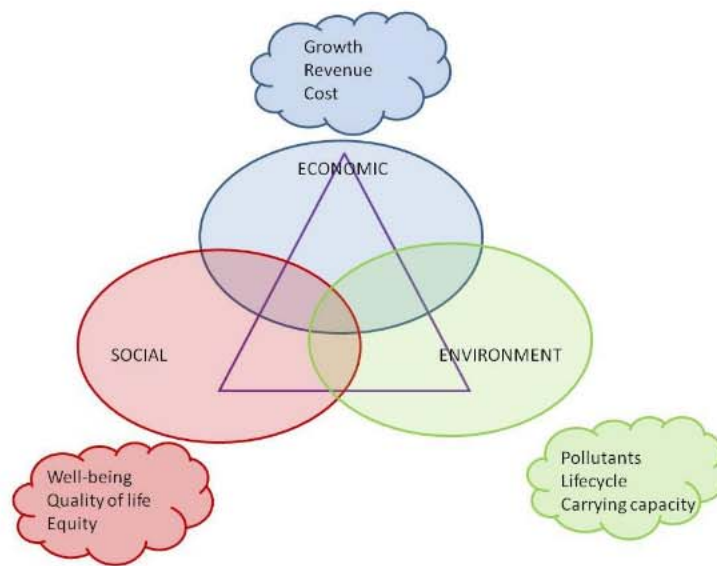


Figure 1-1 The triple bottom line

Following a trend among global public corporations, a combination between the triple bottom line and stakeholder engagement are the basis for Cemex approach to sustainability as shown on Figure 1-2.

## Cemex sustainability model and stakeholders



Figure 1-2 Cemex sustainability model and stakeholders

Figure 1-2 shows how Cemex combines the triple bottom line in the smart world together diagram. Simultaneously, it applies the stakeholder approach when referring to employees as our people, our neighbors, our business partners and the environment as our world in its sustainability model. However, the anthropological interpretation of how employees give meaning to the concept of sustainability, though framed by stakeholder theory and the triple bottom line as a business proposition, requires room for a wider interpretation that avoids normative standards. To this end, the responsibility that sustainable behavior entails is understood following the commitments that citizens face by being a part of a society. In this case, it is helpful to refer to the social contract (Jean-Jacques

Rousseau 2012) to which corporations and individuals implicitly subscribe to by participating in society (Ian Davis 2005). Taking the social contract as the point of departure, the tracking exercise follows how the meaning of sustainability evolves within the organization from an abstract concept into very concrete and measurable parameters oriented to business performance. Furthermore, the emergence of the sustainable subject in Foucauldian terms (Agrawal 2005) along the disciplining technologies which have become a part of neoliberal audit culture (Strathern 2000b; Rose and Miller 2008) complete the construction of sustainability by producing self-directed subjects that having appropriated the construct of sustainability, make sure that it is perpetuated.

#### 1.4. The construction project metaphor

In this dissertation, I focus on the processes that define and give meaning to sustainability. To present them in an organized way, I use the construction project metaphor. While this dissertation offers an analysis of how sustainability is given meaning within the construction industry, the process by which sustainability is given meaning can itself be understood usefully through the trope of construction. In this dissertation, I use the construction project structure and its requisite components to provide context. I describe the landscape and the members of the construction crew, then the blueprints and scaffolding constituted by the documentation that constructs sustainability, followed by the physical construction of sustainability where it becomes material, and finally the construction of the sustainable subject. Hence, the construction trope acts as an organizing device that

allows me to highlight and explore particular aspects of the ways in which sustainability is given meaning within the cement industry. I center my efforts in Cemex as a representative of the industry, important stakeholders such as the expert communities represented by Civil and Environmental Engineering academics, and engineers in the Texas Department of Transportation. Using the construction trope allows me to show how multiple actors simultaneously contribute to the construction of sustainability following different interests that might impact the specifications defined in the documentation, the concrete outcome and/or the subjectivity of individuals regarding sustainability.

In the next two chapters, the context where the construction of sustainability is taking place is described. Chapter 2 describes the landscape. A construction project needs to take into account the landscape where it will take place and the already existing constructions around the plot of land where the new project will stand. The landscape here also refers to considering the materiality of previous structures and the surrounding natural, regulatory and social environments. A part of the landscape chapter includes the background and historical roots that characterize this construction project. This allows for the planning of necessary excavation and foundation calculations that a new edifice requires. To this end I take a look at the history of the environmental movements as it relates to sustainability today and follow the careers of some of their leaders from grassroots movements into the supranational initiatives in the United Nations, the European Union Parliament and multiple NGOs.

The aesthetic and ethical visions that prevail where sustainability is to be introduced are also a part of the landscape that needs to be considered before defining a particular model. For example, in the case of a construction project in Santa Fe, New Mexico, the designer needs to consider the weather, the water scarcity and the deep inclinations of the terrain as well as the traditional construction style that distinguishes the architecture of the area. The topographic characteristics of the environment and the varying landscapes where sustainability is being constructed are described in chapter 2 where the similarities and differences between the United States, the United Kingdom and Mexico are described.

At a general scale there are some similarities that are discussed such as the arrival of sustainability into a market driven economy where the built environment is dominated by the car culture and the urban lifestyle needs to reflect this. Sustainability is materialized and grounded as it is implemented in the construction industry. At the same time, current ideas about efficiency, urban living and independence foster other discourses that also shape construction styles. For the case of cement, industry wide initiatives also influence the direction that sustainability implementation might take; for example, the sector project Cement Sustainability Initiative (CSI) of the World Business Council for Sustainable Development (WBCSD) has contributed to the collective action of the industry sector to report annually on Carbon Dioxide ( $\text{CO}_2$ ) emissions and other pollutants as well as health and safety statistics.



At a smaller scale the landscape is influenced in other ways; there are specific environmental and regulatory traditions as well as distinct aesthetic conceptions that shape the landscape in the three areas. Geographically, the availability of resources such as building materials and the climate conditions; economically, the budgetary situation of the government at various levels and the income of inhabitants; and socially, the concerns and taste of local residents also define the particular landscape where sustainability is to be implemented.

As part of the context where sustainability is being constructed, the most relevant actors are introduced as members of the construction crew in chapter 3. Many construction crew members participate in every stage of the construction project, particularly when it is sustainability which is being constructed. They are building it and at the same time, they are stakeholders who represent their personal interests along those of the groups to which they belong. The construction crew who participates in this project is described by focusing on the external stakeholders of the cement industry; and its internal stakeholders represented by employees' perspectives.

Build a cathedral or build a wall: it all is up to the vision of the worker. One engineer told me the story of two brick layers working in the construction of a cathedral; when asked about what they were doing, one answered that he was building a cathedral whereas the other one responded that he was laying bricks. Both were correct but the interpretation of their work varies. The participation of multiple crew members is sometimes understood by them as their intervention in

the solution of one of the largest challenges that society faces today, or as just one job to pay the bills by others. However, they all are a part of an intertwined array of connected construction projects that, once put together, constitute the actual building of sustainability.

Construction sites are busy places where crew members come in and out at different times, just as is the case of sustainability constructing. Some of the most powerful actors that determine a construction project are not traditionally considered crew members; instead, they are seen as engineers, environmental consultants, investors and regulators. For the case of the construction of sustainability, all of these actors are considered part of the construction crew where participation varies in length and scope.

The next three chapters continue to follow the construction project metaphor. Sustainability is taken to be constructed in three intertwined spheres: Chapter 4 centers on sustainability constructed through documents, where standards and accreditations as well as regulations define what sustainability is with the important participation of experts; Chapter 5 focuses on the construction of material sustainability taking a look into the built environment, where the physical environment expresses the discourse of sustainability through processes in the manufacture of cement, building materials and aesthetics as well as through the use of spaces created or re-adapted through sustainable practices; and finally, Chapter 6 refers to the construction of sustainability in the mindset and cosmology of people

through the construction of the sustainable subject, where individuals' subjectivities incorporate sustainability as an issue that they think and care about.

A very important set of documents that support construction projects are usually the blueprints. A blueprint package includes the details for each contractor involved such as architectural, civil, landscaping, structural, mechanical, plumbing, and electrical. In the case of sustainability, the equivalent package could be said to include conservation, environmental, community relations, health and safety where operations, human resources, communications and marketing departments work together with sustainability personnel to ease the adoption of each initiative.

Chapter 4 includes what I refer as the blueprints and scaffolding of sustainability as a construction project. Experts from various fields intervene during this stage including academics, building industry practitioners, corporate officers and government agents. The planning process takes place first. During it, conceptual guidelines are defined that strongly shape the final outcome and material results. However, this stage often goes unnoticed for the general public and the forces that inform the planning process often go unquestioned. Regarding sustainability, the planning process is equivalent to the definition of a sustainability implementation system through the participation of expert communities or at the corporate level in some instances.

I consider that the guidelines that the United Nations Global Compact publishes to produce and evaluate Sustainability Reports are an important kind of broad blueprint for sustainability in corporations. Similarly, the LEED rating system

is another kind of blueprint that applies for specific projects. Additionally, ISO 14001 manuals perform a similar function for production processes and there are other certifications that have been created for the finished product. Ideally, an updated set of blueprints needs to be available on site to allow for coordination among contractors. Interestingly, not all blueprints regarding sustainability are related nor do they value similarly different aspects since there are so many interrelated outcomes. Hence, communication, training and leadership styles impact on the sustainability outcome while establishing a coordinated path where all interested parties share information and understand the goals of sustainability as they relate to their specific organizational responsibilities.

While the blueprints for sustainability in the cement industry are being determined, a whole array of supporting structures is also built that I refer to as the scaffolding of the sustainability construction project. Some of the components of the scaffolding are the environmental manuals and logs that accompany the certification of ISO 1400. Others are the handbooks of procedures regarding health and safety and all the pre-established systems that support the blueprints of sustainability.

The ethnographic account of the blueprint and scaffolding stage of sustainability construction is composed of four parts that complement one another to offer a glimpse of the merging interests and the re-formulation of sustainability into a complex system. Instances of the collaboration of industry with the academy, the participation and support of government agencies, the voluntary production of accountability reports regarding sustainability and the creation of sustainability

metrics are described in this chapter in relation to the emergence of audit culture mechanisms and multiple disciplining techniques.

Once these preliminary steps have been completed, the construction project starts to take physical shape as described in Chapter 5. Not only documents are produced in this stage; there are also material results that testify the advancement of the process from here on. However, documentation continues to be required. For the case of sustainability, once the early steps of its construction are completed, a combination of documents and material transformations take place simultaneously. For some people, sustainability is embodied in the environmental equipment installed in the factories, or becomes concrete through architectural projects and even in the printed reports or in reforested areas where old quarries have been transformed. This chapter discusses how sustainability becomes concrete in different ways for the people according to their experiences and expectations though influenced by pre-determined metrics that privilege certain parameters. At the same time, I point to the independent strength that these non human actors have in communicating and shaping the understanding of sustainability.

Finally, and in close relationship to the establishment of accreditations and certification processes, the emergence of the sustainable subject is discussed in Chapter 6 where governmentality merges with affective processes. In this chapter I explain the way people relate to the concept of sustainability following distinct logics in the context of stakeholder engagement and interest negotiation. According to the nature of the interests that prevail when giving meaning to sustainability, six

meaning making logics were identified through the analysis of the data and each is described ethnographically. Four of these logics effectively result in sustainability becoming meaningful to the person: the market, hope, relationship and conscience logics which will be described below. However, two other logics emerged from the data showing how people who reject sustainability policies follow a denial or pessimistic logic.

The conclusions to this dissertation are presented in Chapter 7 where I discuss the final edifice of sustainability in connection to the audit culture described in the blueprints sections while influenced by the material forms taken by sustainability and the expressions of cement in the built environment through time. In the context of the car dependency and trust towards experts, particularly those who can quantify relevant parameters, sustainability becomes a manageable edifice with changing meaning. Both, sustainability and cement, act as boundary objects that allow for the communication between the actors and the co-production of sustainability. While separated from the rest, each actor builds a personal understanding of sustainability which changes when discussing it with others or experiencing what others have interpreted about it. In this way, sustainability inhabits at the borders where different groups meet and communicate. Similarly, in the case of cement, the expressions that cement based construction enables act as boundary objects conducing to particular types of interaction among actors. Simultaneously, while capitalism incorporates sustainability into its *modus operandi*, sustainability also incorporates market criteria and efficiency measures in its concrete materialization. The naturalization of the triple bottom line, on one

hand allows for the widespread adoption of sustainability in the business arena, and on the other, it highlights the social and environmental goals that can effectively be translated into economic terms privileging the traditional bottom line. New socially responsible sustainable subjects are emerging who appropriate the discourse and practices of sustainability becoming self-regulated sustainable subjects after negotiating meaning according to their own context, values and beliefs.

## Chapter 2

# The Landscape of Cement and Sustainability

In this chapter, I deploy the construction project metaphor to describe the context and background of cement and sustainability as the landscape where the new construction is to take place. The foundations of any new building need to consider the qualities of the soil, the topography of the land, the interests of the neighbors and the attitudes of the general public. This chapter aims to provide a general description of the overarching context in which sustainability is being promoted at a global level, the role of the United Nations, and the supranational initiatives that have been established to address it. It also describes the context of the cement industry at a global level including the traditional link to ideas of



modernity and development as well as the current transition towards sustainability. I emphasize the aesthetic connection between architecture, capital and cement paying particular attention to the historic role of cement during the social process that accompanied industrialization and its current changing position where sustainable concrete is redefining these connections. I also discuss the role of cement in the urbanization process during the 20th century and the importance of the automobile as the preferred mode of transportation. Lastly, I explain the relationship between sustainability and the cement industry at the global level and in the national context of the three selected countries: the United States, the United Kingdom and Mexico including the contrasting environmental traditions and regulatory frameworks as important components of the regional landscape.

The purpose of this chapter is to bring an anthropological perspective to the landscape following Ingold's dwelling perspective. He states that "the landscape is constituted as an enduring record of - and testimony to - the lives and works of past generations who have dwelt in, and in so doing, have left there something of themselves" (Ingold 2011: 189). Ingold proposes a 'dwelling perspective' where "humans are brought into existence as organism/ persons within a world that is inhabited by beings of manifold kinds, both human and non human. Therefore, relations among humans, which we are accustomed to calling 'social', are but a subset of ecological relations" (Ingold 2011: 5). He describes human engagement with the world as a continually unfolding of relationships which situates the practitioner,

whether of one practice or another, influenced both by a highly structured environment, and by biological and cultural contents.

For him, people interact practically and technically with the environment while they simultaneously construct an imagined life-world. Ingold (Ingold 2011) has pointed to how the naturally real and the culturally imagined are effectively intertwined and considers that the way of acting in the environment is also a way of perceiving it. As the people engage the world through their senses, they are also intervening in it, getting to know the world at the same time that they shape it. Ingold states that “people develop their skills and sensitivities through histories of continuing involvement with human and non-human constituents of their environment” (Ingold 2011: 10).

Following Ingold, I consider that the engagement of individuals with the environment, from the anthropological stance, is twofold given that on one hand there is a cultural construction of the environment and of the role of humans in it, and on the other, the very practices of engagement shape the environment and enable certain human activities while preventing others. Hence, the built environment that results from human activities, and in this case focusing particularly on the use of concrete, reflects not only the values and beliefs of society during the cement age, but literally creates the infrastructure that is required for the practices that revolve around it. The dependence on cars as the preferred mode of transportation and the transformation/domination of nature through the establishment of paved roads and buildings that exceed shelter needs to signify

civilization and power are expressions of cultural beliefs and related practices at the same time. Today commuters, suburbanites and urban dwellers perceive and experience the built environment under the strong influence of car dependent infrastructure. Designers and builders also conceive their projects accordingly, adapting their projects to aesthetic propositions that perpetuate the notion of car use as the preferred mode of transportation, widespread concrete based buildings and ample concrete paved surfaces or stacked up concrete decks for cars to be parked.

The built environment in urban areas demonstrates the triumph of mankind over nature, which has been subdued to obey the command of humans who control their surroundings and create the conditions that have been idealized as the manifestation of civilization. Hence, the massive presence of concrete structures to allow mobility and provide huge areas suitable for air conditioning show the ability of the civilized and triumphant human to dominate nature and provide a 'better' environment. The built environment is thus the symbolic representation of human's domination over nature where concrete comes to represent civilization, advancement and modernity following Weber's ethos of world mastery (Max Weber 2007). Similarly, the more recent built environment incorporates ideas of sustainability that attempt to return to nature and embrace it, concrete structures in this case represent the newer discourses.

Construction workers build and inhabit the city; their experiences and their connections with the built environment do not end when a building project is

completed, but only change by incorporating a new structure into the landscape. Similarly, city inhabitants experience the built spaces for a long time after a project has been finalized. In some instances, like in the United Kingdom, the built environment seems to have a permanent character and there is interest in preserving old structures with very few exceptions whereas in the United States, the built environment has a more ephemeral nature, given that it is commonly accepted to remove outdated structures and build new ones. This attitude towards the built environment is in itself indicative of the relationship that nations have with their surroundings, and it might be a factor that has led the British to be more concerned with environmental challenges than the Americans. These differences can be better understood by reviewing some historical details about the environmental movements that are discussed next.

## 2.1. Sustainability background

First I provide a concise description of the historical moment where sustainability emerges and then focus on the broad context of sustainability in the business arena. The concern for the decaying qualities of the natural environment can be traced back to the very early stages of industrialization. However, the 1960s saw a growth in activism in general and a very particular increase in the amount of environmental movements as noted by Rootes (Rootes 2008). Carson's *Silent Spring* (Carson 2002) marks the beginning of the American environmental movement though Thoreau and others had already noted the need to preserve natural

resources. Rootes (Rootes 2008) describes how in Europe there also existed multiple movements to protect the environment since the middle 19<sup>th</sup> century mostly among the elites, but he points out that Carson's work was timely and received the attention of the media, transforming the environment into a mass concern.

In the European case, as stated by one key informant, some of the main persons pushing the environmental agenda in the European Parliament today began their careers as activists during the late 60s and early 70s. To a great extent, the goals of sustainability became main stream and the legal and political framework that has been established in that region shows this. Carson's seminal work did not have as big an impact in the American case given the different political conditions prevalent in this country. Mexico and other developing countries did not have a strong response to Carson's *Silent Spring* given the socio-economic conditions that pushed them to focus on other priorities so that DDT<sup>4</sup> and similar compounds continued to be used in some cases (Allsopp and Erry 2000).

However, the progress myth began to break down worldwide and the chaos and hopelessness led to a landscape of abandoned industrial facilities, environmental breakdown, and the general decay of the cityscape (Nowotny 2006). The transition towards sustainability happens on the verge of an apocalyptic

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<sup>4</sup> Carson's work described the impact of the chemical pesticide dichlorodiphenyltrichloroethane (DDT) that had been used to control malaria and typhus on the fauna, particularly on birds, which led to its banning and to the launching of the environmental movement.

aesthetic questioning the premises of modernity and guiding the emergence of a new aesthetic discourse that values nature and people. Whereas the Industrial Age emphasized the conquering of nature, the importance of capital, and the supremacy of the machine implicitly reinforcing patriarchal hierarchy and a masculinized aesthetic, the emerging sustainability discourse has a feminized nature. Whyte explains the origin of the modern movement in architecture: “The modern movement did not come into being because steel-frame and reinforced concrete construction had been worked out; they were worked out because a new spirit required them” (Whyte 2006: 163). Going beyond the technical developments that enable new construction systems and measurements of environmental risks, it is the ideology that guides the emergence of the changing discourse that embraces sustainability today that can effectively transform the prevailing landscape, the use of space and the future built environment.

In this changing context, corporations engage with sustainability in response to ethical, market and stakeholder considerations. Freeman and Reed describe the state of things: “Suffice is to say that the social movements of the sixties and seventies – civil rights, the antiwar movement, consumerism, environmentalism, and women’s rights – served as a catalyst for rethinking the role of business enterprise in society” (Freeman and Reed 1983: 90). From an ethical perspective, responsible citizens, including corporations, are encouraged to act towards the improvement of the social conditions among the impoverished majority of the population and to change their consumption habits, taking into account the limited

resources available, the polluting impact of waste, the diminishing water supply, the deteriorating air quality and the needs of the planet. Sustainability is therefore taken by institutional actors as one of the important priorities when elaborating policy measures. However, sustainability is a rather ambiguous term; the official definition of sustainability given by the United Nations Brundtland Commission (1987) is “meeting the needs of the present without compromising the ability of future generations to meet their own needs” which might be understood and applied in very different ways by various social entities.

Figure 2-1 shows how social actors and institutions participate in the promotion of sustainability initiatives. Hence, there are multiple stakeholders who interpret and guide this definition in different directions. The sustainability idea travels among non-governmental organizations (NGOs), governments, corporations, churches and media, evolving according to each actor's worries and experiences. The United Nations tries to lead the way in addressing planetary needs by recognizing the consequences of man-made manufactured risks but also the possibility of mitigating them.<sup>5</sup> The UN brings together NGOs, governments and corporations in an effort to solve the lack of sustainable practices in the current civilization. Thus, during the Millennium Summit, the Millennium Declaration<sup>6</sup> proclaimed the Millennium Development Goals (United Nations n.d.) where 189

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<sup>5</sup> Beck and Giddens have pointed out that a consequence of modernization and individualization is the recognition that risks such as pollution are manufactured and marked by human agency. While human kind is capable of producing such risks, it can also mitigate them.

<sup>6</sup> Resolution adopted by the General Assembly as 55/2 United Nations Millennium Declaration.

heads of state, recognizing a palpable sense of urgency, committed themselves to a shared goal of ending poverty and protecting the natural environment, agreeing to share responsibility.

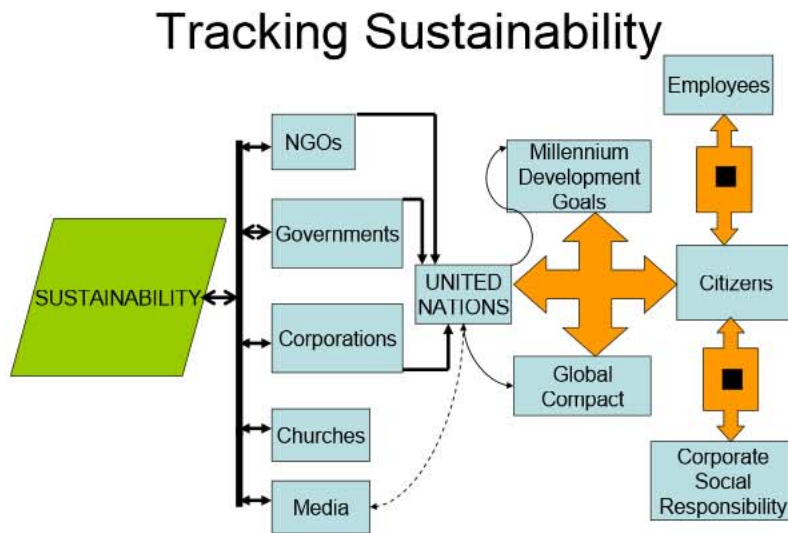


Figure 2-1 Tracking Sustainability

The citizens of all the subscribing countries including corporations and individuals such as employees are then included in this United Nations resolution and are expected to participate with their governments to take urgent and concrete actions in this regard. Figure 2-2 portrays each of the goals adopted in the United Nations Millennium Declaration which are closely related to current understandings of sustainability. These goals are broader than environmental sustainability and have been driving forces in the effort to broaden sustainability to include social concerns, as well. While many of these concerns are relevant to NGOs and/or



governments, corporate actors might participate indirectly to achieve them by sponsoring diverse programs, such as promoting gender equality in the workplace and environmental sustainability through improved processes and technologies. It is interesting to note that, while following an ethical position, the market logic also permeates the Millennium goals and the understanding of sustainability when companies engage with it as discussed later. Profit-seeking activities are conceived as a natural way of organizing existence by the United Nations. Hence the importance of economic growth is expressed through the interest in economic development along with the needs to eradicate hunger and poverty, educate the people, reduce child mortality, improve maternal health, and combat contagious diseases such as HIV.



Figure 2-2 The UN Millennium Development Goals<sup>7</sup>

<sup>7</sup> (United Nations n.d.)

As a complement to the governmental programs needed to address the Millennium Development Goals, the corporations and their very important economic resources are invited to participate in the Global Compact<sup>8</sup>. The Global Compact is a policy platform and a practical framework for companies that are voluntarily committed to sustainability and responsible business practices in the areas of human rights, labor, environment and anti-corruption catalyzing actions in support of broader UN goals. By subscribing to the Global Compact, a company expresses a choice to become socially responsible, and joins governments and NGOs in trying to achieve sustainability. In the case of corporations that participate in the Global Compact, there are organizations which have designed auditing techniques,<sup>9</sup> such as the Global Reporting Initiative (GRI) and the Dow Sustainability Index (DSI), whose guidelines are followed by companies when producing sustainability reports in an effort to be transparent and accountable towards society at large.

There are important implications for industry actors that evolve out of these reports, given that the standard framework used in them establishes the sustainability priorities and the acceptable ways to cover them. In addition, the national traditions, regulations, demographics and geographical surroundings also influence how sustainability is to be implemented and interpreted in each environment. Similarly, the gender, race, class, educational level and income level of

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<sup>8</sup> The United Nations Global Compact. <http://www.unglobalcompact.org> accessed November 14, 2009.

<sup>9</sup> These auditing organizations spread the self disciplining tools required to compare the various sustainability efforts in industry in terms of Foucault's governmentality concept.

individuals shape their understandings and interest in sustainability. Therefore, the local interpretation and implementation of sustainability varies as will be shown later.

Though the triple bottom line was already discussed in the introductory section of this dissertation, I consider it necessary to emphasize how it is an important component of the sustainability landscape which informs the rest of the project. The notion of the triple bottom line (Savitz and Karl Weber 2006) as an expression of sustainability is also a very important influence on how sustainability is being conceptualized within the corporate setting. The recognition of economic, environmental and social forces that often pull in opposite directions as components of sustainability not only make it more challenging to implement, but show how the market forces have become naturalized and merged with sustainability.

## 2.2. Cement background

Given the strong relationship between the natural environment and the built environment that results from the use of cement, the cement industry offers a particularly interesting case to learn how social priorities evolve and how the industry adapts when new values and aesthetic ideas are being introduced. Cement is the main component of concrete; the most widely used man-made material. The presence of concrete is so pervasive that it is often noticed only when it is missing as in the case of an unpaved road. Every year, 20 billion metric tons of concrete are added to the built environment at the global level (Metha, Kumar and Meryman,

Helena 2009) impacting the living conditions of everyone on the planet. This is more than one cubic meter per person per year given that there are 7 billion of people on earth or the same as building 800 Three Gorges dams, the largest one ever built (Three Gorges Dam (dam, China) -- Britannica Online Encyclopedia n.d.), every year.

Concrete's gray sturdy appearance has transformed the urban landscape along with aesthetic conceptions of the city. However, the cultural impact of concrete is rarely discussed (Slaton 2001). Interestingly, the use of concrete is relatively new since cement, its main ingredient, grew in popularity only in the early 20<sup>th</sup> century. The long life of concrete buildings, the affective and sensual representations of gender that accompany such structures and the prescriptive masculinity and femininity that emanates from them usually remain unquestioned. The buildings created by architects combining materials leave a testimony of the political and aesthetic priorities of their time as Kingwell argued: "Architecture...It is, after all, a form of aesthetic immortality, inflicting itself on future generations and shaping thought and action for decades, sometimes centuries" (Kingwell 2008: 81) resembling Ingold's dwelling perspective (Ingold 2011). The built environment's legacy shapes the behavior and imagination of several generations through space allocation and aesthetic communication. The popular imagination has incorporated concrete as a natural companion of urban life and I consider it important to explore the gendered representations of this material as well as its connections with normative gender. For example, the presence of concrete has inspired poems such

as this one that refers to the affective relation that people have developed with it that depicts it as a masculine and strong material.

Hard and Soft

Beautiful Concrete

The next time it rains, go out and touch some. Find a wall or a bench or just a stanchion, and run your hands along the spongy, almost-smooth surface.

Feel the tough, wet muscularity of it. Skim your fingers over a few of the thousand small holes – bubbles really – that notch the outside. Pebbles and other tiny bits are lodged in the surface, looking like you might just pry them out. You will not.

(Kingwell 2008:2–4)

Kingwell describes concrete in metaphoric language that refers to masculine representations; when inviting his reader to appreciate concrete, he writes “Feel the tough, wet muscularity of it” (Kingwell 2008:4) using sensual images and even arousing a desire for concrete through it. He continues to describe concrete’s characteristics using words that could very well be ascribed to a male figure: “solid, heavy, brutal, tough, hard” though also “expressive and rewarding, plastic” (Kingwell 2008:4–8). This intertwined male-concrete description explains the aesthetic dimension that concrete can bring into the buildings where it is used while prescribing a proper way of being a male at the same time. “This routine normalization of a hegemonic masculinity and homophobia has a profound bearing on urban experience, life-chances and well being” (Jarvis, Kantor, and Cloke 2009:19) influencing the way subjects live their lives and their gender.

By referring to corporeality, gendered metaphors educate the public on what patriarchy wants to say about males and females: the aesthetic attributes of building materials and machines “follow the specific cultural and historical conditions that have governed Western culture since before, but increasingly during, the industrial era” (Brummett 1999:43). Through the use of metaphors, gender, materials and space alike are the result of the social construction of reality that embodies the social order and reproduces the structural principles of society, including gender (Löw 2006:119). The built environment goes beyond the principle of “form ever follows function” (Louis Sullivan 1896) as Sullivan stated; rather buildings are instruments by which emotions, ideas and beliefs are articulated following the thoughts of their time (Whyte 2006: 155). Furthermore, in the case of concrete and the buildings and monuments of our time, given that they have been a vehicle to provide identity to modernity in masculine terms, have also come to symbolize and reinforce the powerful regulatory norms and stereotypes that rule our world and discipline our bodies, showing the centrality that capital has gained and the masculine character of it. The masculine representations of concrete buildings symbolized success in a cut-throat competition model intertwined with notions of power, seduction and domination creating a landscape that continually communicates these ideas. As a corollary, the “almighty machine” (Seltzer 1992) of modernity in its masculine interpretation conquered the feminine earth-mother reproducing the historical patriarchal hierarchy to the detriment of nature.

Modernism, brutalism, and other architectural styles in the industrial age gave voice to these ideals. The fissures and fractures that late capitalism currently faces along with the signs of deterioration in the environment are reflected in more recent architectural propositions such as The New Urbanism and Place-making where rather than emphasizing capitalism, efficiency and technology, sustainable concrete comes to represent a harmonious society that values nature and people (Shibley 1998). The paradox of sustainable cement not only needs to address technical challenges related to carbon footprint and global warming, but also the merging of masculine and feminine attributes in the social imagination. While capital and economics linked to masculinity are still important driving forces in the popular imagination and in the social system, the feminine portrayals of nature and care are now recognized as key components of the system. This paradigm transformation offers not only a way out of the chaotic brutalism of the industrial age, but a revalorization of ecology and femininity, blurring the hierarchical structure of clearly bounded gender categories inherited by patriarchy. It is in this defining moment that observing the landscape generated by concrete use provides a wealth of information about our society.

There are more implications to the built environment besides the gendered nature of concrete building. Cement is used to build infrastructure, and as such, it is “both relational and ecological - it means different things to different groups and it is part of the balance of action, tools and the built environment inseparable from them” (Star 1999). There exist strong imbrications between human organization

and the infrastructure around it that are not perceived unless infrastructure breaks down. Today's living standard, the way people work and play, depends so heavily on cement-built infrastructure that I consider it to carry a strong symbolic value beyond that of short lived commodities. Paying attention to the presence of cement around us shows current conceptions about progress, environmental justice, planning priorities and aesthetic values that have naturalized gray cement and concrete pavement as the desired surroundings par excellence. Hence, tracking the adoption of sustainability practices in the cement industry not only shows industry's transformation but the changes in social understandings and priorities about development and the increasing interest in balancing the goal of improving social conditions with environmental impacts while attempting to maximize economic output. Whereas the introduction of pavement and concrete used to be considered as the equivalent of progress enabling the faster distribution of goods and services as well as increasing the mobility of people, today it might be considered to have a contradictory effect. The improvement in social sustainability occurs at the same time that the increased temperature in the city, the potential for storm water management problems, and traffic congestion among others are considered negative environmental impacts that question the stated social benefits, as will be discussed later.

The construction industry, particularly the cement industry, has strong links to the idea of modernity. Development and quality of life under the modern umbrella are defined in terms of material conditions that consider cement as a



superb material for housing and infrastructure (Slaton 2001; Gallo 2005). Not only have dirt floor dwellings come to be considered backward under the idea of modernity, but the conception of comfort appears to require concrete surroundings (United Nations 1992). Whereas some economists (Ananchotikul and Eichengreen 2008; Krueger 2009) consider that establishing financial and legal structures such as solid capital markets and adherence to the World Trade Organization (WTO) or functioning customs agencies are the necessary plumbing for achieving development, I consider that the infrastructure provided by concrete effectively represents the material plumbing required for development as understood today. Even migration and urbanization seem to be linked to the desire for concrete and what it entails (Lundgren 2001; Reyes-Trigos 2004). Cement-based urbanization and paved roads allow freedom of movement based on the use of cars and housing alternatives that make it possible to avoid the nuisances of weather. These are considered ideal conditions leading to consumption patterns that are energy-intensive and have negative impacts on natural resources. However, cement companies have engaged in an in-depth analysis of the environmental and social impacts of cement consumption, leading to multiple initiatives that call for sustainable strategies while continuing to build with concrete as the concern for becoming sustainable has spread to industry.

Today, cement per se is one of the elements that sustain current civilization to the extent that well-being and development are tied to cement consumption as I just described above. Social sustainability discourse and development programs

have naturalized the use of concrete and use it as a measure of advancement. Furthermore, cement producers along with policy makers consider that to increase Gross Domestic Product (GDP) in developing countries, huge infrastructure investments – including concrete roads, concrete dams and bridges, and concrete based energy efficient buildings – are needed (Cement Sustainability Initiative 2007).

In addition, the economic importance of the cement industry is enormous and can hardly be exaggerated. Concrete represents a very attractive market that is expected to amount to \$105 billion by 2015 (Today's Concrete Technology 2010). The economic activity that is linked to the construction industry drives the economy of multiple cities and parallel businesses along with providing the underlying support of energy-intensive consumption patterns, which drive the demand for other products as well. The economic sustainability of innumerable entities is thus linked to the continued use of concrete and cement. Furthermore, concrete is a basic material in roads, bridges and buildings to such an extent that current urban practices are strongly linked to concrete consumption given its ties to the automobile dependency and the characteristics of urban dwellings (Crawford 1999; Hester and Harrison 2004; Harrison 2005; Eisenhower 2011; Charlesworth 1984; Powell and Brennan 1988). The link between building and automobile has even been named motortecture (Meyhofer 2003) to underline the symbiosis between motor vehicles and architecture. While not even a century ago cars and highways were not prevalent (Slotboom 2003) today they are considered necessities and

policy makers as well as most other people can only imagine mayhem when faced with the possibility of altering current transportation patterns (ASCE 2011). At the turn of the 20<sup>th</sup> century horse carriages, mule drawn streetcars, and steam engine trains were used to solve transportation needs and narrow dirt roads were the most common sight (Crawford 1999). Today there are some signals that may point to a new era where cars and pavement might be less valued: “Paved roads, historical emblems of American achievement, are being torn up across rural America and replaced with gravel or other rough surfaces as counties struggle with tight budgets and dwindling state and federal revenue” (Etter 2010). Though the use of cars is highly embedded in society today, there seems to be a change in priorities that might reverse the trend from car dependency and huge paved surfaces towards public transportation or other alternatives which might diminish the use of concrete.

Beyond its indirect impacts on the carrying capacity of the planet which increase demand and consumption through a built environment that promotes waste generation and energy intensive practices by everyone, the cement industry has direct negative environmental impacts due to the emissions of carbon dioxide, dust, noise and other pollutants that harm the natural environment. Technological advancements in the cement industry are focused on controlling these negative environmental impacts and sustain the importance of cement in the social and economic realms. In the meantime, it is particularly interesting to track how cement industry representatives engage with sustainability and simultaneously attempt to

avoid significant change in the cultural understandings of comfort and development. The impact of cement production spreads well beyond the neighboring communities not only through its environmental impacts but through the worldwide urbanization process and accompanying practices that have become desirable expressions of 'being civilized and advanced'. This provides contextual information that explains the importance of cement in daily life which will allow me to show that when the cement industry introduces sustainability into its operations, the impacts extend to the built environment and to people's daily practices. In the following pages I describe the symbiosis between concrete, particularly infrastructure, and cultural practices as I observed them in the sites where I have located my fieldwork.

### 2.3. Monterrey, where quarries frame the city

Monterrey is located in Northeast Mexico. It is an industrial city built in a dry area surrounded by mountains and home to some of the most important Mexican companies. Steel mills, cement kilns, glassworks and beer brewing were the basis for the industrialization process of the region and industrial activity is still greatly valued. With this in mind, we can tour the city of Monterrey, where Cemex headquarters and one cement clinker plant are located. We can view the impressive mountains that surround the city of Monterrey but also the even more impressive imprints of the mining activity related to cement production. This is shown in Figure 2-3.



Figure 2-3 The Fraile mountain and the urban landscape from Las Mitras mountain<sup>10</sup>

Although the name of the city Monterrey means king of mountains, these mountains have become the material with which the city has grown. Cement has come out of the mountains in the form of limestone to turn into all sorts of buildings

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<sup>10</sup> Yolanda Saro's personal collection, with permission

as shown here. Neither the city inhabitants nor Cemex seem to be particularly aware of the changing environment that results from mining the surrounding mountains. Building and growing seem to be the most important priorities since they are considered the vehicle to progress and civilization. Dust particles, noise and deforestation accompany the extraction of cement's raw materials. Neighbors are exposed to health risks, particularly respiratory problems. The ecosystem is altered when vegetation is removed and animals do not find places to nest.



Figure 2-4 A view of the urban landscape of Monterrey with the Cerro de la Silla Mountain on the back and particles in the atmosphere<sup>11</sup>

The effect on the environment is felt in the city of Monterrey, as shown in Figure 2-4; the sky is rarely blue and the houses need to be dusted daily since particles will get everywhere; however, these are rarely discussed. Instead, the urbanization process and the interest in becoming modern as understood by the

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<sup>11</sup> (Padua 2008) With permission.

general public, construction industry entrepreneurs and policy makers brought about a change in architectural style. Cement and concrete displaced traditional materials such as adobe, stone and ashlar which are also available in the region and take more into account local climate. King (King 2002) explains that modern ideas and cheaper products derived from cement and concrete are the most used building materials in Northeast Mexico today. As Whyte (Whyte 2006) states, the technical developments were worked out because the new spirit of the modern movement required them. Figure 2-5 shows homes for low income people built with a concrete framework and concrete blocks in sharp contrast to the traditional house shown in Figure 2-6. The thick walls and high ceilings that traditional buildings had are hardly found in the newer constructions. Though air conditioning can increase comfort, many people cannot afford high energy bills and continue to prefer the newer materials and styles over the traditional ones.





Figure 2-5 Concrete framework and masonry homes in low income neighborhood in the Monterrey metropolitan area<sup>12</sup>



Figure 2-6 Traditional home in northern Mexico<sup>13</sup>

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<sup>12</sup> Ana Cristina Lozano personal collection, with permission.



The growth of the city of Monterrey required improved roads and increased the need for transportation, indirectly benefiting cement sales as modern ideas were adopted and the façade of the city showed them. The number of cars has risen and the distance from home to workplace has also grown, changing the sense of community and belonging among inhabitants and transforming the kind of relationships that factories have with neighbors. While cement workers used to live by the cement factory, steel mill workers by the steel mill, and similarly other workers close to their jobs, urban growth increased the price of land. Hence these sites became suitable for other sorts of construction, and blue collar neighborhoods were created further away from the center of town, leaving industrial sites surrounded by buildings and people who were not directly related to the industrial activity being conducted there. The expectations of new neighbors changed since they were not depending on the factories for jobs and did not take their presence as a natural part of the landscape, and factories had to adapt their production to minimize their impact on neighbors. In the case of cement, dust controls were established and the hours when trailers with product left the facility were shortened. At the same time, the mining areas where cement raw materials had traditionally been obtained, which had been isolated, suddenly were surrounded by neighbors who would complain about dust and noise. Though this is still a problem and much of the city of Monterrey suffers the consequences of mining activity-

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<sup>13</sup> Yolanda Saro's personal collection, with permission.

related dust pollution, the situation has improved somewhat and the population has become less tolerant about this as is discussed later .

However, few people are able to link the presence of cement in their homes and in their lives to the factory and mines that produce it. Hence, the dust has become a part of climatic conditions and the city of Monterrey is imagined as a dusty city as if it was part of the weather and a natural condition. Other pollutants that cannot be seen, such as CO<sub>2</sub> emissions, have only recently started to be monitored due to the intervention of foreign initiatives and environmental movements elsewhere, since local advocacy groups usually turn their attention to the most physically evident issues or to community needs that can be solved with the participation of companies and neighbors.

It is also important to note that Cemex is one of the most important companies in Mexico and especially in Monterrey, where it started. Working for Cemex had generally been perceived as a good thing since wages and benefits are above average and there are opportunities for making a career within the company. However, there have been some changes in the reputation of the company; young professionals have noticed that the working hours are extremely long and the economic downturn has changed their expectations towards Cemex since layoffs are not uncommon. Blue collar workers have found that the working conditions in a cement plant can be very hot and young technicians often look forward to joining a company with air conditioned plants. These attitudes can be related to sustainability and its implementation, as will be discussed later (See page 54).

As has been described, cement in Monterrey has become an integral part of the city, changing the architectural style, the aesthetic conceptions, the movement of goods and people, and the entire organization of the community. While this process was linked to the idea of progress, more recent ideas about sustainability question the environmental impacts of cement and the resource depletion which consumption patterns that the cement based built environment enables, including the expectation from society that corporations participate in tackling social problems. The leadership role of Cemex in the region around Monterrey has contributed to making it not only an interesting case study through which to follow the introduction of modern ideas of progress in the city but also to track how companies have participated in solving social challenges, not only by providing jobs but by engaging neighbors and offering educational opportunities in the communities where they operate. Hence, they contribute to changing the mindsets of the people spreading entrepreneurial attitudes, environmentally responsible behaviors and introducing a managerial approach and metrics into the imagination of those around it when assessing challenges.

The introduction of cement as the preferred construction material in Monterrey's society has achieved such a success that it is hardly questioned. In the local arena, the concept of sustainability is beginning to gain space in the public opinion, and it is mostly through voluntary efforts headed by private companies like Cemex that it is being introduced. Only recently, there has begun to appear some resistance to the operation of quarries by some environmental groups (El Norte

2013). The use of concrete in infrastructure is common in the region, though there are only a few examples given that there are relatively few freeways, bridges and overpasses compared to the widespread infrastructure networks existing in the United States, and Houston, TX in particular, to which I refer next.

## 2.4. Houston, a concrete maze

Arriving in Houston by car makes evident the city's strong intertwining relationship between concrete building and the car dependent culture of some cities. The intricate concrete freeway network has been clearly illustrated by Slotboom (Slotboom 2003) as shown in Figure 2-7 and it captures many of the characteristics of the city which help in understanding its inhabitants.



Figure 2-7 Houston Freeways<sup>14</sup>

Coming to Houston from San Antonio by way of I-10<sup>15</sup> is like stepping into an entire city honoring concrete while loudly embracing an imagined freedom brought about through the widespread use of cars. The incredibly busy roads, freeways, overpasses, bridges and intersections not only are built mostly with concrete, but are so massive, that one quickly stops noticing them. In my case, I remember my

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<sup>14</sup> (Slotboom 2003: Book cover photo) (with permission)

<sup>15</sup> I-10 is one of the widest roads in North America; some parts of it in the Katy area have up to 26 lanes in width.

arrival to the city back in August of 2008 and the seemingly incredible width of the roads, the speed of the cars, the feeling of being vulnerable as others would zoom by the side of my car, and the very long distance that I drove from the beginning of the Houston suburbs to my apartment close to Rice University. While I was driving an SUV, which in Mexico would be considered a rather large vehicle, filled with things to set up my graduate student apartment, I began to feel that my vehicle was only average size in the context of the Texan highway, where many pick-up trucks and SUVs surrounded me along with huge trucks and even motorists pulling trailers of all kinds. Mile by mile, exit after exit, I could see the huge parking lots full of cars surrounding the countless box stores and malls, all of which also were often made with concrete. I told myself that this was certainly the best city for Cemex to have its US headquarters, since everything in the city boasted its love for concrete and cars.

The city's sprawl is truly beyond comparison, as noted by Dr. Steven Klineberg on NPR: "The city of Houston covers 620 square miles. You could put inside the city limits of Houston, simultaneously the cities of Philadelphia, Baltimore, Chicago and Detroit." (Inskeep 2009). While the greater Houston metro area is home to only approximately 6 million people, the population in Philadelphia's metro area is approximately 6 million, in Baltimore 2.7 million, in Chicago 9.5 million and in Detroit 3.7 million totaling 21.9 million people in a similar area (US Census Bureau 2010). Consequently, Houstonians use more energy than people in other cities, and given that the city is built around the use of cars, the carbon emissions are some of the worst of American metropolitan areas. This kind

of city layout is only possible through the concrete infrastructure that shapes and characterizes Houston.

The circulatory system of the city is made out of concrete to a large extent, and the economic and social forces of the city flow through it. Goods and services as well as people going to work or play need to make use of automobiles to engage with this circulatory system. Though public transit exists, the rate of use is low, and the transition towards sustainability on the side of the cement industry requires consideration of how concrete building can become considered sustainable while being so embedded in the local culture and its strong preference for cars as a mean of transportation. Houston is only an example that represents the prevailing trend in the United States, where an overwhelming 86% of the population commute in a car, truck or van to work; 76.1% drive to work alone while only 5% use public transportation and 3% walk to work (McKenzie and Rapino 2011).

The popular imagination has adopted concrete and cars to such an extent that they are linked to the local identity. For example, during the spring of 2012, the local newspaper, The Houston Chronicle (Enriquez 2012), invited readers on their Facebook page to describe how one knows if he/she has become a real Houstonian, referring to these as cultural treats of locals as shown on Figure 2-8 and Figure 2-9.

“You know you’re a real Houstonian when:”





Figure 2-8 Your idea of public transportation is to just add another lane on the highway and be done with it<sup>16</sup>

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<sup>16</sup> Sheila Sanford / Facebook (Sharon Steinmann / Houston Chronicle) (Enriquez 2012)





Figure 2-9 You know better that to go to the Galleria between 3pm and 7pm on a weekday<sup>17</sup>

The complicity of citizens with authorities in creating such a concrete maze makes Houston a particularly interesting space to learn about the alternatives for sustainable cement in an extremely car-oriented urban environment.

Besides the widespread social acceptance of concrete and cement for infrastructure building, parking lot pavement and commercial construction, I could also appreciate some important differences in home construction preferences

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<sup>17</sup> idittyhimself / Twitter (DAVID J. PHILLIP / AP) Houston Chronicle/facebook (Enriquez 2012)

among American people when compared with the Mexican case. In Houston and many other American cities, the single home is very common and it is often built with wood composites and only a little concrete for the foundations and garage entrance. While in Mexico in general and Monterrey in particular concrete roofs and block walls are the most common building materials, and the infrastructure is only beginning to develop, in the US the situation is the opposite regarding the use of concrete. Hence, to talk about sustainable concrete and sustainable uses of concrete in both cities is different in both cases given the different traditions in the two countries.

Whereas in Monterrey the introduction of sustainability has been the result of private companies already engaged with global interests, in the case of Houston, I encountered a politicized discussion about sustainability. In Houston I found repeated references to environmental sustainability being detrimental for the economic well being of the city, and companies intentionally acting against any governmental position that would support such actions. For Cemex, the Houston business environment brought different considerations. On one hand, existing environmental regulations were not too stringent and the company already had in place mechanisms to comply. On the other, the leadership position of the company in Monterrey, where its name is widely recognized, does not travel with it to the US, where there are many examples of larger and better known companies. The city of Houston is known for the oil and gas industry and the Texas Medical Center, so the sphere of influence of other industries is only perceived as marginal even in the case

of such a massive presence as concrete. Any initiative that Cemex engages, whether in the field of sustainability or elsewhere, therefore results in a lower profile and smaller relative impact.

## 2.5. Arriving in the UK and car culture as a key component of the landscape

Unexpectedly for me, arriving in the UK was also a close encounter with car dependent citizens and concrete, though in this case, with a strong mix of asphalt-paved surfaces and smaller vehicles. The widespread use of asphalt on roads and parking lots explained to me the distinctly British structure of Cemex given that they also own an important asphalt division as part of the business, an important difference with other countries where the company operates. Driving in the UK was quite an experience. Though I had been ‘training’ in my head for months to prepare for left lane driving through picturing myself in the car and driving in the UK, the actual experience was very different from what I had planned for. The unexpected difference was not driving on ‘the other side of the road’, but the wide freeways filled with cars that would move so slowly around Heathrow airport that I could really feel at home in Houston during the worst rush hour traffic. I could not avoid thinking about Julio Cortazar and the *Autopista del Sur* noticing that my neighbors could be interesting companions and real characters for my own *Autopista del Sur* experience.

While I was very confident about having a brand new GPS with the maps that would take me anywhere in the UK, listening to the British accent guide reminding me about staying on the left side of the road and instructions on approaching roundabouts were so reassuring that I decided to turn on the radio and stop waiting for more instructions.

Searching for an attractive radio station, I realized that most of them were not playing music but broadcasting current news. I decided to stay tuned and learn about what was going on in what would be my hometown for a few months, but I heard traffic news on one station and switched to the next, and it was the same, and then, again, and it was the same! Well, here I learned that there was a common theme, and that traffic news were more talked about than anything else. Though I had hoped to get to Rugby in slightly over one hour, given that it is only 70 miles away from the airport, my GPS calculated almost two hours and the radio was even less optimistic. The man on the radio explained that M1 was crowded and that the expected time to get from Heathrow to M1 on M25 would be more than one hour! How could it be? Well, maybe I had it all wrong and my GPS skills were so bad that I did not know where I was going. I changed stations to look for another station which would either offer a shorter estimate or talk about something else, but without succeeding. Without getting lost, it took me over three hours to get to Rugby, and while the green landscape full of carefully cultivated plots that I passed on my way there was really fascinating, it was even more striking to witness the accompanying suburban landscape of roads full of very slow moving cars. It was as if everyone was

commuting from London to everywhere else in England, and all the surrounding communities, large and small, new and old, had become London suburbs.

This experience made me realize that traffic had become so pervasive in the British case that it had become a part of the landscape and the news stations would pay attention to it in a similar category to that of weather forecast. For the British, traffic and car use had become internalized and naturalized as inherent components of the landscape. This fact not only surprised me, but forced me to rethink my expectations for my research. Even in a country whose population is aware of the importance of sustainability, its political leaders strongly support environmental initiatives and regulation on the topic is so widespread, the transition towards sustainability in the British case also needs to consider the close dependency on cars that many people have to travel daily from semi-rural areas to the urban centers where most jobs are located.

The population in the United Kingdom is widely distributed. Though many people live in the countryside, they expect to have access to all the services of the urban environment, and they frequently commute at least one hour to the place where they work. This brings a challenge to the government as infrastructure provider, since they need to maintain a wide array of rural roads that connect to the larger motorways. Though there exists a large net of railway, I found that it is costly and people usually prefer to drive cars even when the petrol, as they call the gasoline, is twice as expensive as in the US. Most people prefer to live in small communities far from the city center, and near-town suburbs are less popular than

in the Houston case. This might relate to the size of the country. The geographic conditions of the United Kingdom contrast with the Mexican and American cases. This country is much smaller and it has been populated for so long, that many constructions that date several centuries continue to stand and be used regularly. Mexico and the United States are younger countries with larger territories where distances are vast. The people around London usually live within less than a couple of hours from the rest of their family and they tend to remain very close to the place where they were born.

Tradition is highly valued in the British case and stripping away tradition is ill received. One reason the concrete buildings of the reconstruction after WWII were never accepted has to do with the breaking away from tradition and connection to history. The brutalist style of the period was cold and broke with the previous styles through a rough, blocky appearance and the exhibiting of its structural material (Banham 1966), very often being concrete exteriors which went well along with the masculine narrative of progress and industry. However, the invasive monumentality of these works that could not blend with the surroundings or with nature was rejected (Chan 2012) as the communities where they were built suffered not only the aesthetic eyesore of its presence, but the coolness of concrete and a feeling of confinement. A reaction against this lack of harmony with nature followed and some of the concrete housing projects that were built to receive the returning soldiers after the end of WWII have been demolished while others have

become undesirable places where only marginal populations like the recent migrant workers live.

The institutions created in each country are key elements of the landscape. North (North 1990), the Economics Noble Prize, studied formal and informal institutions as they facilitate or stagnate economic growth; in the case of sustainability I find a similar phenomenon taking place. An important difference between the UK and the two other countries is the strong regulatory framework regarding sustainability within which companies and individuals must operate. Detailed building codes that prescribe energy reducing devices and promote building materials whose environmental footprint is small push the related industries to quickly adopt sustainability measures. These conditions create a very different landscape in which the cement industry must operate and transition into sustainability, given that it is not a voluntary effort nor a political alternative, but an obligation that must be met. Similarly, the people are widely aware of environmental and health risks posed by industry, and strongly oppose any activity that might be perceived as damaging. Interestingly, the use of the car allows people to be close to nature and gardens while also contributing to pollution and to the creation of multiple roads that act as barriers to flora and fauna. The presence of cement and concrete is less salient in this case. The use of concrete in roads is less widespread than in Mexico and the United States, partly due to the humid and cold weather that make concrete less durable, and partly due to the traditional acceptance of asphalt in the region. Concrete bridges and overpasses are also less

common given the interest in preservation of antique buildings and structures. Some older bridges date from the steel age when the infrastructure was built with this material. Similarly, the homes are often old and built with brick and wood while only the new skyscrapers in London and other larger urban centers show the widespread use of concrete.

Cemex's presence in the United Kingdom is relatively new since it dates back to 2004, even though Portland cement was invented in this country (PCA - The Portland Cement Association n.d.). The company acquired the British RMC as part of the strategy to become a more global player in an industry that has shown an important trend towards integration and where only a few very big companies provide the entire world with aggregates, cement and ready-mix concrete. In the British case, Cemex's acquisition of RMC also included an important asphalt division that, as has been described, is also importantly tied to the British preference for cars and is a natural fit for a company that owns many aggregates facilities. Cemex UK is also small in comparison to other companies and the cement industry is not widely known compared to the Mexican and American cases. The landscape of cement and sustainability is truly distinct in each country that I visited and when put together, offers a glimpse of the challenges that the cement industry at the global level faces when tailoring sustainability plans.

The urban landscape is marked by concrete aesthetics and its ambivalent reception as it is by the temporal conceptions of the built environment that people have. At the level of infrastructure, concrete is fundamental in the United States



while in the residential sector is less so, given the preference for other materials and the willingness to periodically renew the built environment in this country. Young Americans are switching from the traditional single home to other living arrangements as family structure is also changing; lofts that show concrete beams and concrete walls are valued by this group. In general, Americans value highly the newness of things whereas in the United Kingdom the built environment is understood to have a long duration. Furthermore, there is a certain rejection towards the use of concrete in housing among the elites in the UK as displayed by Prince Charles, who promotes a neo-traditional style in combination with sustainable features and a return to nature. Asphalt is used for pavements more often than concrete in the UK and only high rises, bridges and overpasses display its concrete components. In Mexico, the use of concrete in infrastructure is highly valued and limited due to budgetary constraints while the homes of people in all income levels rely heavily in the use of concrete and cement. Homes in Mexico are considered an ongoing project that can take many years to complete, and concrete building can accommodate adding on stages through time easily. Concrete buildings in Mexico are valued because they are perceived as strong and long lasting, providing a sense of security to home-owners.

## 2.6. Conclusions

The three countries present different popular interpretations of being modern and civilized in relation to concrete. In Mexico, concrete building represents

modernity in opposition to traditional materials; in the US, concrete highways represent modern mobility in a strongly car-dependent built environment and in the UK, concrete is used in tall buildings that emphasize energy saving and closeness to city centers as expression of modernity. While some of the actors in the field of sustainability in the cement industry have a global scope like the cement companies, there are others with local importance and the mosaic of these actors, their interests and needs are described in the next chapter.

## Chapter 3

# The Construction Crew: Those Main Actors who Build Sustainability

This chapter describes the interested parties that participate in the construction of sustainability and the causal dynamics that I have been able to identify. I focus on the interdependence of actors and in the input of varying nature to construct diverging concepts of sustainability including the underlying ethical considerations to support them. Power dynamics are also relevant to weigh in which interests are more salient in the effort of sustainability construction. Sustainability is a complex topic that involves multiple actors and systems at the local and global level whose priorities and understandings differ. Other corporations, government, civil society and research institutions are some of the most important external stakeholders that shape what sustainability is and how it can be achieved. Cemex employees are the internal stakeholders in this case; they

are all unique but some of them share facilities, line of work, background or level of responsibility. Some employees continually interact with external actors while others perform their jobs internally and only contact the exterior when they go home. Though I consider the natural and built environment along with some other non-human forces in this chapter I emphasize here the human actors, their interests, their ethical standings, the driving forces that move them, and the beliefs that guide them. In the contemporary world, all these actors are interconnected through their direct and indirect participation in the political arena, the economy, the physical /material world and even cyberspace in a complex ecology where seemingly independent systems intersect.

In the context of late capitalism and widespread neoliberal ideas, the criteria of efficiency and the drive to measure performance are embedded in day-to-day practices. Similarly, audit culture mechanisms and reporting technologies that pursue transparency, accountability and quantification are also ever present. These are important referents when implementing sustainability measures that are part of the mindset among crew members and their ethical convictions. Consequently, the concern for transitioning into more environmentally friendly and socially responsible lifestyles needs to be explained by companies and many employees in terms of performance and managed in measurable ways while taking into account the needs and interests of all interested parties; besides the measuring activities, it is still worth focusing on the human processes taking place.

As with any construction project, the construction of sustainability requires that a crew or team is put together to successfully complete the job. By recruiting some members and not others and by giving larger roles to some crew members, the outcome varies and no single combination is better by all accounts, but only different. Some of the crew members intervene at a grand scale while others participate at the small scale or to shape only small details; some are more powerful than others and some are more vocal while others remain mostly quiet. Though they all contribute to the final outcome, there is little or no connection among some of them. Similarly, crew members do not always know what project it is that they are participating in, nor do they perceive the input from other crew members as part of the same project, namely, the construction of sustainability.

This chapter describes the profile of the main actors, considering the people who belong to multiple entities with whom I interacted during my research. I describe their interests, their background and the roles they play in the construction project as members of the crew. I treat each actor as a crew member while also a stakeholder with particular interests, beliefs and constraints considering its affiliation and position in the hierarchical systems. Neither one of them acts in isolation though the frameworks that regulate them often seem to be constructed as if they could produce sustainable outcomes independently of their surroundings. I do not take these surroundings as totally objective and independent but I connect them to human experience and perception based on Husserl's phenomenological approach and the concept of life-world, which refers to the world of objects as

perceived and experienced by the body and relationships (Husserl 2012). The life-world where each person and group intervenes often intersects with other life-worlds where interests and priorities are different.

While I do not discuss at length the interactions between crew members in this chapter, I present the thoughts of informants across systems and the life-worlds where they participate, including the driving forces that guide their decision-making process according to the specific context that surrounds them. I do not present employees as a single group but attempt to provide separate profiles according to the kind of work and location that they share considering the different contexts and kinds of stakeholders that participate in their lives. There are many job descriptions that have not been included here but I have selected a few to provide a sample of the colorful and multi-textured mosaic that composes Cemex workforce.

The interconnectedness that characterizes the construction of sustainability results in a coordinated ecology of activities where all interests play a role, not just human actors or stakeholders (Star and Griesemer 1989). Given that the introduction of sustainability into the prevailing consumer oriented society is a challenge that requires the participation of multiple groups, it is necessary to create a common understanding among them in what relates to sustainability, its components and goals. There is a strong interdependence of actors and interests throughout multiple layers in and out of the organization, which I try to make explicit looking for the translations that sustainability undergoes (Latour 1988; Callon 1986; Star and Griesemer 1989) ; the meaning that prevails as everyone

“translates, negotiates, debates, triangulates and simplifies in order to work together” (Star and Griesemer 1989: 389).

I consider that these translations reflect the interests in each life-world as they are interpreted and experienced. Translation in this case refers to the process where an idea or concept is re-interpreted to adapt meaning in a variety of locations and contexts. Multi-disciplinary backgrounds, multi-interests/ethical values and even multi-time visions converge in this complex ecology. The heterogeneous and complex sets of interests that participate in sustainability construction, though at times controversial, require balancing. Not only do the layers of the triple bottom line need to be negotiated; the national traditions are important as well as the efficiency requirements, the drive towards quantification and performativity (Lyotard 1984) and the personal history of each crew member. Figure 3-1 Translating Diagram

Figure 3-1 shows the translating diagram. The decision making process differs by function and region.





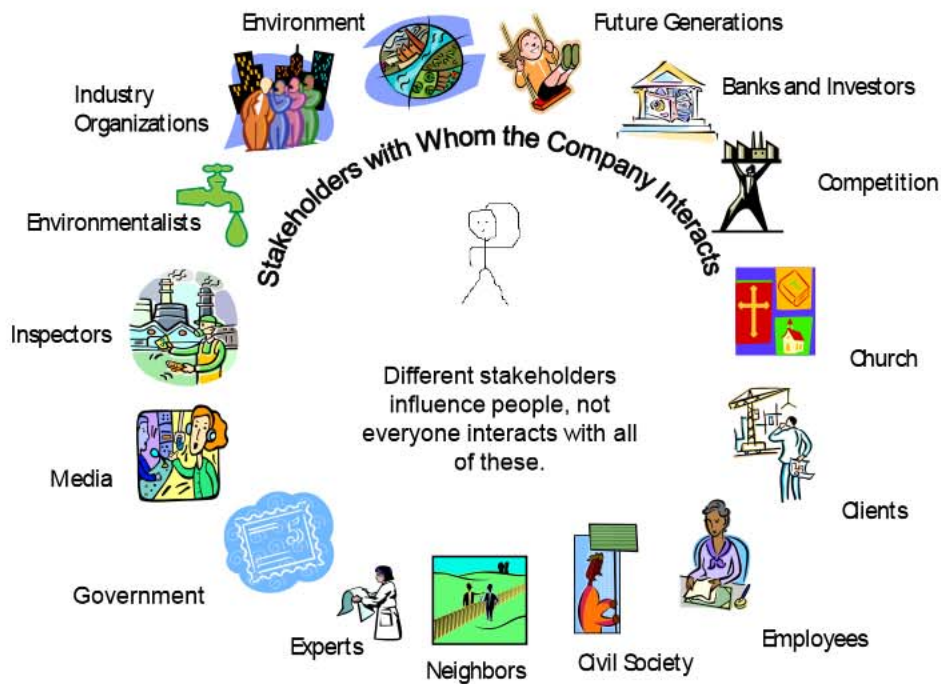


Figure 3-2 The stakeholders who are members of the construction crew

Though this figure shows that practically everyone with whom the cement industry interacts is a crew member, their participation in the construction of sustainability is sometimes negligible or unplanned. However, there are some actors that are heavily invested in sustainability and who consciously try to guide this construction project. Among them, those in charge of sustainability implementation in the large cement corporations play a particularly important role, since they strategize, inform and actively shape this construction project. Hence, it is helpful to learn about the views and experiences of one of these persons, who described the evolution of businesses in society to include more and more stakeholders through time.

### 3.1. Sustainability and the pirate's ship

When I began my fieldwork in Cemex, I had several long meetings with the head of Sustainability who described to me the entire sustainability philosophy being implemented and the new model that was beginning to cascade within the organization. Figure 3-3 shows this model (previously presented in Figure 1-2) which is still in use and allows me to introduce the different construction crew members.

The model refers to the triple bottom line which includes the accepted environmental, economic and social pillars of sustainability as interests that need to be taken into account. It also recognizes the multiple stakeholders and their interpretations of the triple bottom line according to the life-world where they participate.

## Cemex sustainability model and stakeholders



Figure 3-3 Cemex sustainability model and stakeholders<sup>18</sup>

Whereas the traditional business model only worried about profits and shareholders, the Cemex model makes room for a global society, where each circle is connected to the next, recognizing the interdependence of the company and its environment, including different social groups and non human actors. At the same time, the economy as the driving force for the rest is stressed illustrating that for some the economy is instrumental to achieve other goals while society and environment can be seen as good in themselves; for corporations, it seems to be the

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<sup>18</sup> Cemex corporate website [http://www.cemex.com/su/su\\_oc\\_oa.asp](http://www.cemex.com/su/su_oc_oa.asp). Accessed October 19, 2009

opposite. Environment and society are instrumental to achieve economic progress, which appears to be the main concern in the competitive business world.

The views of the Sustainability head in Cemex help me illustrate the array of interests that sustainability officers deal with in the business environment not only in the Cemex case, but in any corporation. Referring to who hires a CEO and who he is accountable to, he explained:

The CEO of any company is in that position to obey the mandate of shareholders; who can choose to invest in that company or in another one, and it is return on investment what usually drives both parties to conduct business. However, things change and the demands of the business environment evolve; one has to be at the forefront since businesses are always faced by competition.

To illustrate the need to be at the forefront in one's industry, he said:

You do not want to be the best bulb TV producer with low costs and wonderful distribution channels when everyone prefers the ones with transistors as occurred in the 50s, so there is a need for innovation and continuous improvement, or consumers will prefer somebody else's product.

He continued to talk about how the market for TVs has changed and how there has been a continuous improvement that benefits shareholders and consumers:

And today we make flat screen TVs. And there were some CEOs who won and some CEOs who lost, but the ones who won, invested in making that TV better. And today we have a TV which is the same size, but it's now a quarter of an inch thick, it hangs on the wall, it's very clear, it's in color. I mean, massive improvements, and you as a company generated value and the people are given the value, and then you have to give that back to the shareholder, so the whole mentality of business is about how I make this continuous improvement, how do I supply my market, how do I get the continuous improvement, and how do I do it faster than the competition, because if the next guy is getting his cost down faster than me, more people are going to buy his TV than my TV or any product that you pick for that matter.

So, in his view, it is the economic drive that is running the operations of the companies competing against one another while considering the interests of the shareholders.

He continues in the same tenor:

So, what we look at, is to say ok, a business has to continually try to get to be more competitive, and the economic side of a business goes through cycles, you know, most people are not making a big profit at the moment and you know, lots of people are having a bad time, when the economy is down. Does that mean that they are any worse businesses or any better businesses? There are cycles, yeah, so you have to manage these cycles and to me, the way

you manage your cycle against your competition, is to continue to promote your business to go forward, it is to be more competitive, it's not about making money today, maybe making more money over the long term, you know, but that's just an analysis. The way you win and you become a better company, and you grow the business to give the return the shareholders want; it is to be competitive, you have to be more competitive, you have to be faster, better, quicker than the opposition, that's just the heart of business, it's the game. It's not a game, but it's a competitive environment.

He clarified the importance of staying competitive to survive in the economic environment, but then he introduced new aspects that have become relevant for competitive businesses:

So, what are some of the things then that come from the economics, the environment and the social, and the new stakeholders that have an interest in our business? Our business partners want us to be competitive; if we sell more product, we buy more product from our suppliers, they want to be with a successful group.

After introducing the interests of suppliers, he then continues to introduce the new stakeholders that are now part of the competitive business dynamic.

If we grow in the business, the banks are happy to lend us money, the shareholders are getting their return, the costumers are receiving our product, so our business partners want to see us to be competitive, but the thing to me

that has changed in sustainability is not the environment, now is an issue, or the social is an issue, or the human rights is an issue, it's those opinions are now represented by new stakeholders that never really had an impact on a business before. Our people, yes we've always been, well for over a hundred years, we've been interested in our people, but who are those people?

He then gave an example to describe the context of business through time describing how irrelevant some stakeholders of today used to be:

Two hundred years ago you could take a pirate ship and if you killed half the crew, nobody even knew it. You know, they died, you could flog them, you know, you could do anything you needed, very basic management techniques.

You know, the ship, the captain of the ship going to India from the UK could have flogged his crew, or killed them, or left them on islands, you know,

But he went faster than the next guy, so he could get to market and sell his tea or his spices.

He explained that this was the way business was conducted back then not only on ships:

That was the competition; that was the thing, so then when around the turn of the century our people became important, they got a bit of a voice through the unions and through collective operation. And after that, our people

have always been part of our business; most businesses say now that the most valuable asset we have is our human capital, and yea, it is because if you want to have this process of continuous improvement, who is going to do it? Only the people who work there can do it, because if they all leave, you are going to have some money in the bank and some shareholders and a CEO but nobody else.

So this was his explanation of how people got some recognition and became important for businesses through a historical account of the labor movements. He then related these changes to the 'our people' circle in the sustainability model on Figure 3-3, and then referred to the circle 'our business partners':

So our people have been recognized very much, as being a really important stakeholder; so now we have our industry, and who we sell to, and we have our people and business partners, and that's kind of traditional business. We've become pretty competitive with our people, we pay competitive wage, and we bring the kind of people we want, and people compete to get into a good company, so you have to recruit the right people, and that's being competitive with the people.

And when we refer to our people, then we mean the employees he said, but then there were more changes and the circle of 'our neighbors' was introduced:

Neighbors never really mattered, you know, quiet often you used to build a plant outside the town, and you didn't even have any neighbors.



The towns have now grown and suddenly you have neighbors, and the neighbors have collective rights that they never had a hundred years ago, that's happened in the last twenty or thirty years.

He then gave a more recent example from his own experience about the growing importance of neighboring communities through time and how they started to be listened to:

I remember growing up in Manchester, and there wasn't even a smokeless law; people were burning coal and in about 1968, the government brought in a law that said that you could only burn smokeless coal, coal that had whatever taken out.

I had no voice to say to the government, or through the elections maybe, but neighbors never really had a voice to say 'Look at the smoke, look at this, you are killing me, my kids, you know.'

So things have really changed.

He then compared that situation with the current status and mentioned how people in these different circles might have different interests and priorities providing a personal example:

But now neighbors have a voice and they have a different interest to our people, you know, I am an employee, so I am kind of interested in my salary, my neighbor isn't interested in my salary whatsoever.

Most of my business partners are not interested in my salary either. My CEO? Maybe, because he wants to be competitive, you know, but I am the guy who is interested in my salary.

In this example, he also mentions how his interests as a person are not always the interests that he represents on the job, given that his salary is a personal priority. He proceeded to relate the sustainability model on Figure 3-3 and the 'our world' circle to the internet and globalization where neighbors can be wherever and our people can mean anybody:

The neighbors are interested in different things, my business partners are interested in different things, but there's also another group of people now, because of the internet, we've kind of become global. There are global bodies, so we are not just our people in a small town, working in a factory selling product to the guys in the next town; the whole world has now become a town.

Then he spoke about other supranational bodies, how some support business interests and how others impact on businesses' interests:

And so, there are global bodies which have interests in what I do as a company. You know, the World Business Council for Sustainable Development is one who kind of advocates for business, but NGOs have an interest in what Cemex does and what any business does. They observe how we act, and it's not so much how we act in a local way, but they are studying the sum of the total of our plants to see if we have and apply a code of ethics, whether we behave right,

if we take the right actions, then we have the right reputation. If we make a mistake people are going to say 'Fine, you made a mistake, you fix it', but if you make a lot of mistakes, then the people who represent this kind of world start to move away from you.

He talked about how the power of this kind of stakeholder changes the power balance since those who had traditionally been vulnerable are powerful. This recently acquired power gives their interests larger weight than before:

And these are very powerful people, they represent world bodies, you know, they can help you or they can hinder you, or they can be neutral. And so, they are another group of stakeholders.

Beyond the consideration of others' rights and ethical behavior which is also included in the official code of ethics, there is a pragmatic recognition of the value of these interests. Linking this explanation to the model he introduced at the beginning of the meeting, he emphasized the importance of cultivating trusting relationships with stakeholders as part of the continuous improvement model where communication and mutual understanding are needed in order to consider stakeholders interests:

So if we go back to our continuous improvement model, we set our goal to be the company of choice for each of these stakeholder groups. We have to ask then now what that means, and in my view of each of these groups, of building a relationship with a person or with a group of people; the first thing

you don't want to do is to hurt them in some way, we can have the arguments and discussions but if you are trying to build a relationship, and you hurt somebody, that makes that relationship very difficult to grow. So, if my goal is to be the neighbor of choice, and I am upsetting the neighbors, however I am upsetting them, I am going to have an issue.

This describes the importance of all stakeholders in the model and how their input is valuable while constructing sustainability. Similarly, the instrumental value of being reliable and preserving trust is recognized with each group of stakeholders. The need for an adequate translation of the interests involved is present implicitly:

If I am trying to build a relation with a global NGO, and I am continually doing things wrong, and I continually have problems, they can't support me. With my business partners, if I promise to deliver on Tuesday, but I deliver on Thursday, then I hurt my customers; they are not going to support me for very long. If I tell the banks I'll pay tomorrow and I don't, I pay next week; they don't like me at all.

And then he links the interests of the stakeholders and expresses that those are the ones which constitute sustainability, considering the circles presented in the model on Figure 3-3:

So how do you actually work within the expectations of these groups, and it is within those expectations that the issues of sustainability are imbedded, our world expects us to have ethics, and human rights, to drive, to

keep the noise down, drive at a reasonable speed, you know, not put their kids in danger, that we are not driving badly, that we do not have big emissions all over their houses.

After referring to some of the interests of the 'our world' circle, he continues in the same tone to mention some of the interests of 'our people':

Our employees expect us to provide a safe working environment, not to hurt them, to reduce the stress, to provide some kind of work/ life balance. If we don't do that, we are hurting them, so we might have been competitive and got the best employees, but if we treat them badly, they are not going to hang around very long.

Similarly, he continues to discuss some of the interests in the 'our business partners' circle along examples for each of the other circles to show that these interests need to be balanced and negotiated when not shared by all and to consider the three pillars of the triple bottom line. Particularly, in relation to the additional cost that satisfying some interests entail, he explains that the economic side must also be considered to remain competitive in the business environment:

If we got a license in a neighborhood, and we've become very competitive to get it, and then we treat our neighbors badly, they aren't going to be too impressed. If we get a contract, and then we don't deliver, we are not going to be achieving anything. And likewise, if we do all this wrong, the observers from the global groups, you know, they are going to look at us and

say 'this is not a company that really is sustainable', you know, even if the public is ok, but they say 'you are not the kind of company we want to promote, we want a truly valuable company that is doing the right thing', and of course, there is a balance, you know, you have to have a balance, our people, and what you do with/ for them still making a return, and do it better than the competition.

The head of sustainability describes how he understands that there are two components for developing a positive relationship with stakeholders which shape the construction of sustainability by introducing more actors through reaching out:

So, the relationship building comes from two sides. One is not hurting people, and the other is reaching out. And actually knowing who they are.

He explains that reaching out to stakeholders is also an important source of information to develop competitive advantages as well, so by building sustainability and listening to stakeholders, the business position is reinforced:

Additionally, reaching out to our people, our neighbors, our business partners, and the representatives of our world, gives us access to a lot of information that they have, and that we don't have. Not only in terms of what their expectations are, but also, ideas on how to do the business. There's plenty of people in the company who, if we reach out and ask them how we do that better, provide excellent insight to do major improvements. Our neighbors, reaching out to them, if we are not hurting them, and we are working with

them, there are many things that we can learn. And the same with our business partners, it's not only delivering on time, but it's helping them to actually further their business, because if our customers become better, bigger, and we are tremendously close to them, they are going to buy more of our product.

To contextualize, he continues:

It's all very simple business stuff, the only difference is that we've added these other two groups of stakeholders to the traditional business model of being competitive.

Figure 3-4 shows how there are more risks and values involved through time as more social and legal constraints are introduced, including sustainability oriented models as the new regular way of conducting business.

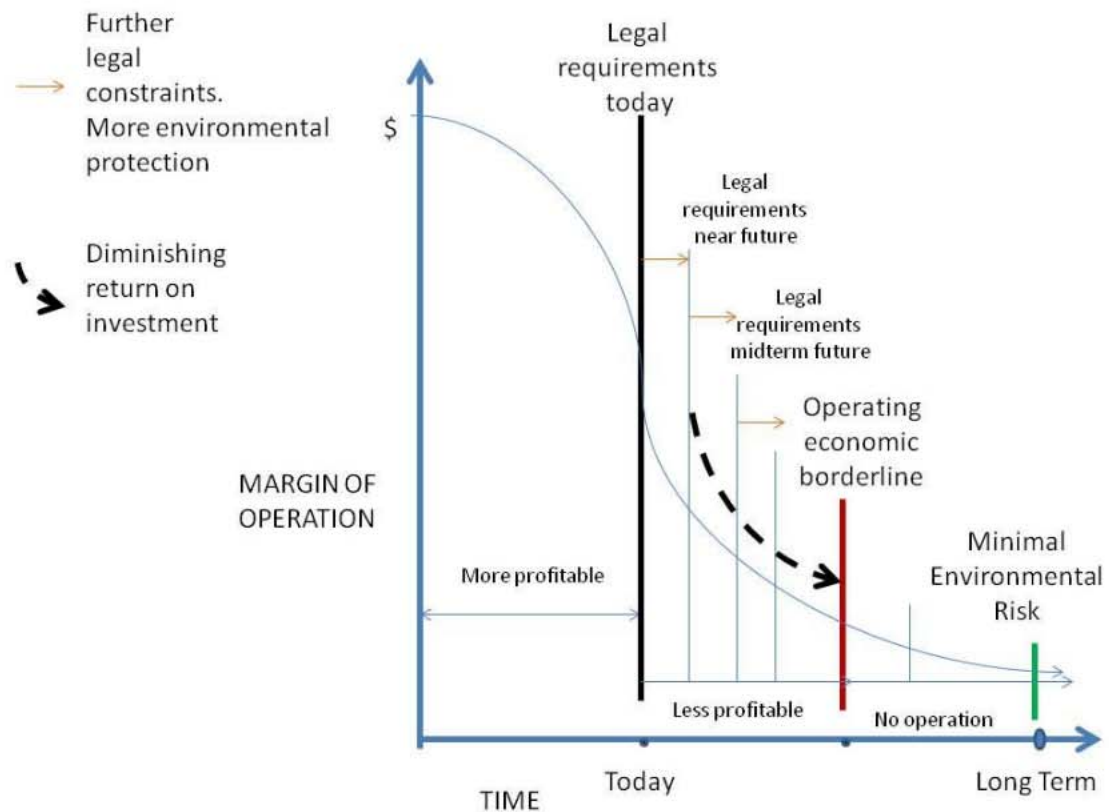


Figure 3-4 Business environment constraints through time

After repeating the importance of developing good relationships with all stakeholders, the head of sustainability introduced another group: the experts that measure sustainability and often mediate through their knowledge the contributions of companies like Cemex to the building of sustainability in different layers such as those of the institutions of science and law as well as aspects of social structure such as common social perception. The input of experts and scientists is also needed to build the edifice of sustainability. By including this group as the intermediary with some others, he also positions them as part of the continuous



improvement model that leads to progress in the competitive environment. Hence, even what is often understood as objective science becomes an instrument not only to measure environmental performance but to generate economic benefits.

And try to build relationships, you know, and every entrepreneur who has ever played golf with a customer, knows about building relationships. It's the same thing about building relationships with our neighbors, and with NGOs and global groups, with whom we've never had to deal with before. Most of those stakeholders represent all of the things like climate change. If we want folks who speak strictly about climate, with people outside the company, you have to find somebody who knows about climate change, you can measure it, but you need scientists, so you have to go and talk to scientists, you need experts and there are advocates who expect their assessments. So once again, you need these relationships with people, and if you are able to build a strong relationship, and that allows you to progress your business, you should become more competitive.

Similarly, he refers to managing risk exposure since it can damage, among other performance criteria, the financial performance of the company and return to shareholders. The expectation of growth and progress in the long run is implicit, even accepting the temporary struggles when the economic cycles make things difficult:

And you should reduce your risk, because there's always a risk that people will go on strike, the neighbors will blockade your plant, the customer will sue you or will refuse to buy your product, or the people in the world will damage your reputation, so if you reduce your risk and you become more competitive, that's the business cycle, how do I become more efficient, or give a bigger return to my shareholders? How do I get better? How do I manage my risk? And so this idea of being more competitive, reducing our impact, building our relationships, and reaching out to make ourselves more competitive is part of the same model.

By connecting everything that relates to sustainability to the business logic, he explains that it is possible to get the acceptance of the triple bottom line and also to control it and manage it like all other business variables. The input of experts to generate measuring systems is also valued not only to respond to stakeholders but to perform and compete:

It's the kind of thing that a business can understand. Because I can ask myself: how competitive am I today? I can measure it, and I can move forward, and I can measure it again next year, and move forward.

Environment, how do I measure environment? I don't know, so I have to go and ask somebody. Environment is really what's important to these groups of people; if climate change is highly important, it's going to be highly important for me. If nobody cares about climate change tomorrow, they

suddenly go 'Oh, it was a big mistake', then my stakeholders won't be interested in climate change, and neither will I; it will change.

So, I really, as a business am interested in what these people think. Therefore that relationship will allow me to tailor my business to satisfy the demands not only about customers (and we do great customer service, and great customer surveys) but to these different groups of stakeholders, and all of the things in sustainability are represented by someone in this group.

One more time, he explains that all these issues fit into the sustainability model presented in Figure 3-3 and relate to efficiency and cost reduction through reduction of impacts and increased knowledge through collaboration and the co-construction of sustainability:

Whether it be someone interested in human rights, whether it be climate change, or poverty, whether it be biodiversity, all of these are there (in the model), and now all of these people have access to the internet and all of these people know what my company is, or at least, if I create a big impact and go against their values and their expectations, they are going to know pretty quickly about it.

Whether it be an NGO and suddenly I have a problem with CO<sub>2</sub>, they'll know about it, or whether it is our neighbors, and I drive and knock a child over in the road, they will know about it. Whether it be our people, and I change the

bonus scheme, and they will know about it; it's not something you can hide, so building this idea of continuous improvement is necessary.

It is about how do I get more competitive, how do I reduce my impacts, and to know that my impacts cost me money. When there are incidents, you have to investigate them. You have to pay a penalty, even if you manage and negotiate a settlement. You have to pay the lawyers. Incidents normally mean expenses, and reducing our impacts tends to be a cost reduction; making the relationships brings the information and allows me to know things to make my business more competitive. And I think the world has decided that innovation these days doesn't come from an entrepreneur, it still does to some extent, there are still entrepreneurs around; but now with networks, and groups, and blogs, and things, knowledge moves forward differently. Physics is moving forward more with combinations of professors than with one single Einstein; there will be networks of people that figure out the new things together.

The sustainability model assumes that all people are using one another while constructing sustainability and trying to advance their own goals simultaneously. Knowledge is co-produced. People are instruments to each other as they strive to achieve the goals that each has; and the interests that guide stakeholders are weighted through the balancing of power more than on the ethical or scientific grounds for each:

And you figure out how to do these things better, and the thought of everyone enriches the outcome. My company could sit there with a few people, we can redesign the industry, or we can redesign my company, without taking this external advice, knowledge, and experiences to embed them into that process. The result is most probably going to be a suboptimal way of moving forward. So, the two models combined (stakeholders and dynamic competitive, impact, outreach) suggest that if I'm very competitive with my employees, I get the ones I want; if I build a great relationship by not hurting them, by reaching out to them and giving training, give them a future, I am going to keep the ones I want. If I am competitive with my neighbors, I am going to have the licenses I want, and if I manage the relationship, I am going to keep them. And if I do the same about business partners, I grow my business and I keep my contracts, and with the world, the same thing.

The importance of communication and interaction with stakeholders is paramount, being one significant difference from the traditional business management. At the same time, the production of reports and the measurement of performance that characterized Taylorism and quality control continuous improvement models in the recent past, is here linked to accountability and transparency towards stakeholders interested in sustainability issues when the company informs on the advancement of goals to interested parties:

So the two combined (stakeholder engagement and continuous improvement oriented through competitive triple bottom line) make the

difference from traditional management. Now you have to ask yourself what do our people want? What do our neighbors want? What do our business partners want? What does the world want? And it's that question that then allows you to put all the sustainability issues into the model. Our world would like to see biodiversity managed, and we have impacted diversity through our quarries, so therefore, we have something to work on, something to improve, measure and report on. I can work with CO<sub>2</sub> as well; they want the CO<sub>2</sub> to go down? I put the CO<sub>2</sub> under 'our world', and talk to the experts about it, and I can tailor a strategy to bring my CO<sub>2</sub> emissions down. I can ask myself what is my CO<sub>2</sub> score today, what is it next month, what is it next year? Always in a continuous improvement model, now I can think like a business man, but not focus just on my costumer, but focus on a number of variables, understanding the important keys that give us an relevant metrics.

Referring again to Figure 3-4, he connects the ever more stringent constraints for the business environment and the need to consider this movement when planning for the future. He compares this regime to the pirate ship ecology:

Now there are established standards of expectations, and those standards are moving forward all the time, so where do you draw your line? As low as reasonably possible to remain competitive while considering the interests of shareholders and stakeholders. There is a moving normal distribution curve; what is not accepted today was previously acceptable.

But this line is moving all the time; now this is not accepted, and now this is not accepted, and now this is not accepted either. So your management decision if you are going to be running the optimum company, starts to make you move further down, and now, there's obviously a balance, if you want to move it to here, it's too expensive for your company to continue operating.

He recognizes that in the negotiating, there is the possibility that markets, customers and stakeholders turn their back on the product and prefer to do without you, so they all have a say. They are complicit in the construction of sustainability, the speed and momentum that it takes, or not. If the curve of constraints is moved way out, then the business decision would be to stop participating in the market. He explains how there is a trade-off that is always taking place:

Now, I can't make any money, now the world has to decide, you know, this is a negotiation process.

And so, managing a business becomes much more complex. If this were the ship captain, the ship captain now has to consider many more things; but so does the other ship's captain.

So it's not like, you know I can't flog the crew, and he can; so it's nobody can, and as the laws and the peoples move their expectations about what a good business is, then that competition between CEOs includes more issues. The company needs to decide where to allocate resources; is it better to invest in safety or biodiversity or both? If I can't afford both, I need to establish my

direction, where am I going to go to? And how am I going to present the image of my company to the stakeholder groups.

And I that's why I like this model (Figure 3-3), because within it you can see, between the two pictures, you can see the world and what all the inhabitants expect of a big business are included in it, and it means that the business model is now a little bit more complicated, and that's now how we manage, but it's still a continuous improvement model. Do I continuously improve my biodiversity this year, or do I continuously improve my safety or both? I mean, I have people in the company who are working on many things, and they all are trying to get better, and we are trying to reduce our CO<sub>2</sub>, and we are trying to increase our ethics, we are trying to do different things, and to me, that is running the business, now it's a business model that includes the issues of sustainability, and that's different to a business that just vaults on an environmental management system with no stakeholder engagement. Because for us, that needs to be a part of the business purely because some people think that is important and we have to put into our systems all of these things like how we treat all of our suppliers, how we treat our customers, how we treat our people, how we drive.

He continues to integrate all concepts into becoming the company of choice to all possible stakeholders through sustainability following a holistic management system. Additionally, this entails that sustainability is imbedded in all company decisions:



The more categories that you can improve, then the more valuable your brand is, and if you can do that while you give your stakeholders a superior return, then you are not far from being the company of choice, which is one of the things I want to be in the circle, I want to be the company of choice, the employer of choice, the neighbor of choice, the supplier of choice and the brand of choice.

And if I achieve all of those things, I am managing this number of key important issues, then I am a sustainable company, and that is a real big difference from saying in other companies: 'I have a sustainability department', and they go off and do projects, like painting schools and that kind of thing; or from those who follow the 'We give some donation' and only participate in isolated projects.

For those sustainability is not part of the business system.

The kind of participation that stakeholders have also has an impact on how sustainability is shaped, not only because of the power that they might have but because of the level of activity that they engage with. He recognizes that the agency of groups influences the implementation of sustainability:

We need the whole business system to be thinking: Is it more important to do this or that? How do we do this? And a lot depends on how the different stakeholders are. If you have a militant group, you take different decisions than if you have a passive group.

The problem is that through the internet, the militancy and the advocacy and the ability to impact the company, that they can put something negative about the company in front of the world, is now very powerful, you know. And also, probably they can set the agenda, not necessarily in the most urgent matters, really, but to them they are.

Through this explanation of the world of sustainability as experienced by the head of sustainability in Cemex, it is possible to identify the multi-layered, multi-actor dynamic where sustainability is constructed and refers to the construction crew members. While the head of sustainability already gave us a glimpse of some of the crew members, in the following pages I complement the previous description by including the viewpoints of other crew members. I try to depict their rationale as well as their feelings and beliefs to provide a more human account of the complex weave of considerations that play a role while sustainability is being constructed.

### 3.2. External crew members

In this dissertation I call external crew members those crew members who are not employees of Cemex but who have interests in it, and who might influence the company or are influenced by it in what it refers to sustainability.

#### 3.2.1. Shareholders

There are many crew members who construct sustainability outside Cemex. The shareholders and board members are important stakeholders and have always

been. Not all shareholders have the same profile, some of them are individuals and there are also important institutional investors like the pension funds or the investment funds where smaller investors might allocate their savings. Most of these shareholders are interested in maximizing their return though increasingly, they also expect the companies to respect ethical principles and to create sustainability reports. In addition, there is another kind of concern which has to do with the time span; while some shareholders mostly look at the short-term performance of the company, there are others who have a long-term approach and who are more willing to support the structural changes that sustainability entails. Similarly, those who have a large participation in a company are able to steer the direction of a company in ways that smaller participants cannot.

I had the opportunity to speak with the professional manager of a large trust fund who explained to me that they had to review the management style of the companies in which they were investing, since the vision of his employer was that they should only invest in companies who besides performing economically, follow the ethical principles of integrity, respect for human rights and protection of the environment. This vision allows us to have a glimpse of how the complexities of sustainability thought have permeated to shareholders, who are also participants in some of the circles described in the sustainability model on Figure 3-3.

In contrast, an analyst in an investment firm described to me the high volatility of investors and managers in high risk/high return investment funds where speculators expect high returns and are highly sensible to the stock price

change. He told me: “These guys are ready to take off and fly away when they feel things are moving, they sometimes keep their investment less than a week and they are still looking for a profit”. For these people, sustainability is probably not a consideration or maybe it is just a cost.

### 3.2.2. Activist investors as crew members

Given the importance of shareholders' interests while running a corporation, a very important force that shapes the notion of sustainability as it is being adopted in industry is the drive of activist investors. They can be single participants or groups pushing the boards of the companies where they own stocks toward socially responsible practices or other changes in management practices. Every year, investors as varied as Amnesty International, As you Sow and the Benedictine Sisters, present requests related to sustainability including environmental matters like climate change and water use or natural resources management, labor rights, sustainability reporting and more (Welsh and Passoff 2012). Though the percentage of shares controlled by such entities is often not significant in a given company, their status as shareholders enables them to present proposals that need to be voted on during the annual meeting. All shareholders vote on the items proposed and there is increasing discussion among institutional investors to take a stand on these issues. Additionally, smaller investors who value the environment now can put their money in investment funds that only allocate their sources in green or socially responsible companies such as Neuberger Berman Socially Responsive (NBSRX), TIAA-CREF Social Choice Equity Retail (TICRX), Winslow Green Growth (WGGFX) or New

Alternatives (NALFX) (Goldberg 2008). In response, companies need to be aware of sustainability and be ready to report their performance in these terms.

During my fieldwork I also looked for opportunities to witness shareholders activities to complement my observations, and became responsible investments adviser. As a member of a committee for responsible investment in a large trust, I had to assess sustainability risks and proposals in different investment alternatives and experienced the influence of activist investors. They acted as a driving force toward sustainability, forcing other investors like the one I was advising to consider, discuss and take a position regarding several sustainability issues. My committee had the responsibility of evaluating the propositions submitted by activist investors which had to be voted on by shareholders at the yearly meetings of companies where the trust had invested capital. During the two years that I participated in this committee, I had the opportunity to experience the highly structured campaigns that activist investors orchestrate to advance their political agenda. Though often unnoticed by the public, the proxy season is full of movement where activist investors confront the boards of companies following the legal paths established by the Securities and Exchange Commission in the United States. This entity overlooks the New York Stock Exchange (NYSE), where most of the Fortune 500 companies are traded.

Whether regarding sustainability, political spending, diversity, top executives' compensation or human rights; these activist investors tried to establish alliances with shareholders with similar orientations; they would reach out to

investors electronically and would talk to media representatives to shape public opinion, raise awareness and create momentum for their causes. Nyqvist (Nyqvist Forthcoming) has conducted research analyzing the strategies followed by Swedish Pension Funds as responsible investors trying to influence the companies where they own stocks. She found that they take a normative role where they try to impose their ethical and environmental principles into the business operation through diverse strategies.

For me and members of my committee, each proposal made by activist investors would mean not only reading their proposals, but following their activities in the news and conducting some research on the side to be better informed before making any decision. The impact of these proposals could influence not only the internal practice of a company, but how the company related to clients and the environment and the general awareness of the topic for all investors. For example, in 2011 the Laborers and Amalgamated Bank, which represents several unions, pushed for linking sustainability performance to executive compensation in eight companies (As You Sow: Corporate Social Responsibility, Shareholder Advocacy and Toxics Reduction n.d.). Though not successful, it attempted to shift traditional metrics to define quality in performance. By translating their beliefs into management proposals directly related to the operation of companies, these activist investors actively had an influence in shaping the policies of companies, and of sustainability in general, to suit their ethical understandings and commitments.

### 3.2.3. Supranational organizations

Cemex informants mentioned several global organizations that heavily influence their sustainability programs. Among them, the World Business Council for Sustainable Development (WBCSD - World Business Council for Sustainable Development n.d.) and the Cement Sustainability Initiative (CSI - Home n.d.), which they sponsor, are important given that in this organization the largest cement producers collaborate to set up goals on climate change, CO<sub>2</sub> emission reduction and working conditions. Through the CSI, 14 companies have adopted common guidelines for monitoring and reporting on emissions while others are in the process of doing so, establishing standard key performance indicators such as specific NO<sub>x</sub> emissions (g/ton clinker), specific SO<sub>x</sub> emissions (g/ton clinker) and specific dust emissions (g/ton clinker). By participating in these organizations, Cemex commits to following such guidelines.

Additionally, the European Union Parliament is also important given that Cemex operates in that area and they have established stringent environmental regulations. For example, while in other regions the governments have postponed the enforcement of climate change regulations and other environmental initiatives, the European Union will not lower the targets or rhythm of reform to abate climate change even in the face of the economic downturn. Similarly, there are mandatory environmental, social and governance requirements across Europe for company reporting that need to be followed and which are being closely monitored by regulators in the United States and elsewhere (As You Sow: Corporate Social

Responsibility, Shareholder Advocacy and Toxics Reduction n.d.). Consequently, Cemex has created a whole apparatus for sustainability recording and reporting, which I cover elsewhere, in order to comply with and respond to the expectations that these entities impose on the company and other entities constructing sustainability.

#### 3.2.4. Environmental organizations

There are environmental organizations with a global scope that also participate in the construction of sustainability, introducing their particular interests into the discussion. In the case of Cemex, Conservation International (CI), the International Union for Conservation of Nature, The Wild Foundation, Bird Life International, the International League of Conservation Photographers (iLCP), among others (Cemex n.d.) have developed alliances with the company to produce a Conservation Book Series. Their interpretation of biodiversity and their expertise in the field are then considered while defining the conservation strategies where Cemex gets involved beyond their input for the book series.

Simultaneously, the collaboration between Cemex and some of these organizations often increases the reputation of all parties involved, indirectly increasing the power of each of these actors. For example, in 2011 CI staff (including Russ Mittermeier, Peter Seligmann and Greg Stone) co-authored and published by CEMEX/iLCP, *Oceans: Heart of Our Blue Planet* (Stone et al. 2011), which was the recipient of the 2012 gold medal at the Independent Publisher Book Awards in the



Environment/Ecology/Nature category. By obtaining this award, the leadership position of these actors is reinforced and their views on conservation gain more weight in the negotiations where they intervene while constructing sustainability.

Also in relation to conservation, Cemex UK established a partnership with the Royal Society for the Protection of Birds (RSPB), which is a very popular and well respected organization that protects birds and wildlife in the United Kingdom (The RSPB: About Us n.d.). The partnership is developing a biodiversity management system that is valuable for both sides and for the community as well. In an interview to the RSPB advisor dedicated to Cemex, he explained to me how this collaboration offers the opportunity to impact the over 10,000 hectares that the company manages; more than the financial aspect of this, it is the chance to influence the restoration plans of multiple quarries. Traditionally, these plans have been developed in communication with local councils which sometimes lack the expertise to promote biodiversity and emphasize the aesthetics of a project. However, people are keen to protect wildlife and they just need to learn about the alternatives.

In addition, this partnership also helps RSPB to show that they work well with the corporate sector, which might make it possible to create similar plans with other entities and also improves the relationship with government. At the personal level, he told me that it is valuable for him to be able to make a difference in the world while working and making a living. The interests of RSPB and Cemex are served while advancing the well-being of local wildlife. For the individual heading the collaborative effort, there is the added benefit of being able to combine a

meaningful activity with the daily job. Simultaneously, employees in Cemex learn about the work of RSPB, are trained on how to better care for wildlife and have the option to volunteer in RSPB projects. For some of them, such as telephone costumer service attendants, it is an opportunity to go outside when their daily work is inside an office; while for others, as is the case of quarry shovel operators, it is learning more about the wildlife that surrounds them while conducting their jobs. As an interviewee put it, still others find RSPB a welcome reason to act for sustainability; a middle manager said: "Listening to RSPB's presentation offered me the perfect reason to act the way I know is the right way; I used to think that the company is more concerned about the money, then I see that biodiversity and environment are included in performance through the RSPB partnership".

### 3.2.5. Neighbors

Society today is deeply dependent on cement and concrete construction; however, it is hard for people to accept the presence of cement plants, quarries and even ready-mix plants near their homes. This is called 'not in my backyard' or NIMBYsm, where people are not willing to accept the eye-soring structures related to industrial activities close to the places where they live or play.

Neighbors often arrive to the area long after the plants have been established; however, they expect the plant to stop making noise or dust upon their arrival and given the growth of cities, very often the plants today are located in the middle of them. This increases the interest of neighbors in clean and quiet

operations. In addition, very often neighbors expect paternalistic attitudes from the company and they ask for money or other give-aways like uniforms for school sports or food for a special luncheon; hence Cemex needs to work with community representatives to establish programs that are coherent with the company's sustainability priorities and establish alliances with a specific goal where neighbors also contribute and become responsible. Neighbors are not a homogeneous group; one neighbor explained to me the differences that they all have; for example, some of them want to work in Cemex, others want Cemex to buy from them while others want Cemex to leave and still others simply do not care. This same person told me how the movie 'Inconvenient Truth' by Al Gore has been important for her and her family and she thinks everyone should watch it. She explained how "there are more and more news about the environment on TV, the newspapers and in magazines as well, and how everyone thinks about the environment now and probably, this is something that has been happening during the last five years or so". Another neighbor talked about how it is valuable for him to be able to trust the company and to know that Cemex representatives tell them the truth even when it is something different from what they expected<sup>19</sup>.

The Attenborough Nature Reserve and its Visitor and Education Centre are located on the site of a mature gravel pit which was mined for over thirty years.

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<sup>19</sup> Companies in the incubator of the community center could not be suppliers because they did not have ISO certification, which was unexpected for those involved.

Cemex restored it in consultation with the Broxtowe Borough Council (Attenborough Nature Reserve | About | Attenborough Nature Centre n.d.) in the UK and returned it to the community for their enjoyment and management. This reserve is a very popular destination for bird watchers and nature lovers as well as for families looking for a place to relax and enjoy together. Similarly, it is a very successful example of restoration given that birds do stop there to nest and colonize it.

After exploring the visitor center, I visited the natural area where I had a chance to observe the variety of birds present and the extreme confidence they showed around the people in the area. There were many visitors and I had the chance to interview a few of them. Bird watching is a popular hobby among the British, and they were busy and quiet observing the activities of the many birds around with lots of equipment, cameras, books and special outfits. When one was leaving, I decided to approach him, since I did not dare to interrupt while he was busy. He gave me a thorough explanation about why this reserve is successful and gave me tips on where else to go to see more birds. He told me about the history of the site and he was very proud of the good work that had been done in this particular site. He described that it is necessary to flood with shallow waters the old pits, to bring back the wetlands, and that willow trees are important for the birds. Over all, he told me that the Attenborough Reserve is one of his favorite spots and he is happy to enjoy it close to home. Similarly, I approached a family with children and they also declared that they visit the reserve regularly. They were also very

proud of the site and were happy to learn that I was there to study what the UK is doing to restore quarries. In both cases, they encouraged me to visit the visitor center and were really happy to have a nearby place where nature walking and looking at wildlife is possible.

### 3.3. The employees or internal stakeholders

Employees have very different backgrounds and expectations. However, they share some characteristics that allow them to connect with each other. Though the translation mechanisms regarding sustainability set by the company and accepted by businesses widely rest on the rationale of the triple bottom line, there are instances when other translation mechanisms are important to communicate with others and even to respond at a personal level. While sustainability issues might be a reason for them to work together on a task, there are other forces at play which direct their thoughts and feelings. For example, several expressed that they enjoy being part of an organization when they feel that it is having a positive impact on the world, though for some of them, this is not as important as the paycheck that allows them to cover their basic needs. However, the sense of ownership that they shared through their examples shows that their job is more than just a way to pay bills. Some employees would go out of their way to host me and show me around their workplace, making sure I could understand their jobs and that I would be comfortable. It was as if I was visiting their home and they wanted to welcome me well beyond the boundaries of research.

Those who have been in the industry express some nostalgia about how newer generations seem to not be attracted to this kind of work, especially in the remote areas, while for them it has been rewarding to be part of small tightly knit communities. One quarry worker shared with me that younger kids think of this kind of job as dirty and polluting and they do not realize that working outside is not dirty or that the polluting is being addressed by the industry. Additionally, he described how there used to be a lot of jobs in the quarry, but that new technologies have changed that. He continued to describe how the village used to be covered in dust and that only newcomers like the university professors who recently moved in, complain about the dust now. For him, life in the quarry has allowed him to work close to home, make a good living for his family, and enjoy the company of his fellow workers throughout a lifetime.

During interviews and office visits, people opened up and talked about their families, their weekends, the activities they share with family and sometimes with co-workers. One of them had fishing pictures in his office, and when I asked him about those, he told me that he fishes with his family, and that the company's newsletter has published his fishing pictures several times, which is a source of pride for him. A few shared with me their fear of losing their jobs since they had noticed how the company is being restructured. Their destinies seem to have merged with the company and it is difficult for them to imagine that they can have a separate existence from the job which they have done for so long, and away from people with whom they have worked for the longer part of their lives.

The people who had been in the company for longer could give many examples of how the introduction of quality control task forces, safety meetings and environmental certifications not only changed their jobs, but the importance they put on certain things related to sustainability.

### 3.3.1. Membership and sense of belonging

When I first joined Cemex I followed the same basic orientation and training that any new hire receives; the long process of acculturation and training also included special sessions on stress management and root cause analysis that introduced me to some of the customized mechanisms that the company provides some employees not only to perform tasks better, but to feel better and cope with challenges in a more structured manner. Like other participants, I met a lot of people and my sense of being a part of the organization increased through my participation in these programs even when I knew that I would only be there temporarily. Cemex combines people with different personalities and everyone needs to balance the organizational culture with the personal preferences on how to get work done. Through these workshops; people learn from others' experiences. They also find that the people who become part of the organization after a large acquisition take some time to feel part of the company, and that they also bring their own culture; which blends with Cemex's to create a new one after some time. Once, an employee in the UK told me how she felt that when the Mexican team arrived upon the acquisition, they would wipe out their old ways, but that now she knew that some things changed and others stayed the same even when you could listen to

Spanish conversations taking place in the halls. She felt welcome to join the Spanish speaking people in the cafeteria and had even begun to order Mexican food from the vendors that visited them to offer traditional spicy foods to them.

Repeatedly, employees in cement plants would confide to me that: “They spend so many hours together, that they know each other very well, and that they are like family, where everyone is taking care of everyone else”. An employee who had recently joined the company shared with me how it had been a great experience to get to know people in other departments through his participation in a charity ride. He had been training with a group of people living close to his home meeting people from Cemex who worked in other areas; he felt more at home in the company and was confident to reach out to them when his job required him to do so. The bonds that are developed at work between co-workers and even between bosses and their subordinates are so strong that truly are perceived as family to many employees, particularly among those with many years in the company.

In my particular case, I noticed how people would reach out to me and help me at a personal level, well beyond the corporate setting, once they learned that I was not being paid for my research and that they felt I truly cared about sustainability and their experiences with it. They opened their homes for me and allowed me into their families, making me feel a part of the community. This was so much so, that I also found how the kinship-style ties that some of my collaborators had built within Cemex were at work as my interview schedule started to unfold. ‘Family members’ who felt close to those supporting my efforts in the three



countries where I conducted research felt on the one hand obliged to participate out of loyalty to their co-workers and indirectly to me, and on the other, safe and reassured that I could be trusted given that I was a part of the 'family' network.

### 3.3.2. Distance between blue collar and white collar workers

While many managers and executives are careful of how they treat everyone, and most employees express gratitude for having a job in a good company, one supervisor told me that "the engineers with their shiny degrees do not want to get dirty, they do not like dust and even less, to start the job at 7:00am"; he said "they want to start at 9:00am and then go home at 1:00pm for lunch as if they were in corporate", and then he added, "and those in corporate sometimes send us templates to fill that do not resemble our plant at all! It is like they do not know my plant and then we need to tropicalize things", showing how blue collar workers interact with white collar people, and how there are potential misunderstandings, translations and adaptations. Another example that shows the differences between these operators and corporate executives is illustrated in the following story shared with me by a supervisor: "Once, one from corporate came, and she said 'it smells weird, what is that smell? And I answered, 'it is people's smell of course, because you know, these people work outside and in the sun', and she took offense, 'but one cannot send the people to shower before talking to someone, you know, I also come from below, and I understand the people and I can put myself in other people's shoes'". So employees come to work and develop strong relations with those around

them, they spend many hours together, and the sensibility to understand them and their context is very important to introduce new programs.

In contrast, several engineers shared with me their early days when they began working as laborers, and how they had been able to go to school and graduate while working in Cemex. They were close to the people in the plant and enjoyed working hands-on in the plant along the workers. A plant supervisor told me that the difference between the guys in corporate and them was often only schooling, since he had been invited to interview for a managerial job, but could not qualify because he did not go to school. He continued to tell me how his current manager is very knowledgeable and that he really understands the men. An operator told me that: “I am outspoken and talk to anyone who comes to visit our plant, and I assure you that if Mr. Zambrano (Cemex CEO) shows up in our plant, I will go to him and say hello, and I would tell him anything that needs to be told because he would care to know”.

### 3.3.3. Culture of entitlement

Many people in the United Kingdom, which has a strongly welfarist state that protects citizens such as the public health system and very low cost college education, expect the state institutions to take care of them. To a lesser degree, there are some welfare state institutions in the United States such as Medicare and Medicaid, and a similar attitude could be found in some American people. The coordinator of a facility that was about to be shut down in the UK described how a

couple of employees were planning as follows: “Now that the site is shutting down, he and his wife got into their minds that the government will pay for rent and other living expenses, so the two of them expect the government to take care of them, without any aspiration for future jobs”. Though governments and companies have limited resources and can only protect the people to some extent, there is the expectation from some people that government ought to guarantee their basic needs without feeling a sense of duty or the need to reciprocate in anyway. Hence, we find people demanding good jobs close to their homes and a clean environment but are sometimes not willing to take responsibility to change the current state of things. Even in Mexico, where the government has less resources, it is sometimes referred to as ‘papa gobierno’ or ‘dad government’; similarly, if the employee expected to be sponsored in something by Cemex, he would say ‘father Cemex’ in this country.

The expectations regarding the role of government can change the way people understand sustainability and their responsibility to address it, since some workers seemed to expect that the government should take care not only of unemployment benefits and healthcare, but of the environment as well. There were some employees in the UK who would complain about how the safety net that they had fought for through their unions, was now being used by people who did not care to work at all. For them, it was as if the basic social contract had not been respected by these people who did not seem to be interested in reciprocating and in making use of the safety net only sporadically.

A Mexican immigrant described to me how the kids of his co-workers in the UK mostly aspired to be poets and musicians, without realizing that someone had to produce. He then said that some of these kids get out of college with their music degrees and do not want to work in anything that does not relate to their interest in music, and then they just ask for support because they deserve a good living. He was surprised to learn about all the support these young unemployed would get in the UK. Also in Mexico there are the youth called NINIs, which stands for 'ni estudia ni trabaja' which means 'does not work and does not study either', which is the unfortunate status of millions of youth in Mexico and other Latin American countries. In Mexico, these young people depend on their parents to cover their living expenses, as is increasingly the case in the United States too, since the economic downturn of 2008. These people who seem to be dependent on safety nets provided by government or family are important stakeholders regarding the future of sustainability, since those employed today need to provide for them either directly or indirectly, which becomes an important burden. As people age and more people are unable to work, and governments face ever increasing budgetary problems, there might be a change in the culture of entitlement that seems to prevail today considering that it seems that there will be more people in need and less support from the state.

#### 3.3.4. Crew members and attitude towards women

While Cemex and the various organizations are open to the participation of women and they actively support a diverse workforce, traditionally, the cement

industry has had mostly male employees. In the sustainability tasks more directly involved with communicating and engaging the public such as community relations I found that the majority of employees were females; in the tasks related to environmental management, I found that there were about as many men as women working in the area. Given that mostly men work in the industry, the large participation of women in sustainability tasks is noticeable. However, the traditional male structure of the industry offered me a glimpse of the changing role of women in the workplace that will probably also shape the implementation of sustainability.

Single individuals bring to work their own beliefs and expectations, which sometimes show the attitude towards women is changing and sometimes show how ingrained it is among some men to consider women in a lower category. A woman laborer who had been working in an American cement plant for over twenty years shared with me how she had enjoyed her job even being the only female outside the offices. She had learned new skills and her favorite part was driving equipment, though a few years ago she was faced with a problematic supervisor, contrasting with the respect and support that she had always had from co-workers and supervisors. She told me that this person expressed that women do not belong in the cement plant and that he chose not to train her. The company supported her when she complained and the problematic supervisor does not work in the company anymore. This shows how Cemex, though still hiring mostly men for plant operation, endorses and supports women who want to join the industry.

In contrast, while visiting a British plant where no women worked in it, I found a well intentioned announcement directed to people using the eating area where they were being encouraged to keep it clean. Figure 3-5 shows how the note also indicates how most men in the plant expected their women at home to clean after them and that they should do the cleaning while at work, given that their women were not around.

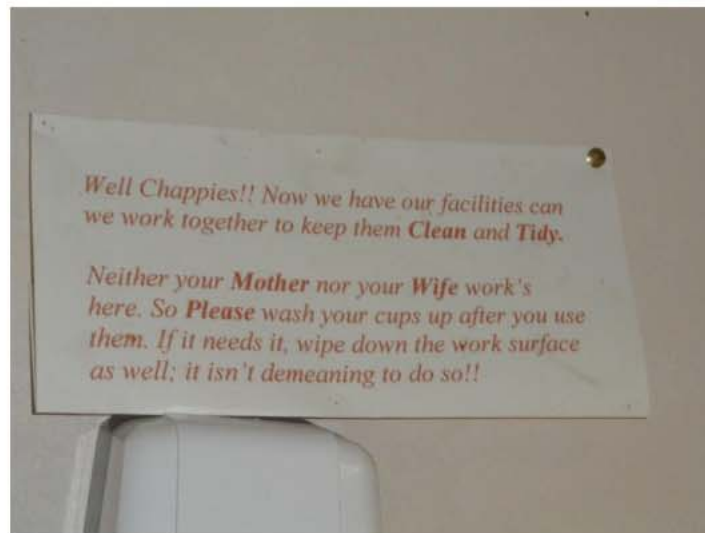


Figure 3-5 Sign encouraging men to clean after themselves at work

As can be appreciated, employees bring to work their own beliefs and expectations and combine them with company policies while they do their job and build sustainability at the same time. These broad generalizations only provide some elements to get some insight about common issues that employees as internal stakeholders cope with regardless of their position within the company. I consider that the Cemex case represents some of the situations that arise in any global

company working in a traditional industry such as cement. Next, I will describe some unique situations that people in specific positions face routinely. Similarly, I take these examples as representative of the differences that organization members in any large company experience in relation to the kind of job that they perform.

### 3.3.5. Top executives at national level

People at this level within the organization usually have multi-cultural experience and travel extensively. They sacrifice their time with family and one of them told me, ironically, how the wives of Cemex top executives are sometimes called 'the widows of Cemex' since it is hard to achieve a life-work balance in this kind of job. This group needs to balance the interests of the company at the global level with the local understandings. Not only do they need to consider their employees, who often have a different nationality, but the expectations of the government officials. For example, they get invited to the inauguration ceremony when a new president is elected, and as one of them told me, it is important to make room for all these activities in the agenda even when there is no direct correlation with Earnings before Interest, Depreciation, Taxes, and Amortization (EBIDTA). They need to communicate with people in the headquarters and also to share the goals set for the country with their team, reaching out to all.

### 3.3.6. Managerial level in the operations area

This group thinks extensively about the people with whom they work. They are usually engineers with several years of experience and oftentimes, also have

operator experience. For this group, it is important to follow what the corporate office asks them to do such as introducing sustainability policies, even though they find that the new tasks just add hours to their jobs, since their previous responsibilities remain intact and the workload increases. One of them told me “Since we got acquired, we have lots of surveys and that takes time, and then they send people like you and we need to take care of you”, pointing to my time-consuming presence. In addition, some of them feel that listening to external stakeholders and attending to events outside the plant are not really relevant for performance, while others stress the importance of good relations with the community to operate smoothly. One of them said that “many things, when not properly dealt with in operations, result in bad relations with the community, so they go together”. Similarly, another stated: “You build relations when you do not need them, so that you have them when you need them”.

Thinking about employees and their needs, one manager told me that he looked for opportunities to allow those at entry-level positions to demonstrate their skills and then promote them, showing everyone that if they perform, there is effectively a pathway to move up. Another manager told me that he had just been assigned a larger space but that it is further from his people, and he does not like that because it is important to be close to them. Also, regarding the introduction of change, one said: “There is no shortcut to gain awareness; any quick impact is bound to create resistance and enemies”.



These people are strongly people-oriented while also being at ease around equipment and concrete production goals. Sustainability is one more task on top of many others, and it is understood and communicated to workers in terms of production, environmental standards and safety procedures. They learn how sustainability is being evaluated and measured, and translate those measures into benefits for the workers when presenting changes to them.

### 3.3.7. Auditing and quantification experts

Meeting with the people in charge of designing measurement mechanisms, selecting key performance indicators and producing reporting tools showed me their firm belief in the rationality of people. They explained to me how sometimes they need to leave on one side soft issues that cannot be quantified in order to present comparative and seemingly objective charts to the decision makers. Similarly, they need to consider the trends among outside experts and struggle with the importance of short term goals vs. the long term impacts of sustainability initiatives. One of them expressed frustration with the attention to measuring impacts after one month of a certain expense when some things do not show their results until much later, like educational initiatives. Another one talked about the efforts to measure reputation and the importance of outside reports on this matter, which has become valuable in evaluating performance, though it is difficult to quantify internally.

### 3.3.8. The environmental manager viewpoint

Auditing is a large component of the job of the environmental managers; they are guided by an environmental management system that has been designed to facilitate inspections by producing reports from a template where employees routinely tick boxes.

There are four main sets of stakeholders that people in the environmental area need to interact with. The environmental agency representatives from government, the auditing organisms that certify the ISO14000, the environmental groups on occasion, and the fellow employees who need to be trained on the different environmental tasks that include following procedures to protect the environment and careful recording of what has been done. Many employees in this position have a background as environmental inspectors for state agencies and they understand their expectations very well due to their own experiences; additionally, they are very familiar with the legal requirements that each process needs to comply with. In the UK they interact with several government agencies at the local and national level, which brings an additional layer of complexity. Regarding the ISO14000, the environmental managers work closely with employees to make sure that all requirements are well understood so that the auditors grant the ISO14000 certification. Occasionally, representatives from environmental groups request a visit to a site and the environmental managers responsible for the area accompany them. An important part of this job is to work with the environmental officers from the government but also to prepare the plants for the thorough inspections that

officers perform. Hence, it is important to bring everyone on board and being ready for visits from environmental organizations is handled in a similar fashion to those from inspectors. Environmental managers work together and they know their counterparts from government since they usually stay a long time in their positions, so they usually know what to expect.

One environmental officer explained to me that she presents the environmental expectations to people in multiple small facilities and that what she does is to convince them that her presence is meant to help them comply with regulations, but first, to help earn more money since her program might mean lowering costs which will translate into a larger bonus. Pragmatically, she refers to the instrumental value of complying to connect with her audience. She then explains that over all, she needs to gain the trust of the people, since only when there is a trusting relationship is it possible to work together. She considers that she has succeeded when they commit to do the things in the environmental plan since she will only visit a few times but they also need to know that she is ready to help if something happens.

I find it very interesting that there is no mention about the importance of tax income for the operation of government, including the environmental agencies. This contrasts with the local councils who worry about keeping the plants running so that they can continue to pay taxes locally as told by a plant manager.

### 3.3.9. Planners

This group is particularly active in the United Kingdom where land permits are very difficult to get. There are two kinds of planning offices in that country; one for strategic planning of the company, and another one to deal with urban planning authorities. British planners in Cemex work closely with local governments and they strategize to make sure that the supply of raw material for operating the plants continues into the future. A thorough set of regulations organizes the work of this group since they must follow detailed Planning Policy Guidance Notes and Planning Policy Statements prepared by government after consultation with communities (Planning Portal - Planning Policy Statements and Guidance (PPS & PPG) (England) n.d.). Getting operating permits for quarries and other land use authorizations in the United States and Mexico is less complicated and does not require as much bureaucratic work. However, there is a trend for increased regulation as the awareness of neighbors and their perceptions on environment changes.

Cemex, like all cement producers, requires aggregates to produce cement and concrete. Quarries are needed to get them. Besides the bureaucracy involved in planning, there is also diplomacy given that the environmental groups increasingly oppose mining activity and neighbors prefer unspoiled nature around them. To address this opposition, the Mineral Products Association in the United Kingdom has begun an education campaign to teach the younger generations about the benefits for lifestyle that minerals bring such as the aggregates used to pave roads and build homes. Children visiting a site under this program are shown in Figure

3-6. The idea is to engage with future generations not only by showing how Cemex is working on the restoration of quarries but that the mining activities are necessary to enjoy many things that are part of daily life.



Figure 3-6 School children learning about quarries and minerals at Halkyn Quarry

#### 3.3.10. Community relations advisers

This area is highly developed in Mexico and I visited several community centers, joined some of the activities taking place at the moment of my visit, and interviewed some people who work in this area. These employees are deeply

attuned to the community around the center where they are located and are constantly communicating with neighbors not only through the activities organized by the center, but by spending time in the area and talking to the people. In addition, these community relations representatives spend time with the local people in the plant to make them aware of the needs and interests of the neighboring community. In the case of Mexico, the activities with the communities are mostly directed to social and human development such as children's soccer schools whereas in the case of the US and the UK, reaching out to the community often means coordinating conservation activities such as the Southam Quarry biodiversity management plant developed in consultation with stakeholders. This is due to the different interests that neighboring communities have in each place. However, in the UK there is also an important civic participation tradition where multiple local organizations represent community interests with different priorities, levels of trust towards companies and government, and appeal among inhabitants. There is some concern among neighbors regarding the environmental impacts of cement plants and the company constantly meets with neighbors to communicate about the performance of the plants, giving attention to all interested parties. For government officials, neighbors are also important stakeholders and they organize consultation processes along with the company to get input from the neighbors when new permits are needed.

### 3.3.11. Corporate communications

International advocacy groups with strong internet presence are relevant stakeholders for this group. An employee in the communications department said, “We are judged not by what we do in Europe or the United States but for what we do in Colombia or Bangladesh. We know that sustainability is important at a global level.”

These employees also deal with media representatives and I was able to join a woman from the UK communication team on a trip to a quarry to listen as a site visit and interviews for an article took place. The editors of an industry publication accompanied by two assistant journalists were visiting this quarry to write an article about the machinery being used in it. We arrived there and joined the local management team to welcome the visitors. When they arrived, we had lunch and I listened as the conversation turned to the stakeholders of the journal. They shared with us that they need to increase advertising sales since the magazine has shrunk during the economic downturn, so the articles they are writing are also about the machinery that they are advertising, so that they support the client while trying to respond to the readership’s interests. I noticed how the media’s interests in this case were mostly economical and the interest in the environmental and efficiency characteristics of the equipment was only as a mean to other ends.

To complement my experience with the media, the communications team introduced me to a local journalist with whom I met in private. In this meeting, I

learned about how newspapers need to sell news and the journalist candidly explained to me that people do not really care about news on how nice the reforestation is going in a quarry or how the local plant got a zero accidents award. What people like to read is the awful news, like “dust covers the town, might be carcinogenic” or “two workers injured in accident, sabotage is suspected”. He told me that, in a way, the better things are going in town, the worse they are doing in the business.

For the people in the communications area, there is the need to balance these interests that media people described to me, with the need of the industry to show their good performance and their interest in sustainability. They maintain a network of informants within the company to learn about what is happening that might be of interest for external stakeholders and also to let others know about the achievements of different plants and employee efforts. Regarding sustainability, they participate in designing communication materials that are distributed among employees as well as directed to external stakeholders.

### 3.3.12. Electricians

Employees who deal with electricity daily are at a particularly high risk of being involved in accidents. While the company has begun to develop cleaner sources of electricity such as wind farms in Southern Mexico, the handling of this energy source is very delicate. The safety training that electricians undergo is very specific and is repeated regularly to reinforce the importance of proper use of the



personal protective equipment (PPE) and how to safely conduct the job. All of the electricians that I talked to went to a technical school to get an associate degree; though sometimes their original training had been in auto mechanics or some other related field. Often, they had worked in the construction industry before joining the plant and they were happy with the stability that a job in Cemex provides compared to the uncertainty that working in construction brings, given that when a project is finished, they needed to look for another job. Several of them told me that the extra hours are welcome when possible because they are very well paid, but that they also try to balance their work with family time because they want to be around their kids. The connection that this group has with sustainability is mostly through safety training, and they are very aware of the safety risks of their job.

One of the electricians that I talked to described to me that he had been in an accident many years ago, before joining Cemex. He got electrocuted on a construction job, burned from the waist up and broke many bones after falling 51 feet. After taking time off, he figured that he had to do something to make a difference. He told me that the gloves that he was wearing the day of the accident, though they were new, were not in good condition and that was why the electricity got into his hand through a hole and burned him. When he came back to work, he knew that safety is first and that one needs to always check the PPE. After so many years, he is still reminded of his accident every day through his scars and he does not feel uncomfortable showing them to people so that they learn and avoid accidents. He has participated in the safety committee for a long time now and is

well aware that he is an example to all the people, so he always stays safe and helps the new employees to get used to the PPE and to the safe working steps. He explained that people need to be able to identify when they are tired and be able to withdraw even when they know that they might get very good extra money for staying longer, since being tired raises the risk of accidents tremendously.

He also told me of the importance for employees to know that the company cares about them, about their families, and about them getting back to their families every evening. For him, this is a key to convincing employees, particularly the new ones, of the importance of safety. He stresses that it is not so much about giving everyone a list with the things they have to do on a piece of paper, but to really show that one cares for them and for making sure that they understand that any failure can translate into not being able to go back home that night. Being so close to risk and having experienced a terrible accident, this worker talks about sustainability exclusively in terms of safety and the possibility of staying safe while conducting the job.

### 3.3.13. Ready mix truck drivers

Ready mix truck drivers are often the only contact that the general public has with Cemex. They spend their day filling their trucks at the ready mix plants and delivering concrete in construction sites. Most of the contact with sustainability that they have is related to environmental regulations and procedures to avoid fines but also on safe driving to avoid accidents. Given the size of the trucks that they drive, it

is not possible for them to see if a pedestrian or cyclist is at their side. This has led to multiple accidents and a special “Cycle Safe” program to educate cyclists was put in place during my time doing fieldwork as shown in Figure 3-7. The figure shows how cyclists are invited to jump on a truck and try to see in the mirrors the areas where cyclists might be. The exercise shows that the driver is not able to see the cyclist and can only guess if there is one or not. While drivers are constantly trained on how to keep a distance from cyclists and to always be aware of their presence, it is important to involve cyclists in the training to educate them about the limitations of drivers. This is an instance where communications and ready mix teams would work together to reach out to the community to address a sustainability issue through the avenue of safety.



Figure 3-7 Cyclists participating in 'Cycle Safe' program

In addition, there is counseling support for drivers involved in accidents, but it is not forced in order to respect the desires of drivers and their sensibility while undergoing a difficult time. Safety training videos present fatal accidents and employees mentioned that they have a big effect on them, raising awareness of risks. However, the drivers involved in an accident are usually reluctant to participate in this kind of sharing; one of them told me that nobody likes being singled out as the

one who did something wrong. In the eyes of those in charge, the idea of the training is not to change the past but to prevent the accident from happening again.

While riding with a truck driver on his daily route, he would describe to me the many environmental constraints and requirements that truck drivers must meet. Similarly, he told me about the safety training that they undergo, including the cyclist awareness program. He said that something that is striking to him about sustainability is that the construction sites are really diverse in how they enforce safety. It is sometimes difficult for him to deal with, since in some construction sites people are not careful around the vehicle and do not wear PPE, whereas in others, particularly the larger ones, safety standards are similar to the ones in Cemex.

#### 3.3.14. Quarry operators

Quarry sites are often located in the countryside and are usually the only large somewhat industrial presence in an otherwise rural community. This creates a very different working environment for workers, given that they spend their days in close contact with nature while they also change the landscape through their digging and blasting. Even with the help of equipment, the job in quarries still demands more physical activity, strength and coordination than other jobs more dependent on computers and robots.

When visiting British quarries, I was caught by surprise not only by the size of the hole in the ground and the equipment, but very particularly, by the caring and gentle giants that worked there. To my surprise, in one of my first visits to a quarry,

I was greeted by a huge tattooed man with the toughest appearance that questioned all my stereotypes. After taking me through the safety training and providing me with my PPE, I told him about my research and he immediately said: 'Well, then I am going to give you a tour of the site including the old equipment that we have on the back'. He then kindly showed me around, patiently answering all my questions about quarry operation, the safety training, the environmental training and his experiences in the company. Then he said: 'Well, I suppose you really care about the environment, and I am going to show you something special we have here' and he said, pointing to a large metal piece of equipment about 200 meters from us: 'Follow me, do you think you can walk that far in this rugged surface?' I said: 'Sure!' still thinking what could be so interesting to walk away so far and what motives he might have to spend more time with me. When we got there, he told me to be quiet and then he told me to have a look into a sort of opening, while he held the door to it. Figure 3-8 shows what I saw.



Figure 3-8 Baby birds inside unused equipment at British quarry

He told me that the mother bird should be back soon, and that the little ones are being well taken care for. Not only is the mother always bringing them food, but the guys in the quarry are careful not to make noise or bother them in anyway. After taking pictures, we returned to the small office where I had started the interview and the other men wanted to know if I had seen the baby birds. They talked about them proudly and were excited to have the newborns around. The closeness to nature that the quarry jobs entail creates many opportunities for this kind of experience.

In other British quarry visits, the men would point to a site, often in the middle of a quarry, where the crested newts<sup>20</sup> had become established. Given that they are considered a protected species, the men need to let them develop and not work near them. Though they are inconvenient in the operation of the quarry, they seemed to be a welcome sight for the operators. Even in close contact with nature, the emphasis on safety training was always in place right next to the environmental one, and a board for safety news, names to call in case of emergency and record books would usually be located right next to the environmental board where environmental news, names to call in case of an environmental incident and record books were displayed. Sustainability, conservation, health and safety are really hands-on experiences for these people, who experience daily concrete examples on each front. Similarly, the relatively big size of quarries makes them be very aware of their impact on the surrounding communities, who require them to respect hours of operation so that noise does not disturb them, set in place precautions in case children sneak into the property after hours, and organize site visits as shown in Figure 3-6 where schoolchildren visit a quarry.

### 3.4. Conclusions

This chapter describes some of the key actors in the cement industry as participants in the construction of sustainability. The company provides a script for

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<sup>20</sup> The crested newt is an European amphibian similar to a salamander.



all employees to follow taking as a point of departure the expectations set by key external stakeholders such as the Global Compact, the Cement Sustainability Initiative and shareholders. External stakeholders also follow a script as dictated by the audit culture mechanisms to be found in their own context as well as the pressures imposed by their particular stakeholders. In this circular motion, I have found that while most actors involved in the construction of sustainability have a vision of what sustainability should look like, their role as crew members and the impact they can have, others are not aware of the process and their participation in it.

Similarly, the prevailing acceptance of stakeholder engagement leads to transforming participants into instruments being used to advance the interests of every group, where more than an ethical analysis of principles, the power level of each group determines the shape of sustainability. By introducing a 'reasonable man' assumption into the business model for sustainability where reason is supposed to guide decisions to achieve the triple bottom line, the affective processes effectively taking place are overlooked during the construction process. However, these continue to play a role as crew members intervene, projecting their own understandings and values into the edifice of sustainability.

Stakeholders participate in the construction of sustainability continually communicating with other crew members their interests and viewpoints. To this end, they need to translate their ideas for others in terms that are meaningful for all such as common evaluating schemes. Often, it is through economic and performance

measures that people engage with sustainability in the upper levels of management, while there are more affective and concrete processes among operators in all business areas.

Ethics underlies the construction of sustainability, and it is implicit in the descriptions that different crew members make about their experiences with sustainability. The combination of rational with affective processes obscures the ethical positions that guide the edifice of sustainability making it hard to identify them. Whether acting as internal or external members of the construction crew, the driving interests for participation and negotiation of the sustainability building blocks is strongly influenced by ethics. The interdependence between all groups and the need for accountability and transparency require that ethical positions be scrutinized and often made public in contrast to the private realm that prevailed when pirate ships roamed the oceans.

## Chapter 4

# Blueprints and Scaffolding: Sustainability, the Production of Knowledge, Audit Culture and Expertise

Corporate management has adopted transparency and accountability policies that translate into well-structured reporting schemes regarding quality control, health and safety assurance, environmental standards, and more recently, sustainability parameters. At the same time, stakeholder engagement and dialogue promotion have been embraced by management representatives interested in sustainability, either as part of a compliance program and/or an ethical commitment. The tensions that result from these two corporate management policies regarding sustainability can be better understood through analyzing previous anthropological studies in the realm of audit culture as they relate to the

case of the cement industry and its relationship with universities and other expert communities. The detailed account presented by Whitehead (Whitehead 2009) on the construction of a climatological state in the UK is particularly beneficial to reflect on the conditions upon which sustainability is being constructed.

The interest in sustainability occurs at an interesting time. We live in a moment when the premises of what modernity entails have either been questioned or dismissed altogether. Reflexive modernization refers to “a radicalization of modernity, which breaks up the premises and contours of industrial society and opens paths to another modernity” (Beck 1992: 3). This period of modernity rejects the certitudes that characterized the industrial society of modern times where the consensus around the possibility of generalized progress for all seemed to prevail; it recognizes the side effects of modernity and makes explicit the different dynamics between nature and culture, but also between law and science in relation to contradictory and global risks. In the context of reflexive modernization and disenchantment, the call to become sustainable maneuvers between techno-industrial rationalizations regarding environmental and social problems and the unpredictability that emanates from humanly induced threats. There are three key concepts that I explore in this chapter as they relate to the blueprints and scaffolding of sustainability’s construction in the cement industry: the emergence of a new community of experts that deals with sustainability, the way these experts produce knowledge in collaboration with other social actors, and the language that

characterizes the emerging field of sustainability. These are introduced through a brief literature review followed by ethnographic accounts.

#### 4.1. Anthropological background

The interest of anthropology in cultures of expertise is very valuable when studying sustainability. Expertise is necessarily linked to the process of knowledge production and its institutionalization (Andrew Delano Abbott 1988; Andrew Abbott 1995; Gal and Irvine 1995; Brenneis 1994). As such, the emerging field of sustainability is linked to expertise and institutionalization given the technological and managerial requirements that sustainability implementation demands. Anthropological interest in knowledge production and expertise is a relatively recent phenomenon. The anthropology of experts is a growing field that has repeatedly explored the cultural processes of evaluation and legitimation of expertise in distinct societies such as special jargon or terminology (Jacobs-Huey 2003), way of thinking (Mertz 2007) and the perceived value of the body of knowledge in question (Erami 2009). Particularly interesting in this regard is Star's work on the epistemological status of indicators and the role of experts' design priorities in determining communities' access to key goods and services (Star 1999). Though there is no consensus regarding the meaning of sustainability among experts in different disciplines (Levin and Clark 2010) not even among those directly in contact with one industry such as cement (Sev 2009; Mihyeon Jeon and Amekudzi 2005; Guyse-Fiskel 2002), no anthropological study as such has yet been made to explore expert

dynamics in the emerging field of sustainability and this dissertation attempts to fulfill such a gap.

The juxtaposed understandings and knowledge bases of corporate actors, environmental organizations with global connections, grassroots movements, government agencies and media outlets have begun to be analyzed within anthropology (Fortun 2009a; Walsh 2004; Tsing 2005; Welker 2009). The participation of experts around public controversy and the alternatives for democratizing science has been explored by Brown (Mark Brown 2009). However, the knowledge production dynamics that influence employee understandings about sustainability including experts and other actors have not been addressed. An important change in the stratification and hierarchy of knowledge production towards more horizontal structures of power regarding environmental concerns has been documented by Maida (Maida 2007), Haenn and Casagrande (Haenn and Casagrande 2007). Through their expertise as anthropologists, Ali (Ali 2009) and Welker (Welker 2009) analyze the conflicts between mining companies and indigenous communities by focusing on the dynamics of how resistance reshapes policies and influences the outcomes indirectly. This methodology strongly resembles the current stakeholder engagement approach followed by companies interested in pursuing sustainability programs that attempt to combine social priorities with environmental and economic ones, though more research is needed into the influence that anthropologist researchers (openly activist or not) have in defining sustainability measures. Nowotny et al. (Nowotny, Scott, and Gibbons 2001) take a look at the production of knowledge and the relationship of experts with the public under conditions of uncertainty. They call this new way of production of knowledge “Mode-2-science” where there is a closer

interaction between science and society which leads to contextualized science and a potentially different power balance between experts and lay people. Also within the study of expertise, sustainability offers an interesting field opportunity to study the emergence of a new professional jargon (Jacobs-Huey 2003) as well as the relationship of a new kind of experts with certification processes and auditing techniques considered as valuable cultural objects (Silverstein 2003; Silverstein 2004; Silverstein 2006; Cetina 1999).

Similarly, audit culture is a phenomenon that has been documented within anthropology. Power (Power 1999; Power 1994) documented the *Audit Explosion* and the increasing standardized systems of self-evaluation that characterize current times and shape social organization and the practices of trust. In this context, inspectors and accreditation agencies are important actors for the spreading of sustainability ideas, its legitimation and its professionalization (Heinelt and Smith 2003). Anthropologically, Strathern (Strathern 2000b; Strathern 2000a) and Fineman (Fineman 1998) have already explored how inspectors construct moral orders and standards and the role of organizational rituals as tools of control regarding environmental policy in industry. Swierstra and Jelsma (Swierstra and Jelsma 2006) studied the perceptions of engineers regarding social responsibility and express the importance of rules and structure to recognize wider societal policies and concerns. Macintyre et al. (Macintyre, Mee, and Solomon 2008) investigated the demands of audit culture on stakeholders when evaluating social performance in a Papua New Guinea gold mine. However, the presence and

influence of the audit culture regarding sustainability within corporations has not been documented.

From the field of organizational studies and in close connection to anthropology, Weick (Weick 1995) studies organizations to point that sense-making does not follow the rational model which organizations often embrace; rather, reality is created by people who construct it when they make retrospective sense of the situations in which they find themselves. Similarly, Bazerman and Watkins (Bazerman and Watkins 2004) describe the cognitive roots of behavior such as positive illusions or the improper discounting of the future which might explain why people often postpone dealing with long term problems like sustainability.

The introduction of standards that presume uniformity among a diverse array of companies and organizations has been documented by several researchers with contrasting results that show the dubious benefits of the extended audit culture regime. For example, the difficulty of small and medium enterprises to apply large firm standards and the heterogeneity of the sector in New Zealand has been assessed by Battisti and Perry (Battisti and Perry 2011). Also the gaps between CSR norms at the corporate level and the norms of sustainable development as understood by civil society in separate cultures have been described by Dobers and Springett (Dobers and Springett 2010) and Belal and Roberts (Belal and Roberts 2010). Schuler (Schuler 2008) has studied the differential effects of laws and regulations for which more sophisticated companies oftentimes lobby for, not only among companies of other sizes, but even among other actors. This work provides



context to reflect on the effects of creating mandatory sustainability reporting and measurement, who is benefited and who is harmed by it. Within the public sector, the mismatch between strategic policy and operational activity related to inadequately implemented performance measures has been studied interpretively by McAdam et al. (McAdam, Walker, and Hazlett 2011) and Devanney (Devanney 2009). Sullivan (Patrick Sullivan 2009) shows that disadvantaged minorities are subjects rather than partners in accountability regimes due to the reporting requirements at the expense of practical activity. Waks (Waks 2009) points to the relational distance between auditor and auditee in Swedish ambulance services that result in the contestation of the knowledge base of ambulatory work. Within anthropology, the spreading of measuring techniques and adoption of standards has been resisted through describing the advantages of ethnography over quantitative assessments of social phenomena since it accounts for the personal experiences during events (Holloway et al. 2010). However, the emergent field of sustainability appears to have strongly embraced the audit culture and an ethnographic analysis of its outcome has not been performed.

#### 4.2. Sustainability as a document: The blueprints and scaffolding of sustainability as a background

In the context of increasing environmental and social problems at the global level, social actors with diverse backgrounds and interests try to address these issues through actions understood as 'becoming sustainable' or 'achieving sustainable development'. In

the case of the academic community, there are ethical reasons to join these efforts accompanied by instrumental ones, as will be discussed later. However, members of different disciplines interpret the concept according to their own field's tradition and their personal experience. In the following pages I address anthropologically the process of knowledge production about sustainability which seems to follow the Mode-2-science model (Nowotny, Scott, and Gibbons 2001), the role of experts from the academic, government agency and industry sectors in the process, and the influence of audit culture. Some of the interactions of experts and accreditation agencies with cement industry representatives as well as civil society are particularly important in relation to the construction of sustainability as such. All stakeholders participate in this construction project given that once a sustainability plan has been tailored, it needs to be put before the consideration of society through consultation with neighbors where scale models are presented and potential impacts are discussed. The engagement with stakeholders aims to get feedback from interested parties following the current trends of accountability and transparency while also pursuing a peaceful relation with neighbors. The acceptance of audit culture is palpable though it is never referred to as such by any informant. In addition, licensing and permitting steps are required, with varying complexity according to the place where the project is going to be built. Oftentimes, the stakeholder engagement process is a step that governments require when licensing and permits are requested.

It is important to point to how the production of documents accompanies this construction and how sustainability's construction goes hand in hand with these documents. The licenses and permits are important in the field of sustainability.

Environmental regulations are a part of this, but so is the so called ‘license to operate’ that a good relationship with neighbors enables. Additionally, there is an increasing amount of accreditation processes that aim to probe the sustainability of projects, whether they are related to construction or consumption products. Particularly in the construction industry, a project might be evaluated by the Green Building Council in the US to provide a LEED certificate that rates how green a building is. In the UK, the Business Research Establishment Environmental Assessment Method (BREEAM) clearly establishes the sustainability expectations that new constructions must meet. Even in Mexico, some sustainability credentials have been created to demonstrate the sustainable characteristics of companies like the distinction “Empresa Socialmente Responsable”<sup>21</sup> that the “Centro Mexicano para la Filantropía”<sup>22</sup> (CEMEFI) has established.

The audit culture frameworks make use of voluntary and mandatory technologies of government through explicit and implicit policies. Hence, governmentality mechanisms stress the voluntary nature around sustainability implementation beyond the coercive measures that a state might mandate while using both. For example, in addition to the licenses and permits that single construction projects might meet, there are other accreditation mechanisms similar to licenses and permits that construction materials producers might voluntarily subscribe to, such as the production of Global Reporting Initiative (GRI) reports and ISO accreditations (14001 for Environmental, and 26000 for Social Responsibility). While the GRI reports are not mandatory in the US, the Sarbanes-

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<sup>21</sup> Translation: Socially Responsible Enterprise

<sup>22</sup> Translation: Mexican Center for Philanthropy

Oxley Act is mandatory and demands that companies include provisions for potential risks which can be understood as including corporate responsibility risks in their yearly reports. The European Union (EU) now requires from publicly listed and non-listed companies some form of disclosure on environmental and community issues as well as employee matters through the Accounts Modernisation Directive (EU AMD). Hence, for companies that operate in either of these two regions, there is an increasing need to comply with reporting. Furthermore, the demands of activist investors and shareholder advocacy for sustainability reporting has forced companies to organize ballots among shareholders often resulting in changing corporate behavior and mandating sustainability reporting (As You Sow: Corporate Social Responsibility, Shareholder Advocacy and Toxics Reduction n.d.).

Similarly, construction materials also have their own credentials such as Carbon Label and CEM2 for Responsible Sourcing certification in the UK Cement market and Green Choice eco-label seal in the Philippines, Green Label in Singapore. In Mexico and in the US, no label or standard has been established but special concretes and advice are available for those who request them for construction projects pursuing BREAM or LEED certification. It is interesting to point that LEED recognizes the value of reducing the cement content of a building through the category of innovation in design, where the use of special concretes is encouraged (Portland Cement Association). As these examples show, the audit culture mechanisms are deeply intertwined with the daily practices of cement industry operators at all levels.

A set of documents accompanies the planning process and subsequent project management steps that are closely attached to the licensing and permitting procedures from which sustainability takes form. Hence, the shape that sustainability takes is strongly attached to the specifications contained in these permits that structure the planning process. Paper based or digital documents contain the abstract essence of the sustainability project that will only become material and tangible later though its main elements are defined here. Time charts, blueprints, cost estimates, environmental impact assessments, licenses and permits are some of the most common documents that integrate what I call the sustainability blueprints package. This package must be generated before starting with the excavating and building of the foundations, scaffolding of the structure, structure building, and finishing touches of the construction of any project, which in the case of sustainability in the cement industry take varying forms as will be discussed later. Once this is accomplished, an accreditation or award might be pursued to demonstrate the sustainability credentials achieved by the specific business or product. Hence, sustainability implementation in the cement industry follows a prescribed path that is expressed in the blueprints specified by the particular instance that certifies the industry, product or activity selected, such as ISO14000 for environmental activities, or LEED certification if it is a building, or Carbon Label in the case of the cement line of products, fulfilling the determined sustainability parameters/blueprints.

In an ideal top-bottom management approach, any organizational change requires detailed planning and then clear steps towards implementation. Sustainability implementation calls for an organizational change where the mindset of the employees is set to change after planned intervention. Regardless of how often they occur, it is

frequently the unforeseen events which actually shape the implementation strategies as has been stated by Mintzberg (Mintzberg 1994) who questions the possibility of ever accomplishing strategic planning given that strategy is based on synthesis while planning is based on data analysis. Similarly, Allison and Zelikow (Allison and Zelikow 1999) also point to the difficulties in planning and question the assumptions for decision making focusing on the historic Cuban missile crisis under the lens of the rational actor paradigm, the organizational behavior paradigm, and the governmental politics paradigm. Despite the difficulties in planning, the appointed industry executives in this case and most others continue to plan and elaborate detailed time charts of expected progress that allow continuous evaluation and adaptation. These are accompanied by cost estimates that might include job descriptions for new positions, processing equipment acquisitions and stakeholder engagement activities. Hence, we can appreciate the logic of the triple bottom line (Savitz and Karl Weber 2006) which naturalizes the economic side of the sustainability triangle that underlies the entire strategy. Following the triple bottom line reasoning, the economic, social and environmental sides of the sustainability triangle must be addressed at all times.

The environmental side of the sustainability triangle follows detailed strategies. The environmental impacts related to the production of cement are an important consideration regarding the construction of sustainability. Research and regulations are focused in reducing energy consumption, and in diminishing the emissions of CO<sub>2</sub> and other pollutants such as NO<sub>x</sub> and SO<sub>x</sub>. In addition, the use of recycled concrete as aggregate and the mixing of alternative cementing materials have significantly reduced the environmental impact of the industry. There are specific environmental accreditations

such as ISO14001 which all of CEMEX cement and concrete plants in the UK have; while in Mexico all of the Cemex cement plants have it, as well as some of the concrete plants. In the US, the ISO 14001 is not as common and instead, Cemex has become an Energy Star<sup>23</sup> partner in this country. In addition, neighbors and employees in the three countries value highly the efforts that the company puts in environmental programs, improving the relationship with them.

Socially responsible activities and social impacts constitute another side of the sustainability triangle. The effort to professionally manage socially responsible activities has led companies to look for quantifiable outcomes of such activities. While alliances with established NGOs are favored, traditional philanthropy is rejected. Instead, some core activities are defined according to the company's mission and trajectory, often privileging educational and environmental projects. In the case of the cement industry, there are multiple examples that can illustrate this process. During my time with Cemex, I could observe the importance of programs such as Patrimonio Hoy, local community centers and liaison committees in multiple locations.

While the transition to sustainability takes place within the construction industry and all the accompanying documents are designed and produced, the importance of expert actors' intervention needs to be addressed. These experts

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<sup>23</sup> Energy Star is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices (About Energy Star: Energy Star n.d.).

come from multiple disciplines and their expectations might be different given the diverse backgrounds and pathways which have led them to such a position. The sustainability movement in academia and the collaboration of expert communities provide an interesting showcase to explore the criteria at play when complex problems are addressed by experts engaged in knowledge production, as they relate to the construction industry in general, and the cement industry in particular. Sustainability is constructed in very important ways through these cooperative processes where the official and unofficial criteria for membership in the expert community can certainly influence the shape of sustainability. By collaborating with industry, experts influence one another and shape the outcome of sustainability, as this chapter describes.

Following the construction project metaphor, it is the expert community who determines the blueprints that others must adhere to when engaging with sustainability. Traditionally, a blueprint has defined what a finished building or product is expected to look like, including a specific plan that is set to guide the construction effort. In the case of sustainability, it is the expert communities who define what a sustainable building, product or practice is as well as the steps to get there. Simultaneously, other important actors such as industry associations or government agencies influence the definition of expert and guide their participation through offering particular funding alternatives.



### 4.3. A twofold outcome of sustainability

Just as the growing awareness about the need to become sustainable has called for a collaborative effort, the elements that end up being included in the blueprint need to be discussed and clarified. What does becoming sustainable in the construction industry mean for the members of the expert communities in each discipline? How do their understandings of the world and of their role in it impact the production of knowledge in the field of sustainability and in the resulting built environment? What narratives support the understandings of expert community members? What role do cement corporations play in the production of knowledge, specifically in relation to sustainability? Expertise, stakeholder engagement and audit culture are relevant to answer these questions. This chapter tries to answer them through the tracking of sustainability efforts of the cement industry that involve academic institutions, professional organizations and government agencies as they collaborate to define sustainability parameters for the cement industry. I illustrate the influence of audit culture, the quantification paradigm that accompanies it, and the strength of the experts' communities as they relate with the rest of society through a set of examples.

I argue that the strength of these forces is such that the outcome of sustainability defined through their lens is twofold; on one hand, sustainability is incorporated into the prevailing economic system to become mainstream and a part of everyday management practices adopted widely at the industry level as well as in other important realms. On the other hand, the idealistic or strong conception of

sustainability is put aside and replaced by a measurable, controllable and transparent process that only partially touches on the behavior change and related supporting logics.

During my research and fieldwork, I encountered four interesting points of interaction among these actors that contribute to a better understanding of the collaboration processes taking place which depict the merging of interests and the re-formulation of sustainability to fit into a complex system. First, I describe the establishment of research initiatives and awards in academic institutions funded by cement industry representatives educating the public, shaping the aesthetic sensibility of decision makers and merging sustainability with concrete into a new architectural discourse. Second, I explore the collaboration of academic institutions with industry practitioners supported by government agencies while defining sustainability parameters (ISI-Envision; BRE-BREEAM; USGBC-LEED). Third, the evaluation process followed by companies to produce sustainability reports that need accreditation as required by governments and investors. And lastly, the efforts of a multidisciplinary team of experts to create a sustainability assessment framework aimed to impact policy changes that could transform the cement industry. All four instances are intertwined and they inform one another regardless of the place where the interactions take place.

#### 4.4. Industry experts shaping the understanding of sustainability among practitioners

Experts in the industry come from many fields and disciplines. They shape the understanding of industry practitioners through their activities in multiple fronts as illustrated in the following examples.

##### 4.4.1. Educating the public and decision makers about how cement is sustainable

In this section I describe how the blueprint of sustainability at the general level is influenced by the intervention of industry representatives who introduce their own interpretations among key groups such as architects and construction industry workers. During 2009-2010 I had the opportunity to participate as a sustainability research intern in Cemex where I was able to learn firsthand about how Cemex, along other cement producers, actively engaged with academics and construction industry practitioners through several initiatives. Though I was aware of some of these initiatives, focusing on them as one more building block towards the construction of sustainability is particularly productive. I found it very interesting to learn about the Premio Obras Cemex, which is an architectural award sponsored by Cemex that recognizes the architectural merit of particular works in combination with sustainability parameters. I learned about the interest of recognized professionals to participate in the judging process without payment, and about the great expectations among the architectural community that the awards

steer. While Cemex organizes this yearly contest in several countries to communicate with decision makers in the construction industry and to establish itself as a leader in architecture in general and in sustainability in particular, the participation varies widely in different countries.

The Premio Obras Cemex began to recognize the most innovating architectural and engineering projects in the Monterrey area in 1991 (Pasos y Requisitos | Premio Obras | CEMEX n.d.). It evolved to include all of Mexico in 2000 and other countries where the company operates in 2005. The sustainable design category and the social impact category were created in 2002 to recognize market changes and to promote social and environmental sustainability while constructing with cement. The winners in each category in the Mexican and in the international competition are awarded with a sculpture, a diploma, media coverage and the license to use the Premio Obras Cemex logo in their websites and brochures as the one shown on Figure 4-1 issued for the Guatemalan contest.



Figure 4-1 Premio Obras Cemex logo for First Prize winner in the Guatemalan Contest

In addition, the winning projects are published in a yearly book that represents the best practices in architecture, civil engineering and construction design for each particular year providing an excellent showcase to firms and individual practitioners. While the people that I was working with do not refer to this process as part of the construction of sustainability in the cement industry, I consider that the influence that the Premio Obras Cemex has as a referent to community members is a part of the construction project. This program is especially relevant in countries like Mexico where sustainability is still a voluntary endeavor and the market is only beginning to recognize its importance.

The Premio Obras Cemex books are very important documents to understand how the company actively shapes the industry by educating key players about the uses of cement. Not only the organization of the contest positions the company as a leader in taste, but defines acceptable trends in construction and sustainability that incorporate concrete in a particular aesthetic discourse. My observations about the Premio Obras Cemex are centered on the Mexican case, which is the most established instance. While I did not observe the process of production of the book, I did have the opportunity to witness the excitement surrounding the award ceremony and the presentation of the book corresponding to the previous year's winners. Participating architects and their spouses dress up and prepare a short speech in case they are announced as winners as described to me by some architects. Company representatives, educational institution representatives and invited judges also show up accompanied by their spouses wearing elegant attire.

It is very interesting to take a look at the books and the changing trends that can be found through time. Figure 4-2 and Figure 4-3 show two book covers where the older one shows massive use of concrete and straight lines while the more recent one depicts the combination of concrete with other materials, curved lines and green spaces. While tracking the construction of sustainability, this prize caught my attention and I decided to become familiar with the publications resulting from previous years. Cemex is not the only company that organizes this kind of contest; for example, Holcim, another cement producer, has established the Holcim Awards Competition for Sustainable Construction (Holcim Foundation for Sustainable Construction - Machen! – Die Deutschen Gewinner Der Holcim Awards 2011/2012 n.d.) which awards monetary prizes and also produces a book. In the steel industry, Metalmag (2012 Architectural Awards Call for Submissions - Awards - Metalmag Magazine n.d.), an industry magazine, also promotes a competition of metal projects among architects, contractors and manufacturers, which includes a Building Green category. It is particularly noticeable how sustainability related awards have become more salient and how there are more categories that recognize this topic than any other. Furthermore, the awards seem to certify that the winners effectively represent the most successful implementations of sustainability principles to design and construction using concrete. In addition, I met with some participating architects to learn about their perceptions and experiences while participating in the contest.



Figure 4-2 Book Cover for the XI Premio Obras Cemex



Figure 4-3 Book Cover for the XVI Premio Obras Cemex

Whereas the contests and books might very well be understood as marketing tools, I focus instead on how they are tools for the production of knowledge and the enhancement of expertise. The book series and award ceremony resemble Porter

and Kramer (Porter and Kramer 2011) shared value concept of capitalism that brings together business and society, and I explored how the discourse of sustainability might constitute an alternative meta-language for the legitimization of concrete building during late modernity as it is being contested (Beck, Giddens, and Lash 1994), at a time when environmental concerns displace the narrative of cement building as synonym of progress. The emerging discourse is particularly supported around notions of knowledge rooted on the support of experts and their conceptions of sustainable construction, while also offering a vehicle to imagine new models and lifestyles. Energy efficiency and minimal environmental impacts become technological devices that point to market driven strategies while also regarding sustainability in construction a socially responsible and ethical undertaking. Hence, sustainable construction might offer a coherent value system that can be embraced by society while also enhancing the power position of industry leaders and technocrats as certifying experts in the field of construction; and in this particular example, the ways this is taking place in the case of the Premio Obras Cemex.

Ruperto (not his real name), is a well established architect in Monterrey. As a young architect, he participated in the Premio Obras Cemex a few years ago and he won first place in single family housing through a house built in a middle class neighborhood in Monterrey, Mexico. I met him over ten years ago, when he had just won the award and his career had changed for the better. At the time, he explained that not only the recently built house would have a better selling price due to the award, but that his working assignments had grown exponentially. In addition,



several local educational institutions were looking for him and had started treating him as an expert inviting him to teach a course as a distinguished professor. Though Ruperto is bright and has continued to work successfully, he acknowledges that the opportunity created by the Cemex award and the accompanying media coverage were important elements in the advancement of his career.

Currently, Ruperto is a recognized expert in the field of architecture who teaches in one of the top educational institutions in Monterrey. He has become a mentor to young architects who combines teaching with his architectural practices; he continues to work closely with the organizers of Premio Obras Cemex, where he has promoted the inclusion of sustainability as a criteria to assess competing works. The prestige that the Premio Obras Cemex brings has been one of the elements that define Ruperto as an expert. Interestingly, he was recognized as an expert when he got the award, and he now participates as an expert adviser to the organizers because he is engaged with academia. In addition, the material results of his successful practice contribute to defining the public perception of what constitutes good architecture, including sustainable alternatives. This individual example illustrates the intertwining relationship between Ruperto's career, his legitimization as an expert by industry that enabled him to join the academy, and his participation as an academic and practitioner shaping the public understanding of sustainable construction.

It is important to point that while Premio Obras Cemex in all its categories is judged by independent experts, the works that can be registered to participate in

the contest must use Cemex cement in their construction. By reinforcing the presence of cement and concrete in buildings that are meant to be emblematic of architecture and sustainability, the existence of the award not only promotes sustainability but a particular aesthetic proposition that privileges the use of cement. The Premio Obras Cemex recognizes those who abide by these ideas, educating the views of experts and lay people about the properties of construction materials, particularly those of cement and how it can be used in sustainable buildings. In this way, the blueprint for sustainability that practicing architects implicitly follow, is influenced by the organizers of the award and their preference for the use of cement. At the same time, the prestige of the company is enhanced while the relationship between company representatives, experts and practitioners is cultivated.

The concern with technological advancement and market efficiency is also present in the Premio Obras Cemex. Additionally, the evaluation and ranking of architectural projects according to standards defined by contest organizers resembles the machinery of professional associations. Even the introduction of a logo that only winners are allowed to use positions the company as the certifier of quality and acts as a proof or credential for outstanding architecture and sustainable architecture. The willingness of experts to participate as judges in the contest legitimates the objective unbiased evaluation of competing works while also legitimating Cemex as an authority in the field. The systematic organization of the contest and the creation of additional categories to make room for the most

important priorities in construction is also a response to the emerging importance of sustainability as it becomes a field of knowledge.

#### 4.4.2. Experts educating the public and the workforce understood as a sustainable practice

Cemex has also established courses to educate contractors and construction workers in those countries where professionals are not as common and self-construction is widespread. For example, in Mexico Cemex created the Escuela para la Construcción<sup>24</sup> in collaboration with the Monterrey Tech (CEMEX Cerca de Ti | Nuestras Comunidades | Desarrollo Sustentable | CEMEX México n.d.); the program has been recognized by the Centro Mexicano para la Filantropía as a Social Responsibility Best Practice given that it promotes the establishment of micro-enterprises through educating construction industry workers (Reconoce CEMEFI a Cemex Como Empresa Socialmente Responsable 2013). In Egypt, where ready-mix and cement are not a common building material, the company created a school of laborers to develop the construction industry in the country through improving the knowledge of small contractors, technicians and regular laborers of ready mix ([http://www.cemex.com.eg/se/se\\_sl\\_pr.html](http://www.cemex.com.eg/se/se_sl_pr.html))<sup>25</sup>.

Other instances exemplify the educating efforts of cement producers that influence sustainability understandings and experiences though they have not been

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<sup>24</sup> Translation: Construction School

<sup>25</sup> Non active link. Last accessed June, 2009)

documented ethnographically in this research project. There are industry efforts through the Portland Cement Association (PCA) where Cemex participates along other cement producers through industry wide initiatives such as the Concrete Sustainability Hub (CSH) which has established in collaboration with the MIT in the US (MIT Concrete Sustainability Hub n.d.). In Mexico, the company has partnered with the ITESM to promote sustainable construction; additionally, the ITESM campuses across the country are often a showcase of cement based construction which contributes to the spreading of this particular aesthetic proposition. Additionally, the PCA also promotes cement use and the sustainability characteristics of the product educating the public about the advantages of using the material (PCA - The Portland Cement Association n.d.).

#### 4.4.3. Sustainability spreading to everyday management practices through auditing mechanisms: Academy, industry and government working together to define sustainability parameters

This section illustrates the institutionalized collaboration between experts from three very important sectors: academy, industry and government, to develop sustainability parameters suitable to the prevailing standards that value highly standardization and accountability practices today. There are many instances where these important actors converge to define how sustainability is to be understood and implemented in the construction industry, and hence, in the cement industry. These organisms have focused in accreditation and certification initiatives that measure and rate sustainability related performance indicators according to unique

interpretations of sustainability and its priorities. Among them is the United States Green Building Council (USGBC) that encompasses builders, environmentalists, corporations, nonprofit organizations, elected officials, citizens, teachers and students (About | U.S. Green Building Council n.d.). It aims to guide society in the path towards more environmentally friendly and socially responsible lifestyles by transforming the way buildings and communities are designed through various initiatives, particularly LEED (Leadership in Energy and Environmental Design) certification for buildings. In the United Kingdom, the Building Research Establishment (BRE) started as a government establishment; today it brings together representatives of all industries related to the built environment to work with research partners and universities. BRE has created BREEAM (Building Research Establishment Environmental Assessment Method) for buildings. It is an assessment methodology of sustainability of new non-domestic buildings that has also been adopted in other countries, mostly in Europe. These two instances focus on buildings and mainly focus on environmental concerns; however, there are important sustainability implications around the built environment in general where infrastructure plays a huge role. To address this gap, the Institute for Sustainable Infrastructure (ISI) in the US is developing Envision, an infrastructure specific rating system that attempts to address the triple bottom line of sustainability (Institute For Sustainable Infrastructure (ISI): Rating System n.d.).

During my fieldwork, I had the opportunity to observe how cement industry employees, construction industry professionals and academics interacted with these

three assessment tools and others. While I did not encounter many references to LEED within the cement industry workforce, I interviewed two important architects in the Houston area who did think of sustainability through LEED. Instead of referring to LEED, people responsible of US sustainability measures in the cement industry case referred to the Energy Star program by the Environmental Protection Agency, though the building where they were located proudly showed its LEED accreditation. Since Envision had not been launched yet during the time I was conducting fieldwork within Cemex, it is not possible to know if they would take it into account. However, as I followed the influence of experts in industry, both LEED and Envision were mentioned more often, as well as among practitioners such as builders and designers. Regarding BREEAM, those closely in charge of sustainability in the UK mentioned it as one of the most important forces in the transformation of industry's approach to sustainability. Builders and planners also considered it, while the general public was only vaguely aware of more strict regulations somewhat similar to fire codes.

“To be an Energy Star partner in industry has been an important achievement for the company” explained an engineering researcher at Cemex. He continued to describe how the reduction in energy consumption that this initiative entailed was not only economically attractive, but also a way of communicating to the community the leading position of the company in responsibly minimizing environmental impacts. The accreditation process required to earn the Energy Star partner status implied the continued interaction with DOE officials which also

improved the relationship with them and the awareness of other employees about the importance of energy's optimization not only in the plants' operation, but in their personal lives. Industry experts participate with government experts to generate energy saving strategies that can be adopted by other industries, resembling academic collaboration. In the American case, there was a strong emphasis on the voluntary actions that Cemex was taking to address sustainability goals and in stressing the welcoming atmosphere of a company that is willing to engage with academic institutions to conduct research. Similarly, there was reluctance to adopting international standards such as the ISO1400, arguing that the local market would not value them whereas the Energy Star program, an American standard, was accepted by US employees and local clients. However, LEED certification has been widely adopted by institutional builders and is mandatory for those buildings funded with federal money, which is expected to reflect the kind of certification and systematization of cement production as much as on any other building material.

In contrast, those who referred to BREEAM in the UK mentioned how the nation was the first to develop such a code. Initially formulated through government agencies, and currently administered by the private sector including academic institutions and non-profits, BREEAM is being increasingly used by other countries. Furthermore, an informant stated "the key for the UK to become a world leader again is to position BREEAM as the best assessment tool possible, and make a business out of it". He continued "We need to be in the business of selling these

evaluations” since everyone will be looking forward to having them done. For the sustainability experts in the UK cement industry, the importance of BREEAM and increasing regulatory environment not only changes the task of accomplishing sustainability, but even transforms the marketplace as all political parties have agreed to address carbon emission and consider lifecycle assessments for building material selection and project evaluation. Not only will new buildings need to conform to strict BREEAM, but a large retrofit program to improve the efficiency of older structures is also expected to take place. In the UK, there is a close relationship among political parties, environmental bureaucracy, industry representatives, environmental advocates and community to define and implement BREEAM in all kinds of buildings.

Mexico presents a very different case regarding the introduction of systematic assessment tools. This country is only marginally introducing LEED buildings among selected high end markets that value green trends and emulate global preferences. No widespread certification process has been adopted for new government projects; however, companies that participate in global markets do have an interest in demonstrating to the world how they express their commitment to sustainability in their workspace, though not necessarily in their operating practices. This is why the introduction of Premio Obras Cemex sustainable building category award is an important step in raising the awareness among the practitioner’s community since thorough assessments are largely non-existent. As larger urban centers create high-rise living alternatives for the middle class, some



interest in sustainable construction has been shown among designers and developers. These new projects appeal to the younger and educated urban elites who value sustainable aesthetics, though not necessarily specific sustainable credentials for living spaces. In addition, there is a large number of older buildings whose operating standards have never been assessed. The domestic market for lower income people is driven mostly by self-construction and no general construction safety codes have been implemented. Cemex has established educational centers where basic construction techniques are taught to these small scale builders without including green alternatives in the curriculum. INFONAVIT, the government sponsored housing Institute for workers, does recognize developers that include sustainable building alternatives using a very basic points scale which mostly privileges insulation and low water consumption (INFONAVIT n.d.). Sustainability as a boundary object adapts its meaning to the different stakeholders by responding to the interests of the educated urban elites as well as to those of the government housing institute and developers.

Regarding infrastructure, there is an increasing collaboration between academics and industry practitioners in the creation of the Envision system in the US (Institute For Sustainable Infrastructure (ISI): Rating System n.d.). The design process of this tool was extremely open and collaborative, where recognized experts from industry and academy worked together to create a first version of the tool which was then widely distributed among practitioners within the public and private sectors as well as researchers and any other interested party. The feedback

sent by all these was then taken into consideration to make adjustments and the new Envision 2 has just been launched. In this way, the Institute for Sustainable Infrastructure (ISI) is attempting to establish a consensus among the practicing community to create a base from which infrastructure projects will be assessed through newly accredited experts familiar with Envision and knowledgeable about the industry. This effort is expected to balance the triple bottom line (social, environmental and economic) on the ground by including the experience and insight of multiple parties with different areas of expertise to systematize and hence, in their view objectively compare alternative infrastructure projects while incorporating sustainability parameters.

Envision's start-up is particularly relevant since it offers a glimpse into the mechanics at play when a new tool of government is being designed and introduced. As I became an ISI member, I was able to co-participate in the creation of Envision during the feedback period, and to witness the online communication processes taking place as it was being co-produced by all involved. By following traditional professional association networks and ethical codes that emphasize collaboration and working for the greater good (Brint 1994), in combination with electronic media to offer transparency and accountability, ISI has established a feasible alternative for the systematic assessment of infrastructure projects that also endorses the importance of professional affiliation and responsibility.

While the US and the UK have very different stances towards regulation and government intervention regarding the establishment of sustainability policies,

probably as the result of differing interests among the interest groups that pressure policy makers in each country (Baumgartner et al. 2009), both share an interest in increasingly systematizing the implementation of sustainability through the widespread use of evaluation mechanisms. Though the UK views them as mandatory and the US emphasizes the voluntary nature of such assessment tools, both have created intricate mechanisms for accounting through transparent and measurable indicators where government, industry and academic experts converge. In contrast, the Mexican case shows how difficult it is to export a measuring tool to a place where systematic assessment has never been implemented. While the US and the UK support the emerging techniques of sustainability evaluation in already existing professional and bureaucratic networks and techniques, the Mexican case presents the opposite. In order to establish an equivalent operating assessment tool in Mexico, it would be required to also develop the latter.

#### 4.4.4. Audit culture and the production of documents when constructing sustainability: the production of company's sustainability reports and accompanying evaluations

The sustainability reports and similar documents are probably the most valuable instrument that companies have to demonstrate their commitment with sustainability; therefore, this section stresses the importance that the production of the reports have in defining what sustainability steps the company will take. Companies are required by investors, and sometimes by governments and/or industry organization commitments to report on their sustainability performance.

In order to produce such reports, a thorough evaluation system needs to be established, usually in the form of Global Reporting Initiative (GRI) requirements. Sustainability performance becomes tangible through the implementation of a diverse array of measures; however, the blueprint offered by the GRI (Global Reporting Initiative n.d.) guidelines defines to a great extent what areas of sustainability will be tackled. At the same time, the transformation of actions performed during the year into its written and graphic form make sustainability a traveling truth; one that can be communicated and compared to other regions, other business units, one's own division or unit through time, competitors, suppliers and the general public.

The trajectory of GRI reporting goes back to satisfying the demands for action in the social and environmental fields that responsible corporate actors, broadly understood as those who subscribe to the Global Compact and/or entities with similar principles, have towards society by participating in and benefiting from their incursion in the market. The ideals that are being addressed are then a response to early environmental and social movements that are now being transformed into measurable standards. An academic mentor described to me how the parameters included and the acceptable vehicles to represent them have been defined by experts who often offer their services to the United Nations as part of their academic duties. However, they are also there to give voice to the advocacy movements in a professional and objective manner that can be adopted by companies.

A more recent phenomenon that has increased the importance of GRI reports comes from the increasing presence of activist investors who have promoted the adoption of sustainability performance indicators in the companies where they own stocks even when they only represent a small proportion of invested capital. In this way, the former opposition between shareholder interests and stakeholder interests becomes blurry, and the executive suites must address sustainability issues to satisfy the mandate of shareholders as well. The demands of activist investors have transformed annual shareholder meetings and the introduction of a sustainability report as part of annual reports is now common. While Cemex has not had to vote on sustainability proxies during the yearly shareholder assemblies, the company subscribed the Global Compact early on and its participation in the Global Cement Sustainability Initiative has driven its actions to increasingly move sustainability higher in the executive agenda.

While the material advances in sustainability stay within its own sphere of influence, the documentation that supports and demonstrates what has been done is the moving element that can be added or subtracted from company's overall performance data. In addition, it is the vehicle that offers a common ground to talk about sustainability among different actors. The production of GRI reports sets in motion a whole array of activities within the company that is replicated throughout all those corporations who have subscribed the United Nations Global Compact, establishing a shared language and comparable outcomes among different industries. The GRI guidelines (Global Reporting Initiative n.d.) address

sustainability in its environmental, economic and social aspects. The cement industry tackles these in five avenues that relate to the Brundlandt initial definition of sustainability and to the Millennium Goals (United Nations n.d.) as corporations can apply them in their daily work. These avenues are environmental, conservation, health, safety and community relations. Though my initial interest in sustainability was mostly focused in environmental actions as the cement industry transitioned to a carbon emissions reduction regime, I realized that the GRI weighted so heavily, that my conceptualization of sustainability was forced to grow wider to include all of these avenues. There are several levels of GRI reporting which refer to the degree of detail and transparency covered in each report, where the highest level is the A+++. In the case of Cemex, at the time when I conducted my fieldwork, the work on sustainability was strongly influenced by the GRI reporting framework; hence the structure of the sustainability team resembled the sustainability report requirements.

The call for transparency and systematic evaluation that GRI guidelines establish have reinforced the implementation of thorough auditing processes within Cemex that include the ISO 14000 accreditation for all facilities, the growth of the environmental departments to continuously monitor performance, and the aim to measure in equivalent terms the accomplishments coming from other sustainability avenues. The International Organization for Standardization has created standards to which interested parties can abide under a voluntary basis for almost all aspects of technology and business (ISO - International Organization for Standardization

n.d.); the cement industry has widely adopted the quality management standard ISO 9000 and the environmental management standard ISO 14000. It has been particularly difficult to translate the benefits of social initiatives into quantifiable parameters that can allow managers to report their performance in this regard. The unexpected result is that those initiatives that have a more tangible impact in the shorter term are privileged over those which might have a profound transformative potential on the long run confirming previous studies about predictable surprises by Bazerman and Watkins (Bazerman and Watkins 2004). The ISO 26000 has been created as an attempt to systematize social responsibility assessment, though it is only a guidance tool that lacks the support and specificity of the ISO 14000. The lifecycle analysis tools that have also been introduced to measure environmental impacts have been adapted to include the social outcomes, though it is only in a preliminary stage and its reception has been mostly skeptic. Multinational corporations such as Cemex are strongly invested in this kind of tools and standardization procedures while locally operated companies, especially in countries like Mexico, have different needs which respond to their specific context.

Similarly, the compliance with health and safety (H&S) regulations, which varies widely among countries, has acquired a sustainability character through its inclusion in the GRI guidelines for sustainability reporting that shows the performance of the company in this regard as part of a holistic policy of care that includes laborers and neighbors. Isolated conservation efforts that often were labeled as broadly environmental and only considered as desirable or tools for

public relations are now accounted for and measured through their potential impact on carbon emission neutralization, as much as their flora and fauna habitat restoration or preservation. Therefore, the actions that companies take to improve H&S, social and environmental performance are expected to go beyond complying with less stringent regulations in some countries, and to deliver similar standards in all its operations supported by measurements and thorough record keeping.

While some countries, like the United Kingdom, have a long tradition of record keeping and an important body of regulations as well as heavily politicized communities that provide a fertile ground to produce highly detailed sustainability reports, there are other places like Mexico where social and environmental initiatives have been taking place without a corresponding auditing mechanism, and where regulatory frameworks and social expectations do not promote such accountability schemes. However, the introduction of quality control systems in the factory settings developed a record keeping culture in some business areas within Cemex, hence allowing these workers to transition more easily into the adoption of the new sustainability related documentation. In the case of the United States, the emphasis on efficiency through accountability has been established in connection to SAP implementation in recent times, and to the previous similar control and management systems before that. SAP (SAP Business Management Software Solutions, Applications and Services | SAP n.d.) is a German software company, originally called “Systems, Applications and Products in Data Processing”, and in the case of the cement industry, SAP software is widely used to control the business



process including sustainability. Environmental and H&S performance are experienced mostly in compliance terms while the social component of sustainability has only been developed in a case by case basis without following a systematic policy or approach. However, the conception of an integrated vision between sustainability and overall performance was less present among the US operating agents when compared to their UK counterparts.

The corporate needs for systematic data from all operating units to integrate a general sustainability report turns into a translation exercise. Following the GRI guidelines results in taking an interesting patchwork of sustainability interpretations that portrays the differing regulatory contexts and cultural traditions where the company operates and transforming it into a somehow homogenous body of data. The adaptation of the multiple initiatives taking place into a common framework offers stability and comparability on one hand, while also removing the context specific sensibility that the case specific framework can show. During my fieldwork within the corporate sustainability office, I was able to witness how some national offices had no difficulty in integrating an informative report on sustainability records, while others had to create a new function to gather the data on already existing initiatives that could fit into the umbrella of sustainability. The sustainability analysts in the corporate office would then need to arrange the results from all countries in neat charts and graphs that could inform top executives and investors, as well as other interested parties about the general performance of the company regarding the five avenues of sustainability.

Experts establishing the master blueprints of sustainability: The development of a Social Sustainability Index and the creation of knowledge (Resendez de Lozano, Due as-Osorio, and Padgett 2013)

#### 4.4.5.<sup>26</sup>

The interaction between academic researchers, government agencies and industry is clearly depicted in the production of tools that are meant to govern the process of sustainability implementation. In this section I offer an ethnographic account of an instance where all actors participate to bring social sustainability parameters into consideration when assessing the sustainability of projects. By focusing on the social aspects, the qualitative and long term dimensions of sustainability are brought to the forefront, contrasting with the already existing environmental and economic measures that resemble the traditional cost analysis framework more closely.

In order to better understand how sustainability related actions are assessed I was able to join a multi-disciplinary group of experts to develop a Social Sustainability Index<sup>27</sup> (SSI). This experience allowed me to learn firsthand about the scientific process involved in the definition of parameters and about the professional traditions that support quantification and objectivity when creating

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<sup>26</sup> (Resendez de Lozano, Due as-Osorio, and Padgett 2013)

<sup>27</sup> The SSI proposes a set of social sustainability goals and indicators that can be converted into measurable targets considering demographic and infrastructure databases available in the US as well as project-specific reports and analysts assessments to evaluate the social sustainability of small infrastructure projects in transportation such as typical urban bridges. Indicators are weighed considering intergenerational impact, relative importance of each indicator compared to others according to stakeholders, area over where the estimated impacts spreads, density of population and estimated number of project users (Resendez de Lozano, Due as-Osorio, and Padgett 2013).

notions of knowledge about sustainability. The process of evaluating whether a project or building material meets sustainability criteria involves a thorough consideration of the goals of sustainability as they relate to this particular industry or product. It is through their participation in such processes that experts define what sustainability means in concrete and measurable ways; similarly, these tools reflect not only the underlying assumptions that our society embraces today, but the technological constraints and the hierarchical structure that supports and privileges experts' intervention in particular ways to address current environmental and social challenges.

By having joined the anthropology PhD program at Rice University, I had the opportunity to meet with some of the key figures shaping the environmental impact assessment tools that constitute the base on which current sustainability evaluations are being built today. My first encounters with these scientists allowed me to have a glimpse of how authoritative knowledge is created, and on the multiple tasks that these heads of research conduct to influence their field of expertise and the establishment of public policy.

Among an incredible amount of relevant data, two statements expressed by my key informants not only shaped the way my research was to be organized, but represent the basis of scientific organization and express the underlying assumptions that they trust: Dr. Ward gave me an extremely valuable piece of advice, which in hindsight, is partly an unquestioned recommendation of common sense, and partly a rather meaningful clue.

After he described to me his professional trajectory and the way he engaged with environmental concerns and sustainable development goals, I asked him how I should better prepare myself to get into the field. He told me: "Become a credible interlocutor, learn everything you can about the technical aspects of the production of cement, and become familiar with the professional language used by the engineers that you are going to be working with." Dr. Ward is a living institution who has shaped countless generations of engineers and whose professional contributions not only include countless publications, but the creation of journals, professional societies, and the offering of advice to policy makers. Though I truly respect all of my informants, what Dr. Ward told me weighted heavily on my mind. When I stopped to think what he meant, and what his considerations were, I realized that by learning about cement production and its technicalities, I would also become acculturated into manufacturing logics, production priorities, raw material limitations and a whole array of physical and personal networks that I had not thoroughly considered.

At the same time, he was telling me how to be a legitimate researcher who could be considered a part of the group. I had to learn the knowledge, and most importantly, the language of cement and engineering. It is not possible to stress enough the language particularities that characterize the professionals interested in sustainability among construction industry participants; though it has been said that English is the universal language of business, or that science is a universal language, it turns out that there are particular terms and procedures that this group

shares. On the one hand, triple bottom line, life cycle assessment, GRI, LEED and many other concepts and acronyms are thrown out naturally among the initiated where all accept their meaning and importance. On the other, kiln, energy consumption rates, fuel alternatives, supply chain, OSHA, ISO, MSHA would be mentioned naturally as if I had always known them making me feel a part of the group and incredibly aware of how recently I had learned those concepts.

Furthermore, I was experiencing the lexical specialization that characterizes expert communities and had to adapt my skills to engage in interdisciplinary research. Carlile and Rebenstich (Carlile and Rebentisch 2003) have pointed to the complex task of integrating knowledge within an organization where contributions from multiple specialties must be integrated and how specialized knowledge is difficult to transfer. Similarly, Bracken and Oughton (Bracken and Oughton 2006) have explored how language plays an important role in developing understandings between disciplines, mostly focusing on the specific dialects, metaphors and articulations that prevail in physical geography and human geography in ways that resonate with the contrasting understanding of sustainability that emanates from engineering, the social sciences and the humanities. My need to become fluent in the lexicon of engineering experts in the cement industry is thus another example that supports these findings.

The other very important statement was made by a professor that I interviewed very early in my research. When I asked about who can be considered an expert in sustainability, he told me: "Many people can talk about sustainability,

but only a few are able to measure it and express it in quantifiable terms. Those who can do it are the real experts in this emerging field.” This statement is important because it shows how a legitimate expert needs to be able to translate into measurable parameters the social and environmental concerns of sustainability in the eyes of his colleagues. Furthermore, to be a sustainability expert seems to require a previous expertise in quantitative methods and correspondingly, the certainty that the world around us can be grasped objectively and professionally managed/controlled through numbers and equations. As I would later learn, the difficulties in expressing qualitative, hard to measure and long term impacts deeply concern these experts while they attempt to live up to the ideal of the legitimate expert through quantification and reason.

To become fluent in the language of sustainability experts in the construction industry, I joined classes in the engineering and architecture departments. I met regularly with engineering professors, attended seminars and conferences with them, and more importantly, I joined a collaborative project that pursued the understanding of sustainability beyond the silos of individual disciplines at Rice University. As a consequence, I had the opportunity to participate with a group of experts who share a body of knowledge and a set of concerns regarding cement and sustainability as I began to participate in research projects with the precise people who were defining the working criteria around sustainability in industry. I was able to learn about the nexus among academy, government and industry as I started to co-produce a working sustainability index with them.

To work in this engineering environment was a very new experience for me that made me think about Latour's (Latour and Woolgar 1986) participation in the laboratory. Undergraduate students, graduate research assistants and professors would work in a team where expectations were clear and ethical commitments to science and peers were strictly followed. The presence of systems and the rigor of the scientific production became evident from the very first day. Regular meeting times, extensive reading, thorough methodological descriptions and the meticulous documentation of advances were the standard. Statistical support of any claim would transform it into an incontrovertible fact, and the introduction of software generated graphs was received as the needed concretion of previously blurry ideas. Charts and flow diagrams were considered to express ideas and processes with more clarity than words, and concrete products were more valued than abstract discussion about sustainability's aims or background.

As I settled in as a new member of the team, a plan to define the scope of the collaborative project led us to reach out to the Texas Department of Transportation (TxDOT). The idea was to capitalize the synergy created by pulling together the engineering knowledge of my advisers with the social science methodology that I could contribute to the group. We decided to address a gap that we had found regarding the assessment of the social aspects of sustainability when evaluating small infrastructure projects. Through previous research connections of the Civil and Environmental Engineering Department of Rice University with TxDOT personnel, and after attending a presentation of a TxDOT engineer to fellow

students at Rice University's monthly American Society of Civil Engineers's (ASCE's) luncheon, I found myself in charge of establishing a network of informants within TxDOT Houston branch to learn about how they perceived sustainability, what they were doing on the job to address it, and the needs that they had. The role of ASCE was important here, given that it was the vehicle to maintain the connection between former students turned practitioners with students in the making and their academic mentors. Additionally, it provided a loose arrangement that presupposed shared interest to begin an incipient collaboration between institutions, such as the TxDOT and Rice University.

While my fieldwork within Cemex had led me to think about government as an important stakeholder which acts at the same time as client and as regulator of the cement industry, talking to TxDOT engineers and researchers offered me a glimpse on how they structure and report sustainability advances. They are a very important reference for cement producers, since the criteria that they select to define which building materials to use and on what basis, informs construction industry/cement producer decisions on how to address sustainability goals in the plants. However, for TxDOT this was not a consideration worth mentioning, and they concentrated on complying with a vast array of bureaucratic steps that are meant to incorporate sustainability goals in infrastructure projects. An environmental engineer explained to me how the environmental assessment required for the larger projects could take over 10 years, which also involved negotiations with neighbors and Washington politicians. The Washington politicians



are likely to be involved in other dynamics where public policies are determined by very interested parties willing to pay the cost leading to skewed outcomes (Olson 1971).

He then proudly showed me a large cubicle filled with files that contained the public library of environmental impact assessments available for anyone interested in the topic as mandated by law in order to be transparent and accountable. When I asked how often it was used and what I would need to do in order to access it, he grinned and invited me to use it anytime during office hours. He explained that though it had been created to provide a channel to the public, only one person had requested to use it and that it would be great if I wanted to review the material. I could not avoid thinking about the number of hours dedicated to generate all those reports which nobody would read, and about the infrastructure that had to be made available to allow the documents to be accessible. Though many documents are now available for consultation online, he told me that not all of them are, and that that is why they created the library.

Once again, it was the documentation of sustainability related criteria that made it concrete and that showed how it was being achieved. The prescribed blueprints of sustainability expressed through federal regulations and requirements had to be followed, and at the same time, documents had to be generated to demonstrate it. One important assumption that was striking for me was the conception of sustainability as part of a car driven structure taken as an inherent characteristic of the environment. Given that most of the TxDOT employees with

whom I interacted are commuters who have lived in the sprawling city of Houston most of their lives, it should not be surprising, except that their perceptions continue to privilege the use of cars over other means of transportation, hence limiting the alternatives to transition into more sustainable lifestyles. Another one was the prevailing idea of the need to increase the capacity of highways to offer better mobility to citizens understood as a way of improving the quality of life of inhabitants, and hence, the social sustainability of an area. The connection between the built environment and their builders became evident and showed the effect of dwelling that Ingold (Ingold 2011) has described to which I referred when describing the landscape of sustainability and the prevalence of car use (See page 29).

New projects emerge as a physical structure after years of existence in the form of documents and plans. The design phase of the project engages with various groups of expert practitioners who follow the guidelines established by institutional experts working for government to define procedures that detail the interpretation of existing law. The participation of community members with different kinds of expertise, namely, the life experience of having spent their lives in the area where a new project is about to be built is only considered marginally. TxDOT engineers kindly took me in and explained to me not only the intricacies of their jobs, but the existing protocol to consider the views of the community as new projects are being evaluated.

#### 4.5. Stakeholder engagement and Mode-2 science when constructing sustainability

“Mode-2 science” (Nowotny, Scott, and Gibbons 2001:89) refers to the kind of science that is produced when experts work together with community groups to generate new knowledge. While activist organizations such as Houston’s Citizen’s Transportation Coalition (Citizens’ Transportation Coalition n.d.), Transportation for America (Transportation For America n.d.) and Bike Houston (BikeHouston n.d.) have criticized and documented the lack of engagement with the communities as infrastructure projects are built, the existing processes for stakeholder engagement follows a regulated framework that is strictly followed. Federal government mandates that people’s views be taken into consideration through a specific set of guidelines, though this does not include reaching out to community members beyond the established public consultations. As it stands today, the protocol establishes that once the project has been designed considering all existing regulations, the external engineering and environmental consultants that work with TxDOT engineers prepare posters and scale models to show to the community in a public consultation. Per regulation (TxDOT 2004:3–59), census data is the designated source to represent the community, regardless of its limited scope when attempting to delineate the profile and preferences of a particular group. In an effort to respect the privacy of community members, they are only contacted through the neighborhood associations and invited to a formal presentation where consultants and TxDOT personnel describe the project and answer questions. Once the

presentation is over, those community members who have attended can express their concerns verbally or in the written form. In addition, online comments are also a possibility for people who make use of the internet to evaluate the project, though the low income people that live by the projects evaluated during my observation rarely use a computer. All the input from the community is then taken into account to make any needed adjustments to the project.

On paper, the spirit of the law (TxDOT 2010) seems to include the preferences of neighbors and to value their input pointing towards Mode-2 science. However, in practice, the very structure in which the protocol has been established makes it difficult to engage with the community and include their insight as the project starts. Though there are instances where the community has been heard and projects have been transformed, in this section I want to stress how once the project reaches the community, it has already been designed and everything is ready to begin the construction. At this point, it is more difficult to make alterations and the existing channels for communication privilege the top down approach. Effectively, consultants and TxDOT engineers design projects taking as their point of departure the blueprints generated by regulations that have been created supporting expert's views on the subject as well as political conceptions of the environment and its relationship with community.

As I tracked the process followed by TxDOT for the Ellisian Viaduct<sup>28</sup>, I had the opportunity to observe the engagement process and to talk with community members about their experiences and expectations about the project. TxDOT officials had worked closely with engineering and environmental consultant firms to prepare the presentation. They anticipated a large turnout given the political history of this particular project (R. Davis and Walton 2004) which, as they suggested me, made it a particularly rich example of agents working together to move forward an infrastructure project that would benefit the entire city while considering the concerns of nearby businesses and people.

However, the public hearing did not generate enough interest among the neighbors, since the high school auditorium where the event took place only had about 20 people. One of the environmental managers at TxDOT explained after I told him that I was not sure on whether the people who attended the public hearing were representative of the community. He told me: “Yes, exactly that is one problem with consultations. Only the people who feel strongly about the project show up, and when the works begin, then the rest of the community feel surprised and even more so because it can be a long time before the actual building begins, since it is dependent on the funds being available.” Whereas the process of approval for new projects officially includes the input from community members, hence making room

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<sup>28</sup> The Elysian Viaduct is a 1.5 miles overpass that connects downtown Houston with the Near North side of the city.

for their participation not only in deciding the future landscape but the scope of sustainability definitions, in practice the outcome is very different. The views of the community are implicitly taken into account through the interpretation of experts working in environmental consulting and engineering firms as well as those working at TxDOT but in this case the co-production does not seem to be taking place with the neighbors but with the environmental consultants and other expert communities. Their understandings about sustainability guide the interpretation of regulations and the design of projects. Hence, the accepted and applied version of sustainability is importantly shaped by this group.

#### 4.6. The guiding principles followed by experts: quantification and standardization

TxDOT does not build sustainability definitions and parameters independently. It works in close connection with the academic community. The Texas Transportation Institute (TTI) is the research arm of TxDOT and is based at the Texas A&M University. In addition, they collaborate with interested researchers from other institutions, which made it possible for our group at Rice University to work with them. The development of the Social Sustainability Index in which I participated provided me with the opportunity to engage with researchers and to become familiar with some constraints they face. As all parties rigorously apply scientific methods in the aim to produce objective and quantifiable measures of the elusive social sustainability; the ruling paradigms become manifest. Among them,

the strength of professional associations and disciplinary boundaries are forces that support and challenge the construction of applied sustainability at the same time.

Engineers at TxDOT, academics and practitioners consider rating systems to be valuable tools to widely implement sustainability policies. A professor explained this situation: “We need to address the existing gap in order to contribute to achieve sustainability in engineering projects.” In order for sustainability to be a legitimate component of project evaluation, a clear set of definitions needs to be in place to guide the planning process, the design criteria and even the public policy strategies. An engineer at TxDOT described: “We know that we are sustainable because our guidelines establish it as a goal and all measures contemplate environmental criteria,” giving me a hint of how only what is included in the impact assessment templates is included in any assessment, meaning that environmental concerns have already been adopted while social ones are still pending. Currently, social sustainability is addressed mostly implicitly (Boschmann and Kwan 2008). If the relevance of social sustainability is to be recognized through triple bottom line assessments, field experts and researchers agree that it must be objectively quantified and explicitly included when evaluating projects. Hence, the increasing acceptance of LEED certification is no surprise to these experts, and the Envision tool is specifically being developed for infrastructure projects. The definition of social sustainability parameters suitable for inclusion in infrastructure projects remains a challenge that allowed me to witness the negotiations and interactions among interested groups.

Given the existing gap between the need of social sustainability criteria and the lack of frameworks for its assessment, professionals and academics are currently working together in multiple instances to fulfill the expectations of already sustainability conscious publics. At the same time that there is a growing consensus about the need for this kind of framework, there are still a wide variety of proposals being developed coming from different fields of practice and multiple disciplines. The team in which I participated clearly represented this situation. The commitment to advance science, the will to share knowledge with the community, the interest in being helpful, the concerns related to multi-tasking as researchers and advocates, the contrasting expectations between scientists, bureaucrats, activists and neighbors, the trust in science, in quantification, in human's capacity to control the environment and the faith in fellow citizens come together in this quest.

The rhetorical sustainability pronouncements that are widely publicized such as the triple bottom line criteria need to be translated into concrete measures by researchers who work together with professional organizations. Savitz's triple bottom line concept (Savitz and Karl Weber 2006) is already found in the mission statements at the TxDOT (Texas Department of Transportation n.d.), public policy documents (TxDOT 2004:3–59), and many others such as the Environmental Protection Agency (EPA) (US Environmental Protection Agency n.d.) and the National Academies (sustainability\_EPA\_MainTop\_CDF n.d.). It is precisely the commitment with the triple bottom line that is driving the efforts to create social sustainability parameters that can effectively be compared with economic and



environmental criteria. While at the early stages of collaboration experienced researchers attempted to use already existing databases to measure social sustainability performance, it became clear that available data such as accident rate could not properly portray the impact on quality of life among various social groups. The mathematical models that could be created to forecast social performance based on existing data would therefore be of little use, and the need to establish new methodologies was considered the goal that could advance the frontier of sustainability science from the point of view of civil engineering.

Though we had already found that there were multiple technical products and design approaches to sustainability in infrastructure that could reduce environmental impacts taking into account cost effective criteria, it was difficult to assess how each alternative would relate to social impacts. We found that some research groups had already attempted to provide a solution, but mostly, their efforts had pointed to the need for an alternative framework that should ideally resemble traditional approaches. The fact that the American Association of Civil Engineers (ASCE) was also addressing similar issues and inviting its members to contribute their proposals in different publications and collaborative efforts was a confirmation of our findings. It was encouraging to find that what we considered a gap was also being considered by the highly respected ASCE. Following a standard scientific methodology, we proceeded to review all the related literature available not only within civil engineering publications, but also those in project management and business journals. Additionally, we contacted some of the researchers who had

already published materials regarding social sustainability to make sure that our focus would be a positive contribution to existing scientifically based frameworks.

#### 4.7. The ethical commitments of the expert community and their interest in sustainability

At the same time that scientific knowledge would increase, it was also important for researchers that the results would effectively benefit society and that their contribution could be applied in the field where contractors and project managers build and maintain the structures that support existing transportation chains. Once they realized that a gap in social sustainability assessment was affecting the assessment process of projects, they concentrated in creating a tool that could be adopted by policy makers as a reliable indicator of social sustainability performance (Resendez de Lozano, Dueñas-Osorio, and Padgett 2013). They clearly envisioned how existing blueprints, such as environmental impact assessment guidelines, could not do justice to the ideal triple bottom line and that the social component had to be explicitly incorporated into them.

Since construction companies in general, and the cement industry in particular, rely heavily in government spending and urban planning priorities, budgets and regulations, they continually track the development of these trends to accommodate their sustainability efforts and definitions. Hence, returning to the construction project metaphor, the importance of the blueprint stage that guides

government and researchers is a very important referent while managing sustainability implementation. Similarly, the production of accompanying documents, which has become the prevailing standard among government agencies, is shared by their private suppliers. To the extent that audit culture is part and parcel of sustainability, and the auditing mechanisms regarding sustainability themselves are often considered a synonym of sustainability implementation, the performance indicators that audit culture mechanisms determine will strongly influence the measures that corporate managers in the cement industry take into account when defining their own policies.

#### 4.8. Theoretical implications that the wide acceptance of blueprints conveys

In the context of reflexive modernization and disenchantment (Beck, Giddens, and Lash 1994), the call to become sustainable maneuvers between techno-industrial rationalizations regarding environmental and social problems that widely respect a blueprint framework and that opens a window to control the unpredictability that emanates from humanly induced threats. The ecological problems that the transition towards sustainability attempts to address not only question the capacity of industry to control its emissions, but the entire capitalist model of intense consumption in developed societies, which has unequal distribution of side effects such as pollution. Stakeholders interpret such effects in different ways. The model questions the certainties of modernity, pointing to a

profound institutional crisis of society itself that requires an examination of the foundations of rationality (Beck 1992:8). In this way, the process of knowledge production related to science, experts and technology in research settings does not offer certainty and control of the environment as promised by the project of modernity (Habermas 1975). At the same time, if the market system can successfully solve the ecological challenges and accomplish the promise of modernization and development, then the legitimation of this order can be expressed in terms of sustainability. However, this is not an easy task, since the increase in knowledge and scientization has not produced a harmonic vision of controlled totality but opposed views coming from experts in different fields and even the input of non experts.

The scientific community often addresses the challenges posed by environmental and social dilemmas looking for the best possible input/output equation. This is a technical game in which the distinction efficient/inefficient is the criterion that guides their work. This is what Lyotard considers the goal of performativity (Lyotard 1984:46). By taking performance to be the most important goal, the ability to be right (truth criterion) and the capability of the prescriber (justice criterion) scientific knowledge is legitimated through technology. The members of the scientific community combine good performativity with effective verification and good verdicts reaching a powerful position that legitimates them. The interest in reliable metrics and quantification processes that the experts in the

examples that I have presented here show how these ideas have effectively been found in the field.

Giddens (Beck, Giddens, and Lash 1994) establishes that the notion of risk within current modernity can be thought of in two stages: the statistical part which can be put under control by experts and modern mechanisms, and the emergence of the incalculable such as global warming and other challenges related to the need to become sustainable. This latter part generates skepticism of expert knowledge along with disenchantment, leading science to lose “the aura of authority it once had” (Beck, Giddens, and Lash 1994:86). However, my fieldwork experience does not point in this direction but towards industry’s strategic efforts to strengthen the experts’ position which might represent a response to their decline or the continuity of the expert model.

The balance of trust and risk between social actors at the individual level is thus questioned in connection with established traditions, with the possibilities of dialogue, of engagement with others and of exercising coercion to ensure the achievement of collective aims. The role of experts is not stable; instead, “a person’s status within one abstract system is likely to be completely beside the point within another” (Beck, Giddens, and Lash 1994:89) transforming the nature of trust relations between experts and lay individuals as well as the basic assumptions of modernity. The efforts to educate and engage multiple stakeholders in the cement industry as members of society not only depict the effort to stabilize the role of experts, but also the aim of demonstrating how industry, government and academy

can work together to solve current sustainability challenges while taking into account civil society.

Though there appears to be an emphasis in the triple bottom line among key actors, the economic line continues to be particularly important. Out of the desire for wealth, the drive for performativity has been forced upon technology to accommodate the imperatives of the market. “Technology became important to contemporary knowledge only through the mediation of a generalized spirit of performativity” (Lyotard 1984:45). Even hard science and facts that are backed by the most advanced technologies are put aside when it is not possible to make them serve the goals of the market or to express measurable results in relatively short term. The resistance of the system is such that the market paradigm has been naturalized while the ideals of social justice or environmental preservation are postponed. Thus, even researchers with firm ethical principles who are interested in objectivity and quantification understandably must meet performativity criteria.

Accepting the emphasis on teamwork and taking as a point of departure the naturalized performativity criterion in knowledge, the goal of sustainability might be the vehicle to imagine new models and new lifestyles. All forces can be found at the same time, and the systems effectively support the market while also making room for creative definitions and processes of sustainability as long as they offer clear metrics.

Sustainability discourse, as a new grand narrative, might legitimate a new technocratic regime since contesting forces, especially those associated with industrial production; seem to be attracted to it. The historical moment in which we live today deals with the accomplishments of the collective social movements that antagonized science and distrusted experts questioning and challenging the failures of capitalism, the ecological damage and the uneven social development across regions (Harvey 1991). Instead of hope for progress and trust in technology; it is fear of the risks involved in new technologies what has spread widely among social actors; “supervision has replaced the granting of autonomy” (Grimm 2005: v) in a turn of greater public participation and the accumulation of laws and regulations.

The crisis of legitimation faced by capitalism and the entire modern system has not broken it; instead, there have been forces within the system such as bureaucratic measures or university's and industry's research that have coupled with critics in an attempt to find a solution such as adapting the system to sustainable standards. By recognizing opponents and engaging critical stakeholders these entities have even created a space for the co-production of sustainability definitions and alternatives. This process has been described by Nowotny et al (Nowotny, Scott, and Gibbons 2001), who consider that the closer interaction of science and society leads to contextualized science, and they point to how a “Mode-2 science” (Nowotny, Scott, and Gibbons 2001:89) has emerged where the producers of knowledge are a less privileged group since more actors are actively involved in its production. In the case of the cement industry, the corporate effort to engage

multiple stakeholders in establishing a path towards sustainability constitutes a version of Mode-2-science that is not emerging from the academic community of experts but from the corporate world.

#### 4.9. Conclusions

The prescriptive instances where the presumption of being able to distinguish between the just and the unjust underlies the experts' participation leading to the creation of standards and auditing mechanisms has been shown. The ISO 26000, the Global Reporting Initiative, and the Dow Sustainability Index are examples of normative criteria at the global level which count with the support of experts to legitimate their claim to dictate how sustainability goals might be achieved constituting the master blueprints. Once institutionalized at the industry level, in house experts at the company level must interpret these blueprints and adapt them to create a specific handbook of procedures that constitutes the scaffolding of sustainability in each company, in each plant, in each specific instance. Simultaneously, the master blueprints continue to be adapted while also inspiring the experts in the examples to which I have referred here such as Envision and the Social Sustainability Index to better inform the broad sustainability frameworks. In this trend, it is an ethical conviction what guides the expert to produce norms. However, there are different ethical approaches that are imbued by either capitalist notions of the good, self-enlightened interest among them, or the concern for the well-being of future generations, which determine the priorities and policies to be



followed. By trying to establish common ground and satisfy various ethical positions through norms, experts transform themselves into supporting pillars of the current structure.

Through the participation and collaboration of experts from different sectors, the development of standards and the certifications/accreditations regarding sustainability processes, products, companies and even professionals (BRE Environmental Assessment Method, US Green Council's LEED, International Standards Organization's ISO14000) is an interesting case where predefined sustainability values are assessed to certify achievement of sustainable practices/ideals. In this process, a market for certification procedures develops, favoring expert communities able to define what is sustainable, and assess when a practice or entity conforms to such a definition, thus increasing its power and legitimacy simultaneously. This phenomenon is described by Gibbons et al: "What counts as knowledge is, in both cases (science and technology) to a large extent determined by what scientists and technologists say shall count, and this involves, implicitly if not explicitly the norms governing the ways they produce knowledge" (Gibbons et al. 1994:31).

Once a certification is achieved, the newly certified entity must share the news with the public, leading to the production of elaborate communication materials that seem to engage and educate various publics about sustainability and the advancements just achieved. The public is comforted through the display of controlled environmental risks, green investments and the promise of a better

future appears attainable. At the same time, a new kind of bureaucracy emerges to support the system along with the professionalization trend of the sustainability field.

Sustainability offers a field of practice that shows the interaction between powerful social actors when addressing global issues. The academic institutions and the communities of experts play an important role in tackling the challenges of becoming sustainable. At the same time, they depict the market, performativity and quantification paradigms that guide their knowledge production and their priorities. This chapter shows how technocracy and capitalism have contributed to the naturalization of the performativity paradigm with the help of experts regarding the construction of sustainability.

To become sustainable in the construction industry is to be accountable and transparent through the production of clear reports that abide by the prescribed sustainability reporting frameworks according to the expert communities involved. The experts' trust in quantification and performativity deeply shape their understanding of the world as a place that can be managed and controlled through the implementation of sustainability measurements. Following this logic, the role of experts in the cement industry is to create the best possible indicators that can lead to sustainable production processes, a sustainable built environment, and the emergence of sustainable subjects who acquire the sustainability mindset as part of their cosmology. Industry representatives work closely with these expert communities to make this happen.

## Chapter 5

# Physical Sustainability: Sustainability Becomes Material and Tangible Shaped by Cement

To understand how sustainability is being constructed in the cement industry, it is necessary to review how it is grasped in its full materiality beyond the experts' notions and the documents that they have created. This chapter shows how the abstract concept of sustainability becomes concrete by providing examples of materiality gathered during the ethnographic tracking of sustainability policies as they were negotiated and implemented in the cement industry. Even though sustainability can be a very abstract concept as has already been discussed, there were multiple occasions during my research when informants gave sustainability a very tangible meaning; these concrete meanings could go from a document such as a written sustainability report to a dust control mechanism to a soccer field as I will

describe later. The various forms of embodiment that sustainability follows have a different impact in their surroundings since they influence the life-world of very different groups. At the time, the scope of influence is related to the duration of each material expression since it might be ephemeral such as edible products or long lasting like the built environment. Beyond the physical and technological considerations about matter, there are social and regulatory forces that also shape the materiality of sustainability. The personal context, the previous experiences and the exposure to different sustainability interpretations influence the material shape that sustainability takes for each individual even when confronted to several alternatives which may be valid for others as the blueprints described in Chapter 4 (See page 142).

In creating a material shape for sustainability, the economic priorities, political systems, and individual beliefs are merged so that there is no pure, homogeneous or correct way of making sustainability a material entity. No example encapsulates all the issues that play a role but I attempt to present here the flow of information, the relations between stakeholders, and the particular circumstances that surround each case to showcase the process that led to a particular material form of sustainability. However, it becomes evident that the material form taken by sustainability responds to the blueprints dictated by the expert communities incorporating technical and social priorities as sustainability becomes manageable and subject to control. At the same time, the overarching disciplinary apparatus that the audit culture has created simultaneously influences the material characteristics

of cement and the perceived material shape that sustainability must take. Audit culture regarding sustainability, particularly for cement, and material expressions of sustainability in the cement industry contribute to spread the adoption of sustainability among employees and those they interact with leading to the emergence of sustainable subjects as will be discussed in the following chapter.

In relation to audit culture, as I mentioned in Chapter 4 (See page 142), the guidelines set by the Global Reporting Initiative (GRI) are the key document for companies to disclose their sustainability performance (See passage on page 175). Thus, the major blueprint for sustainability pre-defines materiality and at the same time recognizes the material constraints of each substance, as well as the interests of stakeholders reinforcing the application of the prescribed assessment framework in accordance to audit culture mechanisms. Among the reporting principles for defining the content of a report, materiality stands out. The reporting guidelines state that “materiality for sustainability reporting is not limited only to those sustainability topics that have a significant financial impact on the organization. Determining materiality for a sustainability report also includes considering economic, environmental, and social impacts that cross a threshold in affecting the ability to meet the needs of the present without compromising the needs of future generations” (GRI 2006:9). Furthermore, the document also details how to determine whether information is material: “A combination of internal and external factors should be used to determine whether information is material, including factors such as the organization's overall mission and competitive strategy,

concerns expressed directly by stakeholders, broader social expectations, and the organization's influence on upstream and downstream entities. Assessments of materiality should also take into account the basic expectations expressed in the international standards and agreements" (GRI 2006:9). Figure 5-1 shows how materiality is defined accordingly in this context.

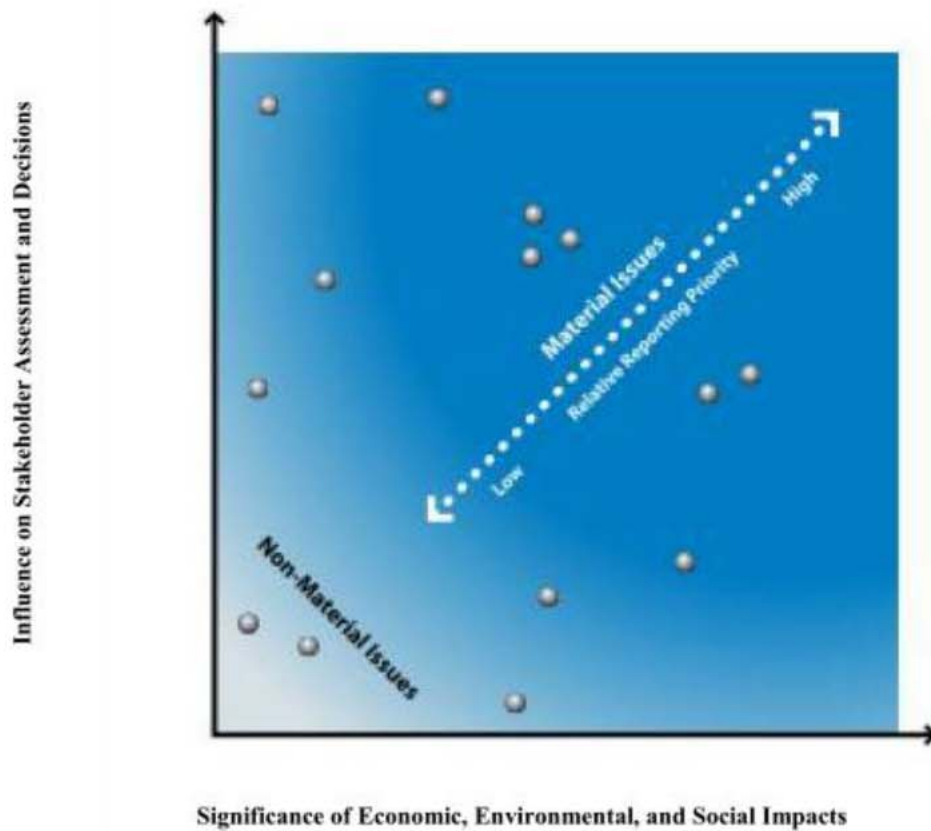


Figure 5-1 Defining Materiality<sup>29</sup>

<sup>29</sup> (GRI 2006:9)

As can be appreciated, materiality is a priority concern when sustainability is being introduced. Companies are publishing the results of their materiality analysis and Cemex's materiality graph is shown on Figure 5-2 where health & safety, community engagement, quarry rehabilitation and biodiversity, stakeholder dialogue, air emissions, corporate governance and ethics, energy use and efficiency, climate change & CO<sub>2</sub>, sustainable construction and employee relations are considered material given that they appear above the defined threshold.

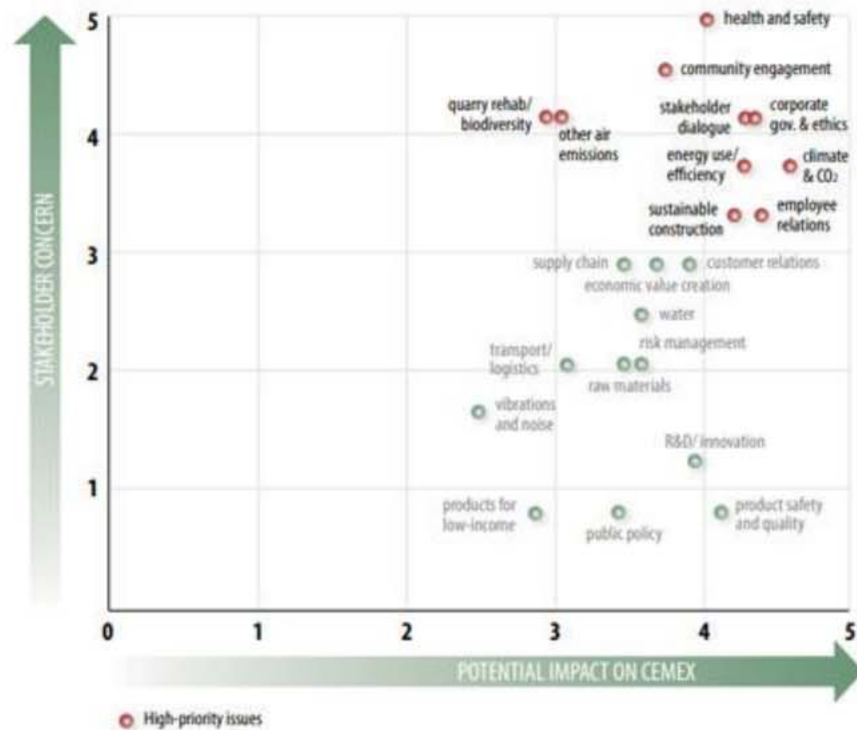


Figure 5-2 Cemex Materiality Analysis<sup>30</sup>

Given that I have focused in the cement industry, I also explore the material qualities of this product, reflecting not only on the GRI understanding of materiality but on how they are experienced by some industry employees, and particularly, how sustainability parameters destabilize not only the production process, but the very material composition of cement. In this chapter I emphasize three concepts while exploring the material implications of cement and sustainability: the agentic capacity of matter (Bennett 2010); the ethical notions that guide the materialization

<sup>30</sup> (Materiality Analysis | Sustainable Development | CEMEX n.d.)



of morality (Verbeek 2006) including the technological mediation and translation of sustainability from good in itself (Aristotle 2012) to sustainability becoming instrumental in the form of useful objects (Aristotle 2012) when materializing; and the role of cement and sustainability as boundary objects (Star and Griesemer 1989). I point to instances where humans respond to what traditionally has been considered inanimate matter questioning the traditional active role of subjects vs. the passive role of objects such as raw materials, equipment and cement as they constitute boundary objects that mediate the materialization of morality.

The materiality of sustainability in the case of cement and the cement industry is very diverse given the complex array of stakeholders, prevailing standards, and physical/chemical characteristics of the production process and related elements being assessed. There is tension between the technical know-how that addresses environmental, social and economic challenges; the expectations at the policy level, in the corporate board room and among multiple interest groups. In addition, there are material implications related to the ethical judgments that either support or question the general stance towards sustainability and the particular interpretations to implement it. This has led companies to address sustainability through five different avenues that create distinct materialities according to what aspect of sustainability is being promoted while following the GRI guidelines. The blueprints that have been described in chapter 4 are the basis for the actions taken by the industry (See page 175) and I explore the alternative resulting materialities and the role different actors play in its definition. While the social, environmental

and economic considerations that constitute the triple bottom line of sustainability are incorporated into these material expressions, the abstract good of sustainability not only becomes material but also instrumental. The objects that embody sustainability are then vehicles that facilitate the achievement of the abstract good of sustainability either socially, environmentally or economically.

While the blueprints for sustainability are standard for all industries, there are some unique material expressions that sustainable cement can take. In addition, there are other material expressions of sustainability within the cement industry that are not related to cement but to the multiple goals of sustainability in industry through the triple bottom line as will also be discussed here. Before I turn to these descriptions, it is important that I explain some theoretical implications of materiality and the way I am approaching it here. Though heavily influenced by the prescribed blueprints, these are also the result of driving forces promoted by some human groups; I take sustainability to be constructed by multiple human actors, experts included, while also being heavily influenced by non human actants such as cement itself, hence its materiality also recognizes and reflects their presence.

## 5.1. Theoretical considerations

Some authors have explored similar topics to some extent. Among them, Verbeek (Verbeek 2006) investigates how technologies prescribe human action and materialize morality addressing the tension between technical know-how and ethics in the case of design. Busch (Busch 2011) describes the moral-technical project of

standardization of people and things in connection to audit cultures. Best (Best 2010) compares the ethical narratives of corporations, the state and individuals grounded on efficiency, equity and humanism building upon Peterson's (Peterson 2001) work on ethical anthropology regarding the environment to propose a new ontology where the human relation with the environment is redefined. The holistic process of sustainability construction is the combined work of human and non-human actants where multiple forces participate to merge environment, society and economy that reflect the triple bottom line framework. Values and priorities are transferred to the built environment when concrete structures are erected still echoing the GRI guidelines; hence, the resulting concrete jungle manifests the beliefs of its creators within the technological possibilities available during its construction, and even a sort of concrete agency that emanates from the massive matter that constitutes it.

The concern with materiality has been explored through vital materialism by Jane Bennett (Bennett 2010) in a way that I find helpful when considering the material implications of cement and sustainability. Bennett's vital materialism claims that there is no pure stillness, that there is no inanimate matter, and that things have a sort of power and agency; hence policy needs to take into consideration the non human forces in events. Through vital materialism, Bennett horizontalizes the relations between humans, biota, and abiota considering "matter as vibrant, vital, energetic, lively, quivering, vibratory, evanescent, and effluесcent" (Bennett 2010:112). Ontologically, there are important implications embedded in

vital materialism, given that changing the regime of perception not only makes room for previously underestimated or neglected actors/actants, but allows a more democratic approach that offers the possibility of healthier political ecologies. She proposes to recognize non humans as actants with a kind of agency and independence instead of assuming a world of active subjects and passive objects (Bennett 2010).

Another important theoretical consideration that is helpful when reflecting about the materiality of cement and sustainability is the idea of boundary objects (Star and Griesemer 1989). They developed an ecological approach building on the *interessement* model created by Latour, Callon and Law where translation between social worlds is paramount. “Boundary objects are objects which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites” (Star and Griesemer 1989:393). Given that in the case of cement and sustainability there are multiple actors with different life-worlds who deal with them; these objects live in multiple social worlds where they have different identities. It is at the boundaries of these objects, on one hand cement and on the other sustainability, that conventional understandings coincide; as long as the objects remain loosely-structured, they provide an anchor for the translation of each others’ perspectives when a space is being shared. The construction of sustainability is a collective work where many groups participate. Star and Greisemer state that: “In conducting collective work, people working together from different social worlds frequently have the

experience of addressing an object that has a different meaning for each of them. Each social world has partial jurisdiction over the resources represented by that object, and mismatches caused by the overlap become problems for negotiation.” (Star and Griesemer 1989:412). In the case of cement and sustainability, both are vehicles that acquire different shapes while preserving some characteristics that allow for the common understanding of the basic idea of sustainability while adapting their plastic bodies to reconcile the meaning of sustainability for the participating parties. Given that an ecological analysis such as the one I present here does not privilege one viewpoint over another, sustainability is treated as a sort of institution that translates in the best possible way the interests of disparate worlds represented by the stakeholders while materializing a moral discourse.

In the case of cement, there are very palpable material footprints that shape the environment long after humans build them, a complex assemblage of actants interacting in multiple layers perpetually talks back to those inhabiting the cementscape<sup>31</sup>. The physical imprint of cement made structures in the urban setting conforms a cementscape that is seldom discussed; while car culture/car dependence and the complementary car-oriented infrastructure is sometimes criticized, the pervasive presence of cement goes unnoticed unless it is missing as in the case of an unpaved road. Coole and Frost describe how "materiality is always something more

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<sup>31</sup> I introduce cementscapes here following Appadurai's concepts of ethnoscaples, mediascapes, technoscapes, financescapes and ideoscapes which unevenly influence global culture (Appadurai 1990).

than 'mere' matter: an excess, force, vitality, relationality, or difference that renders matter active, self-creative, productive, unpredictable" (Coole and Frost 2010:9).

The case of cement certainly constitutes a massive example of this given its impact in the urban setting as shown in Figure 5-3; its constant presence and evolving impact refer to the excess of its use, the force of its discourse as well as the lasting life of cement structures, and the varying relations that cement has with its surroundings and users through time.



Figure 5-3 Reinforced concrete-made environment<sup>32</sup>

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<sup>32</sup> (Library of Congress n.d.)

## 5.2. Cementscapes: Material context, geography and culture in three sites

The massive materiality of cement is also evident in the cities where I conducted my fieldwork: Monterrey, Mexico, Houston, Texas and London, United Kingdom. Though I already discussed the importance of the landscape in Chapter 2 (See page 29), here I discuss briefly the materiality of it. Figure 5-4, Figure 5-5 and Figure 5-6 illustrate this. They show the cementscape that has transformed the natural environment taking elements from it such as limestone, clay and water and arranging them to suit particular human preferences in each place.



Figure 5-4 Aerial view of Monterrey<sup>33</sup>

Monterrey's cementscape is spread out contouring the mountains and rivers. Very few tall structures and almost no green spaces can be appreciated from the sky as Figure 5-4 shows. The streets are narrow and single family homes are the norm. Each concrete structure is linked to the next, forming a tight weave of cement where the lives of Monterrey inhabitants take place. Cement heavily occupies the space in the city. Like patches in a quilt, the different kinds of neighborhoods lay next to one another enabling particular activities in certain spots and not in others. Similarly, social classes are separated by the material structures organized to provide housing, education or work for each social group. The changes in the social fabric as well as

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<sup>33</sup> Coku 2009 @ <http://img441.imageshack.us/img441/2640/dsc00942m.jpg> (Coku 2009) with permission.



in sustainability culture need to take place within the alternatives offered by the surrounding cementscape.

The mountainous environment where Monterrey is located contrasts sharply with the flat lands of Houston and London as can be appreciated in Figure 5-5 and Figure 5-6. Geography determines the shape of the built environment to a certain extent, but so do the aesthetic preferences, traditions and the already existing built structures resulting in very different cementscapes in London and Houston even when both are similarly flat.



Figure 5-5 Aerial view of Houston<sup>34</sup>

Houston's cementscape is interwoven with greenery as can be appreciated in Figure 5-5. Streets and freeways are wide and there are a few areas like downtown where tall reinforced concrete buildings have been constructed. The city's lack of zoning laws has allowed the construction of mixed structures which privilege the use of cars. Historically, the city grew relying on cars, developing as the originally local oil and energy industry boomed (Slotboom 2003). This evolution contrasts

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<sup>34</sup> © Copyright 2013 Roy Tennant, FreeLargePhotos.com (Tennat n.d.)

with older cities where other modes of transportation are more common even when concrete is also heavily used such as New York or London. In the long run, any sustainability strategy in the city of Houston needs to adapt to the material infrastructure which for a long time has been built around the use of cars.



Figure 5-6 London, aerial view from the Post Tower<sup>35</sup>

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<sup>35</sup> With permission by The Bridgeman (The Bridgeman 2010)

The cementscape in London has merged with older structures given that the city has been standing for centuries as shown in Figure 5-6. However, it is evident that the use of reinforced concrete in buildings has transformed the built environment and the material possibilities for the use of space among its inhabitants. While Houston is spread out and privileges the use of cars, London's density and use of space is more concentrated and streets are not as salient given that alternatives modes of transportation have been developed.

These city landscapes show how the cementscape surrounds us and how the material possibilities for sustainability are deeply influenced by the built environment. The differences between these cities show how the cementscape is at the same time equally important for all of them, and how it offers different alternatives for sustainability implementation, its material expression and interpretation in each case. These material differences partly respond to geographic and economic characteristics, but also to cultural expressions of different societies with contrasting priorities and needs, including diverse attitudes towards the environment and even towards concrete building.

### 5.3. Cement and concrete as living creatures: the merging with nature's biological processes

Once cement is poured into the environment, it merges with it and evolves separately from architects and civil engineers who design their projects based on

cement and add them to the city. Cement built structures become independent from their creators and in a way, get a life of their own. The material characteristics of cement make it long lasting; however, not only aesthetic preferences of people change and urban trends mutate, the concrete made with cement can also fall to concrete's pathology and decay. Corrosion and pollution particles leave a footprint on the facades of buildings and infrastructure projects. What at some point in time appears as a permanent landmark, slowly changes its appearance while maintenance budgets often remain forgotten or insufficient. Cracks in buildings might be visible and warn of building weaknesses, however structural damage might take place out of sight and is often hard to identify. The material conditions of the built environment act on those living in it altering the urban atmosphere; hence the graffiti of inner city neighborhoods attracts more graffiti, just like tall buildings bring more tall buildings and broken down homes tend to be close together. Additionally, there are vital forces that can develop cracks in concrete surfaces as well as corrosion that alters the structural strength and life span of buildings. Figure 5-7 shows a corroded concrete structure as can also be seen in aging infrastructure such as bridges, overpasses and buildings (ASCE 2011).





Figure 5-7 Corroded concrete bench located at Houston's Hermann Park

When sustainability, which is more abstract and malleable than cement, becomes embodied in cement, the material power of cement is shared with sustainability. Cement merges with sustainability giving birth to sustainable cement, sustainable construction, sustainable buildings... And a new cementscape with a different discourse inspired in sustainability begins. However, this is only one instance of sustainability's materiality regarding the cement industry, as I will show shortly. What I want to emphasize here, is the versatility of the material form that is possible when grounding such an abstract concept.

The materiality of sustainability in the cement industry takes many different shapes, as informants throughout Cemex expressed. Given that sustainability is approached by the company through separate programs, I describe in the following pages some instances of sustainability taking a concrete and often rather unexpected shape. Simultaneously, I refer to the specific changes in cement, its consumption and production in relation to sustainability.

## 5.4. Expressions of sustainability through cement and concrete

### 5.4.1. New products as an expression of sustainability: A material proof of industry's commitment

The introduction of sustainability in the cement industry has transformed the industry and new products have been created as would be expected. Given that the carbon dioxide emissions of this industry are their largest negative environmental impact, a lot of institutional effort has been directed towards creating alternatives which ameliorate industry's effect on climate change. There are now new concretes that have recycled materials from other industrial processes as cementing agents such as fly ash, silica fume and blast furnace slag (Supplementary Cementing Materials - Cement Association of Canada n.d.) which are the expected changes in the materiality of cement and concrete upon the implementation of sustainability in the industry.

These products blend in the built environment and become a part of a building, a part of a city, and a part of the life of those who inhabit it. At the same time, those who produce them not only create them, but interact with them and even question their own consumption at times. How they are experienced varies for every case, and some informants provided interesting examples.

#### 5.4.2. Discovering new cements

During my time in Monterrey, I had the opportunity to talk with a young scientist who had been working in the development of new cements. She had been with the company for several years and had just come back from working in the Switzerland research center. For her, facing the challenge of improving cement was a very rewarding and interesting job. At the same time, she considered that she could be changing the industry and looked forward to that, while also realizing that transformations in the manufacturing of cement are difficult to come by. I was surprised at the incredible patience that she had not only to answer my questions, but to conduct research everyday and keep detailed records of her advances knowing that results could take years. She was focused on understanding the chemistry of cement and in elucidating new alternatives.

She was very attentive to cement as an actant which would slowly allow her to be witness and co-creator of the next generation of cement. As I listened to her, I realized that cement was unveiling itself before her eyes, and she was there to understand it. She was referring to her careful observations and her recording of



what she witnessed. The materiality of cement was expressing itself and also setting the pace of the work, defining the possibilities for research and the outcomes along the scientists working with/on it. While the scientist never described the intricacies of her research to me, I could understand that she talked about cement in terms of formulas and samples, and always in a tone of discovery, not so much of creation or design, which is important when thinking about cement as actant. By positioning herself as a discoverer, she is implicitly recognizing the independent nature of cement and its chemistry.

While immersed in lab work, she did not seem to relate her job with her very concrete surroundings, the concrete floor, the surrounding factory setting, the kiln and the towers. Similarly, she would not question the heavy presence of concrete in the built environment around her. This selective perception offers a sharp contrast of how she was very aware of cement in the lab setting, but seemed to totally forget it or not see it outside the lab even when surrounded by it. This is important because it exemplifies how even those trained to record and observe, might forget to do so when routine and repetition blur vision and awareness. Sustainability in cement as such was not a part of the young scientist's description of her job, and when I asked her about it, she expressed that any improvement in cement manufacturing somehow has a positive influence in sustainability. I realized that for her, if the research's outcome had an economic, social or environmental benefit, it would translate into an improvement in sustainability, and how any change could certainly be translated in terms of one of the three pillars of sustainability. The

assemblage of sustainability has become so broad, that it has become very difficult to separate it from regular cement production or traditional research. It is also possible to find it almost anywhere when the human actor has decided to find it, in this case, me.

#### 5.4.3. Effectively, the pebbles in quarries become concrete and later on, the substance of the city

In my first visit to a quarry in the UK, I joined a tour that had been organized for a new employee in the corporate offices whose working experience did not relate to the industry. The tour was like nothing I had done before or after because it offered me the material perspective of a seasoned quarry veteran along with the very fresh views of a new employee just realizing the material role of cement and concrete in society and in our cities. The new employee, who had a background in communication within financial institutions was very enthusiastic and would ask a lot of questions that showed how new everything was for her: “Where have these aggregates been used? Which buildings or roads contain these pebbles? How often do you ship material away? How many lorry<sup>36</sup> loads are needed to build a road?” She was discovering the physicality of the industry and was very excited.

The quarry manager was a little skeptical towards this young female executive; he told us that he had been working in the same quarry for more than 40

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<sup>36</sup> Trucks are called lorries in the UK.

years. After responding many simple questions, he suddenly knelt down to pick up a handful of dirt to show it to us. He then said: "Betty (not the real name)! This is what the business is all about!" The veteran of the quarry was truly aware of the cycle from which cement starts, and he positioned himself and his pebbles as pieces of a much larger material world. He asked me: "What do you see here?" pointing to everything around us. He went on to explain how, though people do not realize it, we were standing in the place where the city's basic material is extracted to make it grow. "The gravel that we extract from here is precisely what constitutes our towns, cities and roads and this is our job". Betty then explained that after joining Cemex she had become very aware of the constant presence of building material trucks on the roads, and that everything seemed to require them. Employees in different positions have different opportunities to experience contact with the built environment and reflect about it and the role of cement in various ways. In this short story, I show how the pebbles from a quarry can be seen as a raw material for cement and how the city can also be seen as cement. The different material stages through which cement passes are made explicit in this case.

However, these stages are almost never discussed among those who make a living in the industry. During an interview with a sales woman who had worked for a competitor for four years in the same position and who had been working for Cemex during three years, she explained that she had never been close to the products she sells. She described that her work was mostly to talk with clients over the phone and with computers. However, she was very familiar with transportation

and logistics as well as with the health and safety requirements that clients' drivers must meet to pick up the material. Though she was interested in visiting a plant and really enjoyed her job, she had always performed her job in an office where only women work together and that is not close to any producing facility. I found it very interesting that she knew the differences between products without any physical contact with them and how she knew clients now mostly prefer products with recycled materials when available. She was dealing with the materiality of cement and its changing characteristics even when not in physical contact with it.

For some employees, particularly those in sales as shown in this example, cement's materiality was made present even through its absence, and training along experience on the job substituted for the physical contact to provide a different closeness with cement's materiality. In this case, the intellectual construction of cement through education and practice provide an alternative material concept of cement that applies to perform a job. Nevertheless, the material immersion in the urban setting impregnated with cement such as concrete highways, bridges and high rises, is an experience shared by most informants and city dwellers in many ways regardless of the kind of job they have. This contact with the cementscape schools people in the materiality of cement without realizing it; the built environment discourse communicates values and creates habits that people acquire. Whether it is a built environment that is conducive towards sustainability or the opposite, the cementscape influences the people living in it.

#### 5.4.4. The chemical process of cement production and materials' agency in the kiln

People in close contact with the production of cement experience the material qualities of its components and of cement itself at very extreme conditions. The chemical reaction to produce cement takes place when limestone and clay or shale along with a few other raw materials are put in a kiln and heated to 1400-1450 °C. Portland cement is made of a mix of common materials and it is the basic ingredient of concrete. "Cement is a closely controlled chemical combination of calcium, silicon, aluminum, iron and small amounts of other ingredients to which gypsum is added in the final grinding process to regulate the setting time of the concrete" (How Portland Cement Is Made | Portland Cement Association (PCA) n.d.). It is very important that the temperature at the end of the kiln stays in the range of 1400-1450 °C to achieve the reaction and maintain control of it.

During one of my visits to a cement plant, the chemical process went wrong. I had the opportunity to witness how human actors frantically analyzed and strategized how to react to resisting matter within the constraints of equipment and even human body limitations. Though the energy sources to operate the kiln are inspected and monitored continually, each batch of fuel and raw materials is different. While tracking the temperature of the kiln, in this particular instance, the operators watched how the temperature inside the kiln started to rise with no evident explanation. Human actors cannot control everything all the time; there is room for the unexpected agency of vibrant matter even in the highly controlled

environment of kiln operation. The entire managing team along the maintenance crew met to decide how to proceed; they all were responding to the events occurring within the kiln seemingly unrelated to the prescribed script for these familiar materials. Decisions had to be made and people were concerned about the economic losses while also very aware of the risks. Safety was discussed and volunteers began to step up to get to the equipment and evaluate its condition. I could see the strong teamwork, the shared goals and the trusting relationship between manager and workers. Simultaneously, I witnessed their respect towards the physical force of the materials they worked with, and their awareness of their own vulnerabilities.

The constant need for monitoring and the multiple pieces of equipment that support this task only confirm that the production of cement is not a completely predictable process; any of the raw materials or energy sources might react in a slightly different way changing the conditions within the kiln and the resulting cement mix properties. At different temperatures, the substances in the kiln and even the material that constitutes the kiln behave differently. Even in the same kiln, the cement composition and the chemical/physical properties of the finished product can vary according to these changes.

When the same ingredients are subjected to higher temperatures, the chemical process changes and plugging or other problems might occur since compounds behave differently under these circumstances. Workers explained to me that this is a condition that one never wants and should never occur in a plant. Not

only can the cement batch be lost, but the kiln itself can be damaged and production stopped plus a risk of fire that can also affect workers. In these conditions, the materials in the chemical reaction become truly independent and human actors cannot control them anymore. This risk is always there and the responsible engineers act taking this under consideration even when 'normal' conditions prevail. Following up on the incident, a meeting took place where they discussed what they could learn from the situation, established review processes to discover the root cause of the situation and recognized that it was a close call where someone could have been hurt. In a way, human actions are then determined and depend on whether the basic mix behaves as planned or not. They are contingent upon their material responses where large human and economic costs are at stake.

While the advancement in information technology and video alternatives have improved the control mechanisms in the kiln, there are increased complexities that arise from the introduction of alternative fuels to save energy and minimize costs. These measures are expressions of sustainability goals that transform the material conditions of cement production. Each and every change in the process, when managed successfully, effectively reduces negative environmental impacts but can potentially go in a different direction where the non human actants can re-orient the material consequences in an uncontrollable manner.

## 5.5. Other material expressions of sustainability in the cement industry

### 5.5.1. Background

Similarly to cement acting as a boundary object (Star and Griesemer 1989) where the multiple stakeholders involved in the industry connect, sustainability also acts as a boundary object, though with very different characteristics, particularly regarding its material possibilities as object. The development of new cement products is not the only change resulting from sustainability introduction; research must take place to come up with sustainable solutions and while cement is currently manufactured following sustainability guidelines, more changes and new products might follow. At the company level, the impact of sustainability is found not only in the production process but in all areas of the company. Hence, it is necessary to explore these changes to understand the diverse material forms of sustainability in the cement industry, and particularly, in the case of Cemex. Grounding sustainability in Cemex has required a thorough revision of the meaning of sustainability in business, and also in relation to the stakeholders with whom the company interacts. In order to grasp the idea of sustainability, it had to be made manageable and measurable, and the input of experts and accreditation mechanisms provided valuable input to determine goals and lines of action. The intervention of human agency to address sustainability goals creates a whole array of material expressions of sustainability which on one hand, show the thoughts of the people involved, and



on the other, change the environment and the human experience of it through their actions.

Following the GRI framework for sustainability reporting, the umbrella of sustainability related activities is expanded in industry to incorporate various caring activities following the model portrayed in Figure 3-3. Hence, Cemex and many other public companies which have subscribed to the Global Compact put together the actions directed towards the care of the environment, the community around them, their employees and even their transparency practices. I understand this kind of organization as their interpretation of the Brundtland Report's definition of sustainable development: "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland 1987). The material implications of this interpretation and related industry initiatives lead to the creation of multiple material versions of sustainability. The constant interaction between non human but very animate actants and human actors in this case is eloquent and explains the importance of discussing materiality of cement and sustainability.

#### 5.5.2. Sustainability taking the shape of a dust collector: The environmental avenue

While all actions towards the goal of sustainability are important components of the sustainability strategy, the environmental steps taken by the industry have the largest materiality in the GRI sense; curtailing the CO<sub>2</sub> emissions

offers one of the largest opportunities to improve the environmental performance of cement. However, since  $\text{CO}_2$  is not visible to the eye and its impacts on global warming take time to weigh in, there is another measure which has been widely recognized by blue collar workers and plant neighbors as one with a significant material importance. The cement industry is heavily regulated and the environmental measures to diminish emissions range from dust suppressants and noise reduction mechanisms to new technologies that measure and reduce greenhouse gas emissions among many others that I will not describe here. The dust collectors were among the first environmental measures implemented, and multiple informants across the organization mentioned them as the first step taken by the industry in the environmental arena. For workers at the cement factories, their closeness to environmental monitoring equipment and pollution control technologies has given sustainability a very tangible meaning. A very experienced operator described how dust collectors were installed around thirty years ago. The neighboring ladies were very pleased because their laundry stayed white and clean while hanging to dry whereas they used to have everything dusty. The employee explained that it does not make good business sense to throw away your product into the air, but also, that people were happy when they realized that dusty towns and dusty facilities could be avoided. However, the same employee remembers that about twenty years ago, if the dust collector stopped working, they would just continue working and fix it until the end of the week whereas today, if something goes wrong with the dust collector, production is shut down immediately and the

equipment is fixed right away so that production can resume. He finished telling me that for him, sustainability has been present in the plant for a long time, ever since the first dust collector was installed.

I began to think about this material expression of sustainability, and realized that these small pieces of equipment have transformed the working space, employees' working conditions, and even the relationships of the company with the surrounding communities. When compared to other cement factory pieces of equipment, dust collectors are simple, not very expensive (a worker mentioned that some of them cost around \$400 dollars) or complicated. Still, they stand out throughout the plant since they are painted green, symbolically conveying their connection to caring for the environment. They need a lot of attention from the employees for regular maintenance to provide adequate service, and the most interesting thing of all, is that people around them in all the plants I visited seem to have an affective relationship with them. It is as if the dust collector was effectively impersonating the higher order value of caring for the environment and sustainability in general rather than just an appendix situated on top of the plant.

The material possibilities that dust collectors offer are greatly appreciated by workers whose sensorial experience on the job is greatly improved through the operation of dust collectors. While the cement dust had been accepted by workers and neighbors as a normal condition in and around the plants, being able to eliminate it through dust collectors alters their relationship with the company, the community, and even the environment. The vegetation of the area around the plants

now remains green, people can put their clean laundry to dry in the sun knowing it will remain so, and the relationship of Cemex with its neighbors improved. Dust collectors also play a role in demonstrating the ability of humans to control and improve the environment while continuing to produce cement in very sensible ways, which reinforce the belief that people can shape and decide the environmental outcomes while engaging in industrial manufacturing.

Since the quality control programs and ISO 14000 training were implemented, very detailed operating procedures for dust collectors were introduced for cement plant workers. One very important change was the opportunity that blue collar workers had for the first time to influence the way work had to be done including their input to provide ideas that could alter the dust collectors. For the workers in charge of ecology in the Monterrey plant, the chance to modify the materiality of the plant was a way the management recognized the value of their ideas, and they established a closer relationship not only with the company but with the equipment that they use on their job; particularly the dust collectors. One of them said: "Previously, only management had the first and last word about plant modifications, but then they started to listen to us, while before, anything we had to say was not taken into account because they were the only ones making decisions". They explained that now the goal is zero dust and that they have proposed some modifications which were approved by management; for example, when the dust collectors used bags, the neck where the bags were connected used to get filled with material creating obstructions. It was troublesome to change the

bags, and then the connecting system for the bags was adapted after their recommendation to solve this problem. There was pride in their voices as they were talking about this, and that also explained their closeness to dust collectors, which they have even learned to repair.

Currently, there are about 90 dust collectors total in the Monterrey plant; there have been changes to valves, hoses and connector materials out of the team's suggestions and different kinds of dust collectors have been introduced, specially to deal with alternative fuels. As the cement production process evolves, the material qualities of the dust collectors also need to change to be able to cope with the varying dusts. Men and machines work together in the plant to achieve this. But workers are now happy to be counted and listened, one of them described how "We used to be managed like puppets with no will, but now we are being considered and our ideas are valued, and we care for our equipment". For them, it is as if they had been extensions of machines with no will of their own, so it is a significant change that their own agency is accepted today. Workers can only control dust with the help of dust collectors; dust collectors need the continued service of operators to function. One worker said: "Today, when we have plant visitors, they are surprised that the plant is running because they cannot see any dust escaping into the atmosphere, and we tell them that yes, it is all working. I understand how they imagine other things because it used to be very different and neighbors in their annual visits continue to be surprised because they remember".

There are other environmental devices that have been installed in the cement factories in later times; however, the interaction between operators and these pieces of equipment is not mentioned as often during interviews. I consider that this might relate to the fact that other emissions are less evident to the senses and the impact of controlling measures does not change the working conditions. The material presence of dust collectors and the very tangible evidence of their operation have taken over the environmental sustainability avenue for the workers in the cement plants; for them, dust collectors embody sustainability. At the same time, they remind the older workers about the moment when their own agency and capacity to contribute to the productive process were accepted by management integrating their proposals to improve equipments.

### 5.5.3. Desert bighorn sheep and conservation: The conservation avenue of sustainability

In a broad sense, the interest in sustainability goes beyond the direct environmental impacts that relate to the manufacture of cement to include wildlife, nature reserves and responsible land management. The sustainability avenue of conservation refers to the initiatives that refer to the preservation of flora and fauna either within Cemex property or beyond such as the El Carmen trans-boundary conservation initiative located in Coahuila, Mexico bordering the Big Bend National Park in the US. A team of conservation experts works with Cemex along NGOs, government and communities to improve the habitat for multiple species. During my fieldwork, I had the opportunity to talk with several Cemex experts and NGO

representatives. Though I did not visit the conservation areas in Mexico or the United States sponsored by Cemex, I did visit some in the United Kingdom where I talked with users and administrators. However, in this section I focus mostly on the relationship between the material conditions of the people with the conservation efforts in Mexico as described by Cemex experts. As the interests of those stakeholders who are close to the conservation areas are negotiated, these get materialized defining sustainability in the process.

By addressing conservation, the attention of sustainability goes beyond the human actors and considers ecosystems, flora and fauna, and even water, soil and air recognizing the interdependence of human and non human actors and the value that they all have. This interconnectedness might be interesting for outsiders though it is well understood by expert biologists both through their education and research and as a result of their day to day work. They witness the material forces of nature and the impact of human intervention while trying to guide the results.

The El Carmen is a conservation area along the border of the United States and Mexico owned by Cemex and a few other private owners. After about 50 years of the disappearance of the desert big horn sheep in the area, they have been reintroduced in a breeding reserve also built by Cemex near the Maderas del Carmen protected area for flora and fauna in Mexico. There are about 250 free roaming bighorns in this reserve and about 30 have been allowed to roam free in the mountains of El Carmen. This is a significant success since instead of dealing with the material disappearance of species, now it is possible for conservation

coordinators and researchers to talk about educating people in the area to appreciate and care for the newcomers.

Mexico's land ownership regime has promoted the fragmentation of the land. However, in the case of the desert fauna, large extensions of land need to be put aside as natural conservation areas. In the case of El Carmen, Cemex and other private owners of large areas have been working together to preserve the flora and fauna of the region giving less importance to the potential economic gains of cattle exploitation. This is possible for them because their livelihood depends on different activities; however, this is not the case for some ranchers in the area who depend on the few goats they have on their land to make a living. For the desert bighorn sheep, this could be a risk since the goats can spread disease to them but the material options for some ranchers are limited and new alternatives need to be assessed so that bighorn sheep can share the space with smaller ranchers.

In addition, poverty and lack of education are important problems for the people living in the isolated terrain around the El Carmen conservation area. They do not have access to good sources of fresh food such as meat, fruit and vegetables in sharp contrast with the resources available for conservation of endangered species. The small income and the inadequate distribution channels create the conditions for these people to rely on their hunting skills to diversify their diet. Hence, for some of the cowboys working in the conservation area it has been a very novel approach to get paid for taking care of and observing the wildlife, instead of hunting it down at first sight. Similarly, given that provisions are sent from the city



to satisfy the needs of workers, visiting researchers and others, it has been an important change for these cowboys to have the option of eating meat based dishes for lunch in the ranch house with the other workers. By introducing the conservation plan in El Carmen the wildlife as well as the people have improved their material well being though the process is on-going and it will take many more years to completely turn around the economic outlook of these families.

El Carmen is different today after more than 10 years of working in returning the land to its natural state. The bighorn sheep are back and they show how in some instances, it is possible to revert negative trends in the environment and make room for vulnerable species. Human activities have transformed the landscape for thousands of years; ever since agriculture was developed by our ancestors; different species have been displaced as the unintended consequences of human practices for their own survival. Important actors like Cemex are now in the position to change the material possibilities of the land and the viability of some species.

#### 5.5.4. Personal protective equipment and guardrails: The safety avenue of sustainability

When I began my research about sustainability I did not expect to find health and safety measures to be considered as part of sustainability reporting. However, after being trained on basic safety to be able to conduct research within Cemex facilities, I started to understand the link between sustainability and safety and the reason for it to be included. Taking sustainability as a boundary object, it is also a

translation device which helps connect stakeholders and their interests re-defining the meaning of sustainability and its construction; hence the caring for employees' health responds to GRI guidelines and shows workers the commitment of Cemex to them. While both, environmental and conservation measures refer directly to caring for non human actors, health and safety deal directly with the care of the people. Particularly in the case of the safety avenue for sustainability, it is the path to provide the necessary elements for conducting the multiple tasks that cement manufacture requires in a safe environment.

There are many regulations that determine how to deal with safety in the workplace which introduce multiple material elements to it; in the case of Cemex US, there are two government agencies that overlook Cemex work in this regard: the Mine Safety and Health Administration (MSHA) for quarries and cement plants, and the Occupational Safety and Health Administration (OSHA) for ready-mix plants and everything else. In the United Kingdom the health and safety of the workforce is enforced by the Health and Safety Executive and in Mexico this responsibility relies on the Dirección General the Seguridad y Salud en el Trabajo. In all the countries where Cemex operates, there is a legal framework to regulate health and safety. Additionally, there are many economic reasons for health and safety to be attractive.

However, this is not what makes workers believe in it or change their working practices to be safer. What they explained to me in the three countries about what that drives them to be safe is mostly their interest in returning home at the end of the day to be with their loved ones, but also the impact of terrible

accidents that they discuss during safety training with very graphic images<sup>37</sup>.

Materially, what they consider that keeps them safe is the Personal Protection Equipment (PPE) and the infrastructure built on the job site to make them safe. The PPE includes hard hat, safety glasses, and steel toe boots at least, but it can be more complicated according to the kind of work to be performed and the law in each location. The infrastructure that has been created on the job to make it safe includes procedures and training manuals to avoid risky behaviors as well as guardrails, fences, fire extinguishers and similar devices. These materials are really simple but make a huge difference in the bodies of workers in case that they are involved in an accident.

Employees shared with me their experiences in safety. For most of them, this is the instance where the company really shows how it cares for the people since safety is a culture that they learned on the job. Particularly for older employees, the changes on how they conduct their job now is very different from how it used to be when they joined the industry more than twenty years ago. Rigo (not the real name) explained how he does not think about it anymore, he just puts the PPE on and does not even feel it covering his body. When I asked about how it was when he started wearing it, he told me that it was uncomfortable and that he got hot with the extra layers, but that now he is so used to wearing it, that it is like a part of him.

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<sup>37</sup> Kahneman and Tversky have studied how graphic images are remembered in their work about recollection and vividness of stimuli (Kahneman and Tversky 2000).

Furthermore, he described how he even wears safety glasses when doing small repairs at home because he knows how easy it is to get hurt. Similarly, Emeterio (not the real name) described that wearing the PPE is not only convenient but mandatory. Both of them continued to tell me about how they need to intervene and tell other workers to put their PPE on in case that they forgot, so that they all remind one another. They talked about how one person who would not accept to wear the safety glasses had to be laid off.

The plants are big and they are so automated that only a few employees are needed to operate them. Though most of the tasks are assigned to teams, very often there are workers alone in one area and only video monitors located in some areas show those in the central operating room how the plant is doing. In case of an accident, it could take some time for fellow employees to notice the problem and provide help. Hence, the handrails and similar protecting devices play a very important role to make the plants safe for the people. While I was spending time with the workers in one of the plants, I became such a familiar presence that they allowed me to move in and out of the plant by myself. One night, after I had finished talking with the operators of the night shift, I had to leave the plant by myself. Usually, someone would walk me out, but this time, I did it on my own.

I had already been trained on safety and I was wearing all my equipment, but I became very aware of my surroundings once I was in charge of my own safety. I realized that we all need to do our part regardless of how much protection there is in place for us. I could then understand Gaspar (not the real name) comments about

how safety is truly a combination between responsible people and adequate settings. He told me that the best materials are not enough if the person does not act carefully, and then he continued to talk about how human intelligence needs to be at work all the time, but then how an unexpected turn of events can only be sorted out safely when the proper PPE and handrails are in place. He even mentioned how sometimes the manuals are so detailed that people stop using their minds, and that is a huge danger because that is the same as being inattentive and putting oneself in the hands of the non human, so he told me that I should push to make things less detailed and bring back the thought of the workers.

Material changes in safety had played a big role in diminishing the incidents at work and employees deeply appreciate them. They also talk about the changes in their behavior as they have learned about safety and how they have really internalized the need to wear PPE to the extent that they do not feel it over their bodies. Similarly, they participate in improving the safety of the workplace by pointing to the areas where new protective devices would be helpful, modifying the material appearance of the plants. When one of these proposals is made, it often is implemented in all the plants and the influence of the idea of one worker can really impact the workspace and even the likelihood of a positive outcome in case of a problem. Over all, safety management allows people at all levels to feel that it can be controlled and this might explain why several informants provide examples of this, resembling Bazerman and Watkins studies on how people prefer control over the uncontrollable (Bazerman and Watkins 2004). The script of sustainability that

prescribes safety to become a part of sustainability in the GRI guidelines is also a way of connecting employees' interests in their own well-being with the continuous improvement model that extends quality control to safety to environmental concerns as already described in Figure 3-3 (See page 78).

#### 5.5.5. Fruits and water: The health avenue of sustainability

Similar to safety, the interest in health is also related to the importance of caring for the well being of employees and prescribed in the sustainability blueprint constituted by the GRI guidelines. However, health is considered by workers to be a more personal instance where the company can only influence the habits of workers to some extent. They would even talk about how everyone is responsible for their own health decisions. Regardless of these thoughts, Cemex continually produces educational materials and implements some initiatives to convince people of eating and drinking healthy alternatives to diminish obesity, diabetes, hypertension and similar conditions. The people in charge of health in the corporate offices explained to me that they create health programs and upload them in the computer system, so that electronic files can be accessed by health officers or plant managers as well as any employee interested in the subject through the company's intranet. Information technology makes it possible to distribute health brochures easily and share similar content company wide. Figure 5-8 shows an image of a fruit connecting a material object, which is food, to the health of employees.



Figure 5-8 Health essentials poster

The education about health focuses not only on what employees can choose to eat but also on what they drink. While interviewing the ready-mix crew to learn about their experiences with sustainability, I visited many ready-mix plants and even joined some truck drivers to make some deliveries. I noticed that there were many overweight people in this job and in one particular plant, while talking with the manager, I could see a short list with the sizes of the new uniforms that he was going to order for his team: It included one L, 2 XL, 3 XXL, 2 XXXL and I was really surprised. There was only one regular size and all the others were extra. I asked him about whether there was an obesity problem in his workforce and he told me that these men spend very long hours on the road and that they usually exercise very little since delivering the load is mostly automatic. He continued to describe how they are trying to promote healthier habits and that the corporate office sends

posters with recommendations that he prints and posts next to the drivers' eating area. Drivers sometimes have a drink and occasionally have lunch there while their trucks are being loaded. He took me around to see the area and I could see that there were no lunch boxes in the refrigerator but an icebox full of water bottles caught my attention. I asked about it and he said that this is what they are doing to promote water drinking among drivers.

Joshua (not the real name), a ready mix truck driver, explained that sustainability is a hard word and that he does not really use it, but that the different avenues of sustainability followed by Cemex have become somewhat familiar to him because of the training he gets and the newsletters. He then told me that regarding health, the company has made him increase his water intake and diminish the amount of soft drinks he consumes daily. He showed me the empty water bottles in his truck and told me that he used to buy huge soft drinks with lots of ice to keep hydrated in the hot Houston weather but that he is drinking plain cold water now. When I asked him, he told me that he is still overweight but that he has lost some pounds because he stopped buying soft drinks and is enjoying cold water now. This is something new for him and several of his colleagues, who had never considered drinking water instead of soft drinks while on the road.

The health sustainability avenue has acquired a material form through connecting the well being of employees with the choices they make about food and drink. Employees' health is also impacted by the environment. Though they do not talk about it, the improved air quality due to dust collectors impacts their health.



Additionally, the company offers health brigades that are organized yearly in most plants providing the opportunity to get early detection of potential health issues such as diabetes, hypertension, loss of hearing capacity and other conditions. A health stand with lots of educational materials and all the necessary equipment is brought yearly to most facilities to conduct the health brigade. This material presence enhances the health of the people as well as their awareness of potential health risks. Workers in the three countries value and look forward to these medical brigades and have had nice experiences with them. Medical insurance expenses and the cost of sick days are lowered when the health of employees is good; through tackling health in relation to sustainability Cemex saves money while also increasing the quality of life and even the life expectancy of its employees.

By including health as a sustainability avenue, sustainability becomes corporeal and embodied in the well being of employees. The construction of sustainability in this case also shows how the sustainability has become a malleable boundary object. It reflects how multiple material expressions of sustainability evolve in connection to normative auditing techniques as well as stakeholder interests and affects according to the prevailing context.

#### 5.5.6. From “Patrimonio Hoy” to chocolate and more: The social avenue of sustainability

The social responsibility actions in which Cemex participates offer multiple avenues to improve the well being of the communities where the company

participates. Some of these are institutional efforts organized by the companies while some others are the result of single employee's initiatives that round up colleagues and engage the company to accomplish a social goal. I will not be able to describe here all of the programs and initiatives in which social benefits spread out to the community as sustainability is being constructed by multiple actors within Cemex, so I have selected a few examples offered by my informants. The program **Patrimonio Hoy** and the workshops to start small businesses offered by the community centers established by Cemex are the institutional efforts in Mexico on which I focus here. In addition, I talk about two social initiatives started by employees in the UK that had important repercussions for their communities not only in material aspects for those who benefited from them but in improving morale among co-workers: the concrete bases for the **superlambananas** in Liverpool and a cycle ride fund raiser to support Macmillan Cancer Support nurses.

#### 5.5.6.1. "Patrimonio Hoy"

**Patrimonio Hoy** provides low-income families living in urban and semi-urban areas with access to building materials such as cement, concrete blocks, and steel. **Patrimonio Hoy** provides these products at average market prices as well as microfinancing, technical advice, and logistical support to assist participants in building their own homes" (High Impact Social Programs | Sustainable Development | CEMEX n.d.). This program has been recognized worldwide because of its impact improving low income people housing and for empowering the women who work as promoters. I had the opportunity to visit a neighborhood where **Patrimonio Hoy**

changed the landscape and the imagination of its inhabitants through material improvements in their homes. Like these people, the impact of the program spread throughout Latin America, where over 350,000 families have benefited from it since 2000.

The low income people in Mexico and other countries in Latin America where Cemex operates often live in substandard homes that lack windows, whose roofs are not finished and the average time of completion of a home is about 25 years. People who leave the countryside and migrate to the city usually end up in slums where there is no pavement and where a home is just a shack made out of cardboard and a few metal sheets and very slowly, they start building homes which they call 'casas de material' which translates as 'material homes' with block or bricks, cement, windows and roofs. During this time, families need to share one room for all their needs. The material conditions of their existence are totally transformed when they get credit and advice on how to design and build a home through *Patrimonio Hoy*. By supplying these clients with building materials, Cemex not only makes business but creates spaces for women to become entrepreneurs and as one of them said: "We do not simply sell material things like a fan, food or cosmetics, we sell homes, and through that, we sell patrimony, a better life and dreams". I found that the connection between home, better living and dreams was made repeatedly among my interviewees, who greatly valued roomier living arrangements after having lived in single room improvised homes with roofs leaking. One of them told me: "At night, I sit on my brand new patio with my husband and I watch my room

with a good new roof, and I tell him that now I can even see the next rooms that we will build in the future following the plan that the Patrimonio Hoy architect made for us". She continues talking and tells me that she is so happy with this turn in her life; that she became a promoter because she wanted to share this well being with those around her.

Another promoter explained to me that for her, the material improvements achieved via Patrimonio Hoy are only a small part of the program. For her, it is the opportunity to discover that a low income person like herself can save and learn to be disciplined with money, putting a little bit away every week, what is the most important take away from this program. She explains that this skill is truly the largest improvement in her life because she now knows that she does not need to depend on give-aways to move ahead, and that is something that her children have learned through example. Materiality in this case is elusive, since this story mostly refers to the development of a new mindset that the habit of saving enabled in this person. However, it is through the motivation of an improved material condition that saving and planning habits get to be developed.

A client, whom they call 'socio' as in partner, showed me the home that she and her family are building and I could appreciate the roomy spaces being built and then I could tour the empty areas where the next stages would be located. The Patrimonio Hoy architect who supports the partners designing with them according to their preferences and needs was with us during the tour, and she later explained that for her, it has been a very rewarding experience to work with this people. She

described how sometimes the partners show up and ask for a credit to remodel a home, and they tell her that all they want is a new room and they do not even consider to include a window in their proposal, so she works with them and helps them develop a progressive plan that suits their needs and that can last several years, but that each stage is livable and independent from each other.

There is no way that I can exaggerate the difference that the program can make in the expectations of the people beyond the material benefits. A mother explained that children can now imagine a home of their own where boys will be in one bedroom and girls in another one, where they will not witness sexual exchanges and where the younger ones will be more protected from potential abuse. Another one told me that those with respiratory problems no longer fear the cold weather knowing that their home will be all wet and that they will struggle to breathe. By changing the conditions of the home, even the mental health and life expectancy of the children increase.

#### 5.5.6.2. Entrepreneurial workshops

Sustainability tastes like chocolate for a group of neighbors of the Monterrey cement plant. The Cemex community center that serves the neighborhood where the factory is located offers entrepreneurially oriented workshops as a way to be socially responsible and have a good relationship with the surrounding community. The material results of these start ups are diverse and are known after long periods of time since it is not only the training that needs to take place. I joined two different

sessions, one at night where a team was getting organized with the help of business coaches provided by Cemex to produce and commercialize environmentally friendly cleaners for households and businesses; the idea was to put together a group of five or six neighbors, mostly unemployed men and stay at home moms interested in working from home, and help them with a very small scale venture. It was interesting to witness the dynamics, the effort and the support that the team members had and I would like to think that they succeeded in their task. There were lots of planning and expectations though few decisions were made on the night that I attended.

In contrast, there was another workshop offered on Thursday afternoons where a chocolate expert would teach women to make, decorate, pack and commercialize chocolates. After only one session, a woman could start preparing chocolates and sell them right away. This was a very well attended workshop where women paid about three dollars per session and would receive the ingredients to practice decorating the three chocolates assigned for each day. The workshop lasted 4 weeks and attending women would have a set of chocolate samples for different occasions and the skills to start making money at home. About 18 women participated in the workshop including me; we learned how to melt chocolate, serve it on special lollipop molds, unmold the chocolate lollipops and then how to decorate them. This course was truly hands on and we all would have something to show for our work at the end of the session. The connection between training,

working and making money through this workshop was very clear and fast, so people were eager to start.

There were three large round tables where we could sit, different groups were formed, mothers sat with their daughters, friends sat together, and with lots of encouragement from the instructor and all the attending women, we all finished a lollipop. Though the instructor brought a sample that was circulated among the group, everyone added a personal touch to the lollipops, so they were all different. While we were working on our lollipops, the instructor gave us tips not only about how to work with the different colors and tricks to get the job done faster, but on how to introduce our work with our networks so that we could start selling. Some women who had already attended the workshop on previous Thursdays shared their experiences with the group about how they had struggled to melt the chocolate at home and how the first unmolding efforts had been difficult. Most important of all, one of them also talked about how she had already received an order for 50 single wrapped chocolates with pink flowers that a friend wanted to give guests on a baby shower. She explained that her neighbor saw her samples last week when she came home after the workshop and she liked the pink chocolates so much, that she ordered her 50 chocolates right away. These chocolates would need to be delivered the following Tuesday and the new entrepreneur was beaming while sharing her story at the time others clapped her hands for her happily. While 50 chocolates are not a lot, it was a very good start, since each one of them would be hand-made and they had to look alike. Regarding profit, if the woman paid for the molds and for her

ingredients including the bags for each finished chocolate, she would not make any money with this first sale but she would be able to have earnings on the next sale since she would already have the molds.

People were very excited with the perspectives of making a business at home and some women expressed that they just wanted to have fun preparing chocolate at home but most of them were planning to sell. A group of sisters decided to order some molds and share them, some friends decided to buy a large piece of chocolate to split because it would be a very large risk to have so much chocolate for each one of them, especially if their potential clients were the same. Another woman talked about how it was going to be a challenge to make sure that the children at home would not eat the chunks of chocolate, even more so, the beautiful finished pieces.

The instructor was very enthusiastic and would share her experiences generously. She would also explain how to make a nice bow to tie the bag on top of the chocolate, and how to make nice sets as well as where to order the chocolate and the molds. Then she emphasized the importance of being clean while working, how it was important to wash our hands before beginning to work and how we should avoid the temptation to lick our fingers. Some women agreed but could not avoid eating their chocolates instead of finishing them. We prepared two kinds of lollipops, one solid and the other one, a chocolate covered marshmallow. In both cases, we talked about the different options for decoration and what would be more recommendable for each occasion. The last chocolate we prepared that day was a rice crispy treat dipped in chocolate. This last one presented different challenges



because it was like a blank slate where we could make very different designs. The decorating material was almost gone since we all had put a lot of effort on our two previous chocolates, and some women began to fight for the few pink dots left. The instructor had to intervene to let us know that we really did not need ‘fancy’ elements, and she showed how a few peanuts, M&M’s<sup>38</sup> and colorful liquid chocolate lines would be a perfect ending. The stress of the fight calmed down and we all finished our chocolates. I could see everyone carefully wrapping their own chocolates, and I decided to wait a little longer to make sure that the melted chocolate had solidified. Given that I only had to walk half a block to return to my office and that I had not left any child with a neighbor in order to join the group, I did not have to hurry. I just stayed longer and continued to listen to the conversations and learn about the plans that everyone had for selling their chocolates.

From my point of view, this workshop really seemed to fulfill Cemex’s socially responsible definition of a successful initiative: people learned how to develop new businesses instead of asking for gifts, offered the opportunity of improving the economy of families in the neighboring community, and allowed for the empowering of women at the same time. I noticed that the women who attended the workshop also spoke about the soccer camps for children that Cemex offers too, and about how they wanted the school year to begin so that the soccer practice

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<sup>38</sup> M&M is a round and colorful chocolate candy.

would re-initiate and one of them told me that she learned about the center through the soccer moms, and I realized how central to the community was the role of Cemex. This model follows the neoliberal scheme of creating alliances and building relationships with the community and I could see that women were effectively re-discovering their agency beyond the home, and how they appreciated the change brought to their lives by Cemex through chocolate.

When I got back to my office in the Sustainability Department with a shiny chocolate arrangement, my colleagues were eager to try them. I gave them away and explained that I had just prepared them after participating in the workshops offered at the Cemex Community Center next door. They were surprised and then became shy at taking away from me what I had prepared with my own hands. I explained that I had prepared the chocolates precisely to bring a sample of what was being done in the community center to my fellow colleagues, and that I did not expect them just to see the chocolates but to try them as well. They got convinced easily and ate them happily. A couple of secretaries were marveled to see the nice outcome of the workshop and the Social Responsibility Director explained that the workshops are open to the public and that they could also join them. The secretaries were surprised and said that they might join the workshops later, the guys said that they would talk to their wives about them and maybe they would also want to join. I do not think anyone of them ever joined any of the workshops because there is the perception that they are offered to disadvantaged people only; however, I think it

would be nice to have more participation from people in the company because it would allow them to become part of the community around the plant.

Patrimonio Hoy and the chocolate workshop are successful examples of the institutional efforts followed by Cemex to address the social avenue for sustainability. These activities have been in place for many years in Mexico, which is the country where the company began and where there are so many material needs that companies have a lot of options to fill the existing gaps. In some instances, the company works with the community and local governments to improve the infrastructure by providing low cost materials to pave roads, and in all cases, the material outcome is expected to benefit the community while breaking with traditional schemes of paternalism. In Mexico, when talking about the shapes of social sustainability projects, the diversity of options is as varied as the needs of the people.

The multiplicity of ways in which sustainability is being enacted across the company results in such a diverse material collection of physical sustainability that goes from water bottles to chocolates and improved housing. Furthermore, the co-production of sustainability by different actors contributing to its construction reflects the material results of Mode-2 science described in section 4.5. The Mode-2 science model is applied to the sustainability issues prescribed by GRI and implemented through the five avenues of sustainability in collaboration with key stakeholders throughout the organization.

#### 5.5.6.3. “Superlambananas” to commemorate Liverpool being the “Capital of Culture 2008”

The case of the social avenue for sustainability in the United Kingdom is very different. While Cemex has established institutional alliances with local NGOs to support community interests, the majority of their work is directed to environmental and conservation efforts. However, I found a very active community of employees who would volunteer during their free time to organize various initiatives to support the community. They also constructed sustainability according to their own understanding as the following example describes. The **superlambananas** became a symbol of Liverpool when a crossover between a lamb and a banana, both of historical importance for the city’s docks, was designed by Japanese artist Taro Chiezo in 1998. The sculpture is cherished by locals and became the selected motive for a large street exhibit where local businesses and organizations sponsored 125 mini **superlambananas** that were located throughout Liverpool to beautify the city during the period that Liverpool was the “Capital of Culture” during 2008.

The transportation of the **superlambananas** was difficult and it was important to protect the artistic decorations that made each one of them unique. When the story of the difficulties reached the ready mix crew who regularly worked with city officials supplying product for construction projects, they got together and came up with a plan. Hence, as a non official Cemex UK sustainability example, a project begun; a group of ready-mix employees decided to give back to their

community by providing 125 hand-made concrete bases to support the 125 **superlambananas** that would decorate the city during the year long appointment as “Capital of Culture”. While Cemex donated the material to make the bases, the group fabricated the mold for the base and would work on them during the weekends. They took me to the place where the bases had been designed and I could see the mold, I listened to the stories of how the city officials did not like them at first because they were not smooth on the surface, and then one of the volunteers suggested turning them upside down. In that way, the smooth and even surface that had been in contact with the mold convinced the city officials and the bases were accepted.

The cities, as well as all the structures of the built environment, probably are made of stories and decisions like this one. They are the material representation of the people who designed them, took care of them or not, and in this case, chose them as the vehicle to show visitors the essence of the city. Those who enjoy the **superlambanana** exhibit will never know this story or notice the concrete.



Figure 5-9 Superlambananas on display in Liverpool during 2008

As can be appreciated in Figure 5-9, the colorful superlambananas that decorated the city during 2008 laid on rectangular concrete bases. Usually, I would have not even looked at the bases, particularly with such colorful artifacts on top. But this time, I had been invited by the organizer of the base producing initiative to witness exactly the beautiful bases that the volunteers had created. I now knew all the hours put into these almost invisible bases, I knew about the design alternatives and the technical challenges that these volunteers had faced and I had heard from their wives about how many weekends the guys would just go away and build the

bases. My understanding about so many small structures in the built environment had changed after I had learned the complexities behind these small pieces and about the spirit of collaboration and teamwork that was behind them.

#### 5.5.6.4. Macmillan Cancer Support cycle ride fundraiser

Another instance where the avenue of social sustainability was creatively tackled by committed employees during my time in the United Kingdom was a coast to coast () cycle fund raiser to support the Macmillan Cancer Support charity. This charitable organization provides volunteering nurses to cancer patients in their homes among other activities. One of the employees in Cemex wanted to do something for this organization to thank them for the help they provided during his dad's terminal illness and he organized a special C2C cycle ride with Cemex support to gather funds and donate them to the charity. I not only watched how he was motivating fellow employees to join the ride but encouraged them to get in shape and even train together. Before long, I found myself participating in weekend and midweek training rides and talking about whether I would be able to endure a demanding cycle route in British weather. The group would cycle in three days from Whitehaven on the West Coast to Sunderland on the North East Coast of England covering 140 miles of the most amazing landscape including picturesque villages around the North Lakes district, climbing the Pennines Mountains, to end descending to the railway paths of County Durham.

I was welcomed in the Rugby group and started practicing regularly; my Cemex hosts even got a bicycle for me to use during my entire stay. It was a wonderful opportunity to share with local people the beautiful English countryside while listening to their stories about the towns and exercising at the same time. During this time I learned about the diverse construction styles in England through time, the preferences of the people towards single homes in the countryside, and the apparent absence of concrete in most places. In addition, I learned about how Cemex employees regularly engage with all sorts of fundraisers and that they support one another following a thread of reciprocity. It was customary for employees participating in a fund raiser activity to go around the offices with a piece of paper inviting people to sign up with a donation, and some would also send emails describing their charity project and the way they were training to successfully complete the challenge. For every pound collected, the Cemex Foundation would add another one in most cases; and everyone expected to be supported by colleagues or to support colleagues regularly to increase the impact of the fundraiser effort. Every employee who registered to participate in the C2C ride had to finish the ride in order to collect the money from colleagues and Cemex, and though some would get money before hand, it was understood that the person was responsible for effectively completing the route on a bicycle.

Even me; a complete stranger who would not stay long enough to have the opportunity to give back later, got sponsors within the company and the sympathy from colleagues. It was not so much about me but about the trust in the organizers



and in helping the charity. The interest in Macmillan Cancer Support was important, but so was the teamwork where everyone was training and pushing towards a shared goal, and even the personal fitness level so that all participating members could finish. The other Cemex locations began to compete with us to demonstrate their commitment with the C2C ride either by signing up more people to the ride, or by sending us descriptions of their weekend training sessions. It turned out to be very important to be engaged in this kind of activity if I had declared my interest in sustainability and social responsibility since in the case of the UK, it was the employees and their initiative that put together multiple fund raisers like this one, and only by joining them could I fully understand its importance.

The people who rode were not the only ones involved in the C2C; there was a group of volunteering family members who would provide snacks and prepare lunches along the way and there were some Cemex representatives in a couple of towns to cheer for us. I could see that it was a whole community working together to help a well respected charity like the Macmillan Cancer Support and endorsing the effort of a beloved leader in the company; more than a group of colleagues riding together, it was more like a family sharing and following the leadership of an enthusiastic dad. Our leader and organizer stayed focused, he spent the entire three days of the ride coming and going to motivate everyone just as he had been inviting people to participate. After we returned, he invited everyone to continue cycling together to preserve the nice group and continually informed us all about the money being received upon our arrival.

The *superlambananas* and the C2C cycle ride exemplify the personal commitment of Cemex UK employees with their communities, their willingness to work together in volunteering for a good cause, and the creative approaches that social sustainability can take to produce very original material expressions of sustainability.

## 5.6. Conclusions

As it can be appreciated, the materiality of cement has important implications. There is the agency of non human actors to be considered as well as the interconnectedness between human and non human actors. They all impact the outcome of sustainability initiatives in the cement industry and elsewhere. When related to sustainability, cement's materiality can be transformed while also shaping the alternatives to become sustainable in very diverse ways including the options that existing cementscapes enable or not. In addition, the scripts prescribed by the blueprints in the form of the GRI and other auditing mechanisms create multiple avenues to address sustainability also providing very different examples of the material presence of sustainability in the workspace, in the environment where cement is used, and in the way people experience both.

The boundary nature of sustainability is reflected by the fact that it remains abstract to maintain coherence among multiple stakeholders while also becoming specific and concrete in certain contexts. All human stakeholders can agree in the common goal of "preserving resources for future generations while taking care of

the needs of the **present**” which is understood as a good in itself. Similarly, they all can accept that environment, society and economy must be preserved as instrumental goods that are also good in themselves. Once these goods are made concrete through the day to day operation of cement factories, the multiple interests are negotiated producing distinct material expressions of sustainability that are merely instrumental as they can contribute to achieve the abstract good of sustainability in a broad sense. The agency of cement is more salient in the case of the kiln operations whereas the needs of the neighbors become chocolate; superlambananas and cycle fundraisers equally represent sustainability efforts; employees’ eating habits are translated into health and safety to accommodate GRI reporting; and saving the bighorn sheep becomes a tangible proof of Cemex commitment with sustainability that ameliorates environmental impacts. All these examples show how each of the material expressions of sustainability mediates through different technologies the underlying morality that sustainability in the abstract conveys. The diversity of directions in materiality is defined in the blueprints to some extent but it also creates very different experiences of sustainability which will also then create different subjectivities.

The force of audit culture with strong prescriptive guidelines that surrounds the construction of sustainability becomes evident in these material examples; similarly, the negotiation of interests between multiple stakeholders also provides important input to create the material expressions just discussed. Additionally,

cement and concrete, like other non human actants, also intervene in the construction of sustainability and contribute to the resulting edifice.

While in this section I have mostly paid attention to the material aspect of cement and sustainability, in the next chapter I focus on the role of the human subjects and in the emergence of the sustainable subject through sustainability implementation.

## Chapter 6

# Construction of the Sustainable Subject

This chapter shows how the abstract concept of sustainability becomes a part of the person as it is introduced in the minds of people. I focus on the process where a new subjectivity emerges leading to sustainable subjects in the context of the cement industry. The ethnographic tracking of sustainability policies as they are negotiated and implemented in the cement industry led me to another very important aspect of the construction of sustainability. I have shown how policies are shaped by self-interested publics and individuals attempting to influence others, particularly policy makers, in this negotiating process (Baumgartner et al. 2009). As sustainability policies are implemented and negotiated, they are interpreted differently by employees according to their interests, the stakeholders with whom they interact, and the context that surrounds them. Hence, the way they produce,

reproduce, consume and inhabit the material environment is transformed as presented on Chapter 5 (See page 206). Stakeholders played a paramount role in shaping policies and their interpretation by different groups of employees privileging either the economic, social or environmental aspects of the triple bottom line that represents sustainability in business according to the more salient interests. At the same time, personal priorities and experiences filter all of these.

The knowledge available as the elements of sustainability continue to be researched is incorporated into the blueprints following the inquiries of experts involved in the construction industry who commit to sustainability through multiple avenues and ethical commitments. Whitehead has already discussed the relationship between practices of government and the scientific modes of knowledge through which such practices are sustained (Whitehead 2009). For the case of the cement industry, government and science also participate with the private sector in the development of knowledge. The rationality of sustainability reveals the importance of science, which shapes government policy and systems of interconnectedness with multiple actors; and the evolving relationships between forms of bio-politics to regulate subjects and ecopolitics to balance the relationships between economy, society and environment that resemble Agrawal's environmental subjects (Agrawal 2005) and Whitehead's atmospheric government (Whitehead 2009) respectively, though introducing the participation of corporations.

While governmentality focuses on reason and technicism, affect continues to play an important role both among individuals and mass society's social life which is

necessary to consider for institutional survival (Mazzarella 2009). Hence, following Mazzarella, for sustainability to be effective, it needs to be affectively imbued to harness the attention, engagement and desire of the people. As each individual relates with the ideas of sustainability introduced through technologies of government and becomes a sustainable subject, these are mediated through affective and ethical considerations that tie the local with the universal. In the case of sustainability, the underlying tension between the risks of the environment and the inefficacy of human intervention is affectively, if not reasonably balanced, through hope in the human capacity of becoming sustainable.

Building from the ground up and considering the voice of my informants, while taking into account the concepts introduced above, six meaning making logics that employees follow when faced with the introduction of sustainability were identified, allowing for an understanding of the cultural change process taking place as the organizational transformation is happening. Employees follow distinct logics when they give meaning to sustainability practice: market oriented, hope oriented, relationship oriented and conscience oriented. It was also found that in seldom occasions, some individuals follow a pessimistic or denial logic that does not accept sustainability either because they consider it is impossible to attain or because there is no need for it.

The ethnographic documentation of stakeholder engagement details how sustainability policies require customization to context specific concerns. Similarly, by considering the sustainability logics identified ethnographically, it is possible for

management to design training, select candidates for leadership positions and communicate to employees and stakeholders more effectively regarding sustainability implementation. Moreover, it shows how audit culture through scripts such as GRI sustainability reports, material expressions of sustainability and the individual context are combined to produce the ultimate product of sustainability construction: the sustainable subject that internalizes the logics of sustainability to appropriate them. Variations occur as affective processes filter the appropriation of sustainable logics and incorporate them into the sustainable imagination of subjects.

### 6.1. Governmentality and the creation of the sustainable subject

The studies of audit culture and the processes of self-accountability accompanied by the emphasis on performance have been thoroughly documented by anthropologists (Strathern 2000b; Fineman 1998; Swierstra and Jelsma 2006; Macintyre, Mee, and Solomon 2008; Busch 2011; Werbner 2004; Fox and Lloyd David Brown 1998). Audit culture has already been explored in the Blueprints and Scaffolding chapter (See page 142). However, in the case of the sustainable subject, it also plays an important role; especially in relation to the presence of governmentality mechanisms and its introduction, which anthropology has also explored thoroughly (Burchell, Gordon, and Miller 1991; Castel 1991; Inda 2005; Rose and Miller 2008; Greenhalgh 2008; Li 2007).

To understand how sustainability implementation leads to the emergence of the sustainable subject as explored in this chapter, it is important to consider



governmentality, a concept developed by Foucault (Foucault 2009) which refers to the technologies of power and discipline that characterize the modern state, since it changes the conception of policy away from the coercive or strictly juridical. The presence of governmentality has been studied by anthropology not only in technoscience, risk management and solidarity, but also in public life to some extent (Burchell, Gordon, and Miller 1991; Castel 1991; Inda 2005; Rose and Miller 2008). Murray Li (Li 2007) explains the 'will to improve' in Indonesia as the result of neoliberal development policies embedded in governmentality. Dracklé and Krauss (Dracklé and Krauss 2011) compare energy governmentality in Northern Germany and in Texas discussing the changing power relations that are emerging in connection to wind power. In close relation to the topic of sustainability and the influence of governmentality, Whitehead (Whitehead 2009) describes the scientific and political constructions of environmental life and the emergence of a climatological state through the interrelations of technology, policy and practice. By following Whitehead, this dissertation not only shows the emergence of a sustainable state but that of sustainable subjects where corporations also engage in the process.

Agrawal (Agrawal 2005) conducts an examination of the social basis for enforcement and regulation of the environment, particularly the forests in India, showing that regulatory mechanisms that elicit widespread participation from a significant proportion of villagers are also effective means of transforming subject positions. Agrawal calls this process environmentalism, where technologies of

government implemented by the British in India led to the development of environmental identities and behaviors among the native population. “At its core, environmentality is about the simultaneous redefinition of the environment and the subject as such redefinition is accomplished through the means of political economy” (Agrawal 2005:23–24).

This is precisely what takes place in the case of sustainability implementation in the cement industry. Like in Agrawal’s findings (Agrawal 2005), regimes of regulation and enforcement related to the institutionalized structure provided by the GRI, LEED and other auditing mechanisms also transform what users think, introducing sustainability into their mindset. Audit tools become the heuristics of environmental sensemaking (Weick 1995; Gilovich, Griffin, and Kahneman 2002). The awareness about the environment and human impact on it reaches individuals through audit techniques; regulations and voluntary accountability mechanisms are the source of awareness and recognition of the fragile balance and limited carrying capacity that the planet offers to the employee and other individuals exposed to sustainability initiatives as stakeholders. Hence, the sustainable practices promoted in the workplace and elsewhere unfold an internal dynamic where the sustainable subject emerges.

Agrawal talks about the responses to the new policies regarding forests; the spread of statistics and allegorically, the colonization of forestry professionals by numbers. He emphasizes how “statistics came to occupy a privileged place in the advocacy of different institutional and legal structures through which to govern”

(Agrawal 2005:32). While it was not known as audit culture, the mechanisms followed in India back in the 1920s strongly resemble the prevailing status of quantification, recording and reporting that characterizes sustainability reporting and sustainability management systems in business today.

The narrow goal of greater efficiency in surplus generation implemented by the British among the Kumaon villagers of northern India was broadened to include the operations of the community and the satisfaction of the needs of the community members addressing poverty (Agrawal 2005). Similarly, the sustainability concerns of the present introduce into the capitalism oriented system the interest in the social and environmental needs considering the interests of diverse stakeholders; in the former case, the presence of the British is justified while in the latter, the capitalist system is legitimated through a moral discourse wrapped around efficiency and economic criteria.

Multiple mechanisms intervene in the variable production of subjectivities as the emergence of new sustainable subjects takes place. The rearrangement and transformation of institutions such as business practices have important effects in framing people's interests, their involvement in the enactment of regulation not only changes the tasks on the job but their perceptions and priorities, and the manner of their engagement with the processes of government requires them to question their basic beliefs and assumptions (Agrawal 2005). Agrawal states that the "Strategies to govern forests have effects on flows of power, shape subjects, their interests, and their agency" (Agrawal 2005:98). My tracking of sustainability implementation

shows similar dynamics taking place in government and market. Consequently, Agrawal declares that “People and their communities are the product of power and its institutionalized exercise” (Agrawal 2005:98) and my informants’ experiences confirm this.

## 6.2. Affect and sustainable subjectivity

However, it is not only technologies of government which influence the emergence of the sustainable subject. There are affective processes regarding sustainability that are important to spread its acceptance beyond constraints and into actor’s morality. In connection to sustainability within the construction industry, Fiedler and Deegan (Fiedler and Deegan 2007) have studied the motivations of individuals from building and construction companies and from environmental groups to collaborate in environmental initiatives. They found ‘green desire’ to be one of the motives along with reputation, legitimacy and financial interest. However, the relationship between affect and ethics is often overlooked by regulators, bypassing the importance of sensitivity when establishing bureaucratic controls on social and environmental impacts. Coeckelbergh (Coeckelbergh 2006) explores how the moral imagination interplays with regulatory frameworks in the work of engineers, pointing to the importance of educating them to develop their ethical awareness and encouraging their feelings of responsibility. Volkoff et al. (Volkoff, Strong, and Elmes 2007) study the implementation of a new corporate

system observing how organizational mindsets are embedded in technology, and how technology mediates organizational culture change. Andersson et al. (Andersson, Shivarajan, and Blau 2005) analyze the importance of ethical commitment by supervisors to ecological sustainability for such commitment to trickle down through the organization. Cramer et al. (Cramer, Jonker, and Heijden 2004) show that though the introduction of CSR is often approached discursively, meaning remains highly intangible, situational and personality related. Though these studies are important contributions regarding the affective dynamics of sustainability, more research into the affective processes that surround its incorporation into people's mindset is needed.

To discuss affect and its relationship to sustainability, it is important to first clarify some ideas about affect itself. Massumi distinguishes between affect and emotion pointing that affect can be equated with intensity beyond the symbolic, logical or ideological:

An emotion is a subjective content, the socio-linguistic fixing of the quality of an experience which is from that point forward defined as personal. Emotion is qualified intensity, the conventional, consensual point of insertion of intensity into semantically and semiotically formed progressions, into narrativizable action-reaction circuits, into function and meaning. It is intensity owned and recognized. It is crucial to theorize the difference between affect and emotion. If some have the impression that affect has

waned, it is because affect is unqualified. As such, it is not ownable or recognizable, and is thus resistant to critique (Massumi 1995:88).

For Massumi, affect is expression as and for itself so that thinking affect as Spinoza proposes (Spinoza 1985:475–477) takes us to the realm of ethics. Massumi continues to describe that the bodily process of affect does not simply absorb stimulations but infolds contexts, volitions and cognitions: “Intensity is asocial, but not presocial – it includes social elements, but mixes them with elements belonging to other levels of functioning, and combines them according to different logic” (Massumi 1995:90–91). It is the logics of engagement with sustainability which I will discuss in the following pages. In Massumi’s reading of Spinoza, affect is then bodily and autonomous, not necessarily culturally mediated but representing the difference between passivity and activity (Massumi 1995:93) which is so crucial for engaging with sustainability or with anything else for that matter.

Mazzarella explores affect and building on Massumi’s work, explains that it is corporeal, and that “thinking affect points us toward a terrain that is presubjective without being presocial” (Mazzarella 2009: 291). This is relevant because it reminds us that we apprehend social life through our sensuous life and not as bounded intentional subjects. For Mazarella, affect, unlike emotion, is not always semiotically mediated. Mazzarella refers to Deleuze (Deleuze 2005) and the affective circumstances that preexist and guide the principles of association that we call reason pointing that “the appearance of personal, subjective life is then, for Massumi as for Deleuze a secondary effect of cultural mediation” (Mazzarella 2009:292).

Mazarella explains that this mediation involves the logics of modernity as an ideology. He states that the narrative of the modern era has often been considered to have disenchantment as its central theme. However, there he emphasizes that there is another theme that is equally important: affect is progressively evacuated from the bourgeois modernity ruled by what Weber calls the “iron cage” of “specialists without spirit, sensualists without a heart” (Max Weber 1998:182). I consider that it is precisely against this affect evacuated governmentality of industrial society that sustainability presents itself as an alternative within itself to encompass the affective world along with the rational technicisms of audit culture. This way, the tools that politicians and experts deploy to construct sustainability; on one hand the affective bonds of multiple publics as stakeholders towards sustainability, and on the other, the rational propositions of audit culture to regulate them, meet to develop sustainable subjects. This combination might grant the survival not only of sustainability, but of the market institutions which support capitalism, given that affect management appears to be, in Mazzarella’s terms, “a central principle of social life and institutional survival” (Mazzarella 2009:298). Hence, through the emergence of sustainable subjects, the existing system affectively secures the engagement of individuals with sustainable discourse and practice within the prevailing institutions.

### 6.3. Affect and the need for hope: Sustainability as a new meta-narrative

The rational actor that governmentality technologies force to become sustainable is also an affective actor to whom sustainability not only makes sense, but offers a hopeful alternative in the face of environmental deterioration and social decomposition (Beck, Giddens, and Lash 1994). Caring for the environment and communities might be relevant in rational market terms, but they also are valuable when considered affectively. Additionally, fear is a powerful argument to create collective efforts and to mobilize resources as politicians have done in the War on Terror. Sustainability discourse might be emerging as a new meta-narrative that supports the current system, power structure and offers hope to society at large appealing to affective needs.

The fact that multiple stakeholders engage in discussion to implement environmental policies can be understood as an expression of the desire to fulfill this need; however, the resistance of the market and its followers to incorporate sustainability ideals in the decision making criteria might be showing the impossibility of breaking with the traditional economic models. This is a complicated problem which is rooted in the very legitimation of the system which could be transformed through affect and ethics. When the legitimation falls into the realm of democracy and the preferences of the general public, then politicians get interested in offering short-term incentives under the guise of sustainability without



risking the immediate well-being of the electorate pressing their emotions and feelings. The sciences' expert community and the knowledge that they can provide about sustainability lose their legitimating role and their strength, weakening their position and that of the technocracy represented by them when they are not able to maintain the affective ties with the public. Politicians, as a different kind of experts, seem to follow a different strategy as they seek to be favored by the electorate while also attempting to maneuver within the neoliberal political culture obsessed with short term gain and the long term goals of sustainability, balancing reason with affect, public and personal interests, and ultimately, playing with the promise of caring for life.

While Lyotard (1984) considers that the grand narratives which promised the people the legitimacy of knowledge and held society together have been broken, I wonder if in order to preserve hope, humankind becomes interested in working together to achieve sustainability goals, combining the speculative tasks of some researchers with the useful applicability of others. In this way, social cohesion might be achieved by the shared fear of Earth's collapse, and the possibility of stopping it by transforming our lifestyle and decision-making processes. This very real fear is a strong connecting force that supports the role of sustainability as a boundary object that represents the affective and hopeful connection between all the involved parties in the construction of sustainability. All are interested, to some extent, in becoming sustainable subjects given that through it, they also get to be hopeful subjects able to avoid despair.

Sustainability discourse, as a new grand narrative, might legitimate a new technocratic regime if contesting forces, especially those associated with industrial production, can be attracted to it combining the audit culture mechanisms which I have discussed with suitable strategies to affectively engage the public not only in the cement industry but in other instances. The political dynamism of panic, as has been discussed by Bhabha (1994: 203), is a rather strong force that acts as a vehicle for political identification. Sustainability discourse might channel this feeling of fear by incorporating environmental and social goals in market-oriented projects exemplifying an emerging meta-narrative. If this logic applies, humans are able to foresee a better future as a result of their sustainable actions, demonstrating their ability to control their fate and their impact on nature. The very desire to maintain hope can be the driving force for subjects to engage with sustainability. This could be a way of adapting the promise of modernity to allow for progress in a way that to some extent makes room for connecting the economic system with all others through the meta-system of nature conservation or ecological imperatives which at the individual level preserves coherence. Habermas (1982) has already pointed to the withdrawal of motivation and legitimation by society in the face of absent democratic responses to the crisis of capitalism: “the scope of tolerance for merely instrumental attitudes, indifference or cynicism, is expanded” (Habermas 1982: 281).

The crisis of legitimation faced by capitalism and the entire modern system has not broken it; instead, this dissertation shows that there have been forces within

the system such as bureaucratic measures, business initiatives or university's research that have coupled with critics such as environmental advocates and social activists in an attempt to find a solution such as adapting the system to sustainable standards. In the mist of the continued capitalism crisis combined with negative ecological consequences (Harvey 1990, Giddens 2000), social movements display signs of internationalization recognizing the multiple interdependencies that have shrunk time and space while the ideas of environmentalism spread among multiple interest groups who now participate in the co-production of sustainability definitions and alternatives. The efforts to engage with stakeholders in the cement industry echo this trend and provide examples of how the co-production not only empowers participants but creates strong affective ties with the results given that a sense of ownership is fostered.

Sustainability is tied to the growing awareness of environmental problems and their impact on human's sense of vulnerability painfully increasing the need for hope. As I have pointed out, when the importance of the ecological issues is recognized, its solution is tied to the perpetuation of the capitalist order, though with a 'green' twist that also includes all of humankind in the problem. Beck explains:

The ecological issue must be worked down into other questions: technology, development, production arrangements, product policy, type of nutrition, lifestyles, legal norms, organizational and administrative forms, and so on. Only a society which awakes from the pessimism of the

confrontational constellation and conceives of the ecological issue as a providential gift for the universal self-reformation of a previously fatalistic industrial modernity can exhaust the potential of the helping and heroic roles and gain the impetus from them, not to conduct cosmetic ecology on a grand scale but to actually assure viability in the future. Ecology cancels out objective apoliticism of the economic sphere (Beck, Giddens, and Lash 1994:51).

This description of the importance of ecology touches on affective reasons as much as on hard facts. We might find that though Lyotard proclaims the end of the meta-narratives of modernity, the ecological narrative seems to be an alternative to offer continuity to the project of modernity while acting in postmodern times when uncertainty and disenchantment rule. The desire to believe in the system and in the promise of progress makes room for the acceptance of the narrative of sustainability as a legitimation tool of knowledge production and technocracy that also fulfills the need of subjects to preserve hope; it is precisely in the interest of preserving hope that subjects are affectively willing to engage with sustainability and become sustainable subjects. In this regard, the timing for the emergence of a new subjectivity is right.

## 6.4. Findings and discussion

To discuss the emergence of the sustainable subject, I focus on the ethnographic research that I conducted within Cemex. Before getting into details, it

is important to describe the business framework that the company follows to address sustainability.

The implementation of new policies and the introduction of new concepts such as sustainability into global organizations require a complex strategy where cultural processes, geographical and legal contexts are taken into account. In the case of the implementation of Cemex's Sustainability Management System (SMS), a mix of administrative, communicational and training tools have been used to pursue an organizational transformation directed to embedding sustainability into the day to day operations of the company at all levels. As I have described previously, the tracking exercise included the following of particular initiatives related to five areas: Environmental, Community Relations, Conservation, Health and Safety by interviewing the people responsible for its introduction and the channels followed in the selected regions.

Not all areas involved the totality of the organization, though the communication strategy included sharing with employees in different business areas and regions how the five avenues would contribute to the important goal of transitioning to sustainability. Regardless of which sustainability area touched on which job, all employees had to be trained to learn that sustainability performance is an important business parameter not only due to regulatory frameworks but also to meet the challenge that socially responsible companies and individuals need to account for. In addition, investment and research decision making processes had to be adapted to reflect the company's commitment to sustainability. The goal of the

SMS is to contribute positively to diminish the social disparities where suitable, to operate respecting the environmental constraints of our planet while continuing to care for the interests of shareholders, and to consider the long term carrying capacity of the planet while also providing a platform for the continuing operation of the company. In summary, their Smart World Together model (See Figure 1-2, on page 16) portrays the adoption of the triple bottom line that adapts according to the interests of the multiple stakeholders.

However, the basic question remains: What does it mean to the employees when a company vows to be sustainable? By trying to elucidate this, I attempted to understand the processes through which the employee engages with sustainability eventually becoming a sustainable subject. While the company clearly follows a managerial approach to sustainability framed by audit culture mechanisms; the multiple interests at stake are weighted differently by the members of the organization within the context of audit culture but in combination with affective logics. Figure 6-1 shows a sample of Cemex's employees' varying interests as they were mentioned during interviews. As can be appreciated in the figure, the mix of interests that an individual has can vary according to priorities and circumstances. Additionally, the interactions with other people, either as such or in their capacity of representatives of different groups, introduce additional complexity, since the saliency of interests can be related to its constant reference through social interaction.

A seasoned veteran shared with me: “I’ve learned some things in the workplace that have certainly changed me. I’ve become very particular on how I dispose of oil or grease. You know, all that goes into the water, if we are not careful, and I have two wells in my property, so I am very careful. About recycling, if the municipality makes it easy providing containers and picking them up, we will all do it, like when I lived in Georgia and we did it, or in Michigan, where there was a deposit on all cans and bottles, and people could make money on that and the retailers had to deal with all the hassle but it had a positive impact on the environment”.



Figure 6-1 Individual Interests

Those interacting with employees have their own set of interests in addition to the interests of the organization to which they belong and represent, and both sets of interests influence the outcome of such interaction. The interests that each person represent play an important role, since it is through them that a common ground can be established to engage in conversation and an empathic relationship can be developed.

Both, the person and the company constantly interact with others, whom are named stakeholders in this paper, since stakeholder theory is a helpful organizing tool and an important referent to the informants as stated earlier (See page 13). Any exchange refers to the constant balance of everybody's interests, negotiating and communicating them. Figure 6-2 and Figure 6-3 respectively show the set of stakeholders that employees and Cemex have as described by employees throughout the company. As can be appreciated, many of them are the same; however, not all employees interact with all the company's stakeholders and each person has a particular set of experiences, beliefs and commitments that affectively shape the interactions in which she/he participates giving more or less weight to different interests.



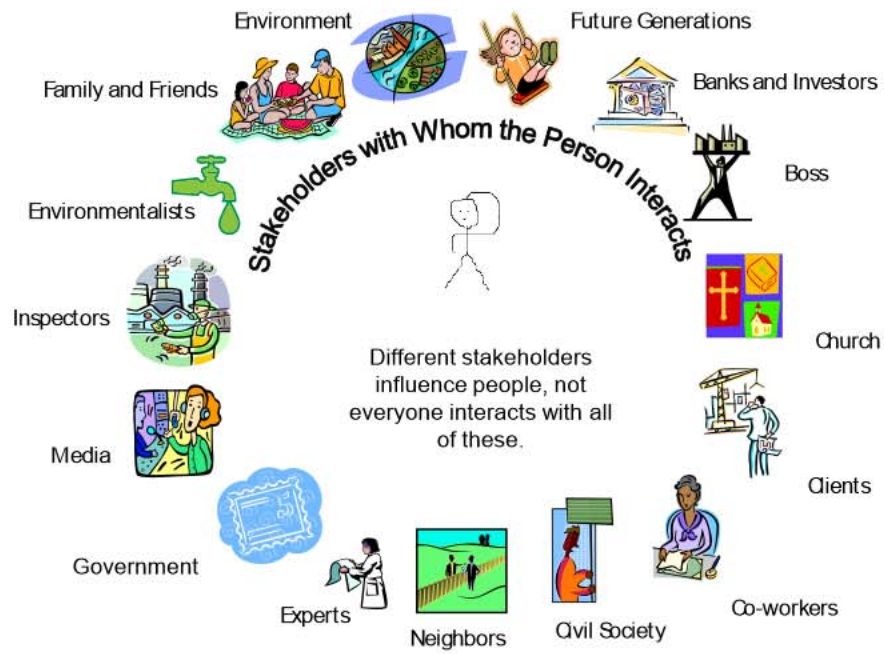


Figure 6-2 The group of stakeholders with whom a person interacts



Figure 6-3 The group of stakeholders with whom Cemex interacts

A very personal process takes place when a person gives meaning to a particular action or policy as represented in Figure 6-4. The figure shows the three layers of meaning making mechanisms that overlap at the personal level which interviewees, usually unaware of the process in which they are immersed, followed: First, the superstructure apparatus that conforms the individual's context where constrains, regulations, paradigms and assumptions historically and geographically defined surround the person enabling certain interpretations and not others such as audit culture. Second, the affective dynamics in which the person is involved including stakeholders near and far. And third, the ethical dimension that rules which interests will be weighted higher in each decision. Even when reason is

playing an important role, affect is also important. To some extent, there seems to exist an affective relationship with reason that can be understood as one more instance of affect in some contexts such as the one of expert communities or management.

Not only is the employee making a decision based in his/her interests, but considering those of others following an intricate process which resembles the expectations and considerations framed by adherence to the social contract (Jean-Jacques Rousseau 2012) represented by corporate social responsibility. Rousseau (Denise Rousseau 1995) describes how employees often follow contract reasoning when coping with organizational structure even through implicit agreements that are never discussed. Affect and reason weigh in as an evaluation is made and a decision is taken, whether to support, postpone or re-invent sustainability. All the while, sustainability continues to be constructed.

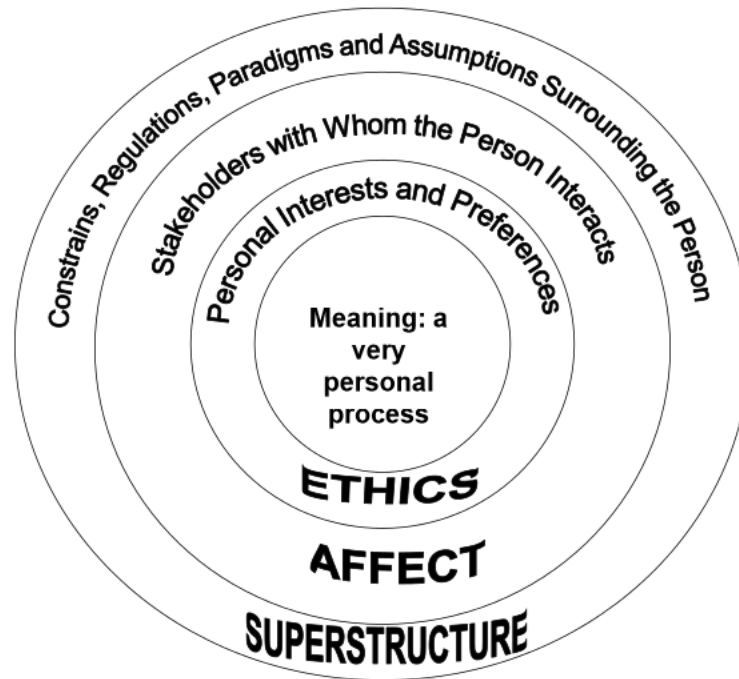


Figure 6-4 The meaning making mechanism

At the company level, Cemex implements the SMS strategically responding to stakeholders according to management views through the offering of sustainability related concrete promises tailored to their interests, hence transforming the broad promise of becoming sustainable into context specific measures. While all the areas of sustainability are being developed in all countries, some important differences emerge as a consequence of this adaptation. Cemex Mexico prioritizes social programs such as the sponsoring of community centers and promoting the program Patrimonio Hoy within the sustainability umbrella recognizing the interests of neighbors and the housing needs of low income groups. Cemex US focuses mostly in energy saving efforts partnering with the EPA through the Energy Star program; and

the UK establishes new accreditation mechanisms such as the “Carbon Label” that account for low carbon emissions given the importance of carbon reduction for the regulatory agencies and the environmental groups in that region.

For employees, these concrete promises are sometimes directly related to the working environment but also to environmental, conservation and community quality of life matters at a more general level; since employees are members of the community and at the same time, they deal with external stakeholders on behalf of the company. Similarly, Cemex employees also are impacted by the needs of the corporation, the fading hope in a supportive welfare state, the uncertainty in the conditions of the future regarding their jobs, and also their life expectancy where even the planet is undergoing rapid deterioration. The desire to trust others and to establish reliable relationships, the drive to improve one’s condition and surroundings, and the anxiety of not being able to control any of these are some of the facts that are faced by both Cemex and its employees.

According to the nature of the interests that prevail when giving meaning to sustainability, six meaning making logics were identified through the analysis of the data as described in Figure 6-5. Only four of these logics effectively result in sustainability becoming meaningful to the person: the market, hope, relationship and conscience logics which will be described below. However, two other logics emerged from the data showing how people who reject sustainability policies following a denial or pessimistic logic.

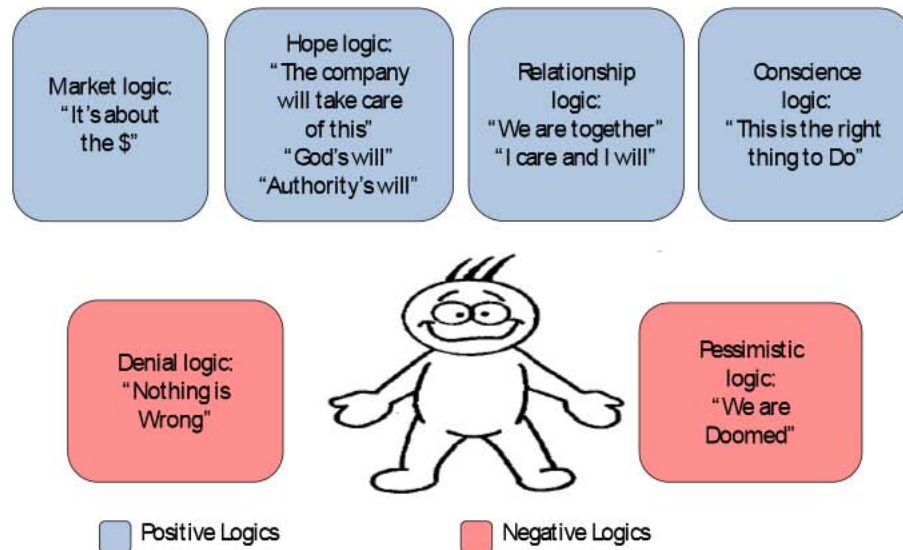


Figure 6-5 Meaning making logics followed by employees

The same practices are often interpreted and given meaning in various ways even by colleagues in the same department. Similarly, not only one meaning making logic is followed by any person all the time; according to the sustainability initiative being discussed and to the particular circumstances that the individual faces at a given moment, the meaning making logic used varies.

#### 6.4.1. Positive Logics

The meaning making logics that result in the employee effectively relating to sustainability related initiatives and engaging with them are called positive logics.

#### 6.4.1.1. Market oriented logic – “Sustainability makes business sense”

This logic was found widely across the organization, mostly at the managers' level though it was also displayed by operators at times as in the example below. Employees who follow this logic consider that sustainability is relevant as long as it is profitable. These persons have naturalized market dynamics to the extent that they filter their decisions through this lens without hesitation; they generally consider that if sustainability makes sense in business terms, then it must be adopted or that it is the reason for implementation. Economic considerations seem to mediate sustainability transactions and they are used to translate sustainability actions among stakeholders or organizational levels. For example, an operator in a cement factory explained after being asked about the new environmental policies being implemented in the plant: “Mmm, they just call it sustainability but it is all about the money, it is to save the money, and it is all right because it is a business, but you don't need to call it other things, and I don't think this is sustainability.”

This logic is the most rational in the short term since it is supported on hard facts and evident advantages in quantifiable cost/benefit analysis; paradoxically, it is also the least rational when sustainability is considered an urgent matter that, if not taken seriously, might lead the planet to chaos. To construct sustainability following this logic might lead to fast paced construction and also to emphasizing the more profitable sustainability related activities in market terms. However, this might be a risk given that some key actions of sustainability related to social and environmental issues are hard to quantify and its results are not palpable quickly.

The limitations of the market logic are rooted in the very limitations of the market where trade off and opportunity analysis do not fully reflect the scope and scale of sustainability.

#### 6.4.1.2. Hope oriented logic – A) Trust in human capacity to solve problems

This logic was followed by employees in all geographic regions though it was less often mentioned by people in management positions. Employees who follow the hope logic seem to believe in the capacity of humankind to successfully address the social and environmental challenges of our time. They trust authority and institutions such as the government, giving the public sector an important role to enact policy; or top management, placing the private sector as one of the key forces to put policies in place and consider them to be effective. Their engagement with sustainability derives from their respect to these superior forces. Interestingly, many employees in the UK mentioned the state as a capable entity that not only could and should enforce sustainability measures, but that was already achieving a positive change. In contrast, in the US and in Mexico, it was more common to listen to employees referring to the positive changes that society could accomplish through the activities of the private sector.

This logic affectively supports reason given that it is the vehicle to achieve progress and the advancement of humankind through work and rational planning. The previous experiences of the person lead to certain expectations when new situations are confronted, and to ratifying trusting mechanisms that might place the



private or the public sector in a powerful position. The empowerment of existing institutions through this logic can lead to innovation and to pushing either elected officials or public companies to respond in pro of sustainability creating desirable synergy.

#### 6.4.1.3. Hope oriented logic – B) “God will help us get out of this problem”

Another stream of hope oriented employees followed a logic that placed the power to attain sustainability in divine hands. Under this logic, the employee trusts God for solving current challenges while adhering to its mandate as a religious commitment. Mostly, it was employees in Mexico who followed this logic, though there were also a few in the US but not in the UK.

There is an important contrast between both groups given that the first one reflects a belief in the spirit of modernity where man is able to achieve progress and improve quality of life for all through either the private or public sector; while the second one displays the importance of God and its intervention to attain better living conditions on earth. This logic does not assign agency to human actors and would only view the construction of sustainability as the result of God's hand, where humans are only vehicles to achieve divine will. Rationality and affectivity support this logic in the context and previous experience of the individual who embraces it.

Accountability is important in this logic, but it points to presenting the results of work on Earth to the creator at the end of life. Hence, accreditations and

credentials are earthly elements that can show the commitment of the individual towards what is considered desirable and/or good in itself.

#### 6.4.1.4. Relationship oriented logic – “ My peers would not accept differently”

For the employees who followed the relationship logic, the belonging to a community is important. This logic was shown by employees across the organization. They talked as members of a group and considered themselves to be responsible; in addition, they often expressed an expectation of reciprocity or recognition from their peers as well as a sense of ownership. The belonging to a community referred here to being a part of the working unit at times, but also to being a part of the surrounding neighborhood, or a human being among many. For example, another kiln operator explained the changes in the kiln operation and his participation in it: “See, I started working in the kiln, and we were looking for ways to be efficient. Today, we try to be productive and do it by saving energy when operating the kiln”.

This logic is deeply invested in affectivity though some individuals might follow it to build social capital and to enhance their reputation among their peers. In some instances where communities are tightly knit, there is significant pressure for all members to behave in certain ways which can promote sustainability as in the case of neighbors watching and approving if one person recycles. Similarly, when the challenge of becoming sustainable is shared by co-workers, the sense of

ownership can promote sustainable innovation effectively contributing towards the construction of sustainability. Simultaneously, the person appropriates sustainability ideas and becomes a sustainable subject who will not only practice sustainable behavior but, by modeling it, will set an example to be followed by peers.

#### 6.4.1.5. Conscience oriented logic – “It is the right thing to do”

The conscience logic is followed where normative thoughts take precedence for the employee. This means that sustainability actions ‘ought to be done’ because of ethical reasons and these employees interact with others who relate to sustainability without expecting something in return besides a shared responsibility and recognizing the intrinsic value of some initiatives. Though this logic was not as frequently followed as the others, it emerged throughout the entire organization. For example, an operator who was describing the benefits of alternative fuels said: “We have changes, now we are burning tires, and that is good because the tires are not biodegradable and they stay there forever if we don’t burn them”, he then continued to talk about recycling: “Today we recycle and we help the future, but things are different; when I was a kid in the farm, we did not have much, but we were cleaner and did not know” mentioning twice how it is “good” to be sustainable.

This logic can be considered to have affective and rational support depending on the motives of the person. Some value the planet and its inhabitants per se while others do so as instruments which will preserve comfort to themselves and their

descendants. The interests considered can be different though the result would still be endorsing sustainable behaviors and a commitment towards the construction of sustainability.

#### 6.4.1.6. Discussion of the positive logics

The examples given in this section were taken from the kiln operator interview pool, and their close connection with environmental issues is evident. Their constant exposure to environmental control systems and the training which they have undergone shapes their views. At the same time, it is possible to appreciate the diverse interpretations and priorities that this group has. Other groups of informants would offer different examples and their closeness to environmental issues would probably be different. However, the diversity of logics that kiln operators followed resembles the diversity found among the other groups.

In many instances, employees used several logics when explaining the relevance of a sustainability initiative. For example, an employee in a cement factory who was referring to the installation of energy saving devices in a kiln said: “When they came to install the new equipment, they trained us and then the new materials started arriving. And, you know, it is good that they came because it is better for the planet if we use tires, and it is all right because the kiln works and it cost less” mentioning a conscience logic and a market logic argument that support his appreciation of the change being considered “good”. It is possible to appreciate how all priorities and interests are being assessed simultaneously.

There were also a few employees who would express the balancing of competing logics. One of them, a manager who had just been told that he had to reduce the working force of his area, explained: “They (upper management) need to improve their financials, but now I need to face the guys in my team and let go a couple of them. How can I explain that we as a company care for the well being of the community and the environment when we cannot even retain these good people who have been working together for so long?” This kind of statement rarely came up during the interviewing process, but it clearly shows how it is not always possible to satisfy all the competing interests and priorities at play.

#### 6.4.2. Negative logics

There were two meaning making logics followed by employees who refused to engage with sustainability initiatives and they are called negative logics.

##### 6.4.2.1. Denial logic – “Climate change is a hoax”

The denial logic was only followed by a few employees in the US. Given that climate change has become a political issue in the US, it is understandable that this logic was only shown there. These employees would not recognize the existence of social or environmental problems requiring action. For them, the implementation of sustainability policies only followed a fade. As an example, there was a truck driver who said: “You know, it is only the media that talk about climate change, but what climate change are they talking about? There is no need to stop driving or saving gas, it has been the same forever”.

#### 6.4.2.2. Pessimistic logic – “The world is about to end”

Very few employees in the US did not believe that sustainability measures were being taken at a timely moment. For them, it was too late to avoid the consequences of bad environmental behavior through time and they did not accept the possibility of a positive outcome. For example, an old employee in the maintenance department in a US plant talking about the environmental alternatives that society had said: “The only thing we can do now is to pray; we are beyond redemption and we need to just stop and ask for forgiveness, since the end is near”. This position contrasts with the widespread belief that the British people expressed about the possibility of achieving sustainability.

### 6.5. Conclusions

This chapter provides help to achieve an understanding of sustainability implementation as an example of organizational change and its obstacles; namely, the importance of communicating about sustainability to multiple groups not only according to their context, but to the multiple meaning making logics that are followed. At the same time, sustainable subjects are being constructed. The shaping of sustainability in Cemex is being influenced by various stakeholders with whom different departments throughout the company interact. Their input weighs in the stakeholder engagement prescribed by the blueprints for sustainability as well as through the affective processes that take place during the negotiation of interests among groups. While market policies are strong in this case, and the market logic is

often used as a translation device, the green-cultures are also widespread among internal and external stakeholders.

By considering the meaning making logics, it is possible for the company, the advocacy groups, and all stakeholders to tailor communication strategies about sustainability to promote their interests expressing them in terms of meaning making logics supported by audit culture mechanisms while also connecting to the affective logics at work. Stakeholders might take different approaches to implementation and to spreading a particular view tailoring communication to the identified logics. In the future, the human resources department interested in promoting sustainability within Cemex or other companies might select candidates who display positive logics about sustainability. The stakeholders that benefit from audit culture are currently at an advantageous position to impose their construct of sustainability given the business structure that privileges measurable key performance indicators when coping with sustainability challenges.

The audit culture mechanisms have transformed the understanding of sustainability through its introduction into the business culture as shown here for the cement case. It has taken sustainability from an ideal abstract stance towards life that rejects consumption society and market economy to become a profit seeking strategy that can be measured. Through audit culture, sustainability has become concrete, allowing for the triple bottom line to be met and for the socially responsible sustainable subjects to emerge. As an adaptation of the promise of modernity that makes room for affectivity, sustainability today offers a manageable

future that makes the improvement of living conditions and eternal growth possible when respecting certain parameters, while also preserving the market economy through its naturalization and its commitment with sustainable ethics.



## Chapter 7

# Final Conclusions: Sustainability is a Multi-faced Building

This dissertation describes how the construction of sustainability is influenced heavily by the prevailing audit culture, the built environment where sustainability is to be built, and affective processes that each person experiences while relating to it. Existing institutions and cultural paradigms such as audit culture create possibilities to engage the public that delineate the style in which sustainability is built following these preferred frameworks. While the mechanisms of audit culture are applied to the construction of sustainability, audit culture permeates more aspects of the daily life of common people, growing in importance. Given that the participation of diverse social groups is not only expected but promoted, the construction takes place with diverse entities working together; multiple stakeholders intervene and shape the edifice of sustainability using

translation mechanisms to communicate their interests and understandings in ways that are meaningful to others while power is also intervening. Sustainability and cement act as boundary objects which allow for the communication between parties changing appearance in the process according to the prevailing context and priorities of the most convincing actors. The malleability of sustainability and cement makes room for multiple shapes that adapt to local needs. On becoming material and concrete, sustainability does not necessarily always mean the same to all and only at the interface between intersecting life-worlds is the interpretation negotiated and its corresponding building block laid on the wall of sustainability.

### 7.1. The particularity of the cement case

By focusing on the cement industry, I have also showcased the intricate relationship between cement as a material with ideas of becoming modern and urban lifestyle. The design of infrastructure projects and other elements of the built environment are increasingly adopting sustainability as a priority; a condition to which cement producers are responding. Cement manufacturing is a traditional industrial process which developed at a time when growth ad infinitum went unquestioned, environmental impacts were understood as examples of progress, and the productive process was so labor intensive that neighbors welcomed the presence of manufacturing plants as sources of employment. Cement built the cities mostly after WWII; the urban environments grew as cement manufacturers popped and quarry holes emerged. The transition to sustainability is particularly intense in

this industry which in many ways symbolized what is now being transformed. From dusty industry to carbon conscious, from energy intensive to alternative fuels, from isolated plants with no neighbors to operations in the center of urban communities; there are multiple threads that show how sustainability is transforming cement production and even cement as a material.

## 7.2. Experts remain powerful architects of sustainability

Experts play a very important role in the construction of sustainability in the cement industry; they not only bring in their knowledge but firmly assert the scaffolding of audit culture which holds together the edifice of sustainability providing connections and communication alternatives between actors and multiple layers. Different disciplines and professions such as civil and environmental engineers, lawyers, process engineers, and project managers with varied perspectives, economic interests and social concerns utilize the roadwork created by auditing mechanisms to construct sustainability. The collaboration between experts, industry and government optimizes resource use while enhancing their power position. At the same time, the very same members of the expert communities recognize the importance of the common people and endorse stakeholder engagement to corroborate and co-produce sustainability standards following the Mode-2 Science framework.

### 7.3. Existing elements of the landscape shape new constructions

The landscape where sustainability is being constructed only allows certain designs while others are thwarted. There are important constraints to the building of sustainability which heavily influence the resulting edifice. On one hand, there are the cultural institutions such as market and auditing mechanisms that though humans have created them, have become larger and more powerful than people. On the other hand, the material limitations posed by finite capacity and resources available. The market dynamics that characterize our society have become naturalized to the extent that the economy has been included in the definition of sustainability through the triple bottom line. This eases the adoption of the triple bottom line because people easily understand the economic priorities embedded in this approach to sustainability while it also makes it difficult for environmental and social goals that are hard to translate into economic benefits to be considered equitably as stated by Kelman in his ethical critique to cost benefit analysis (Kelman 1981). The spreading of audit culture into the realm of sustainability requires that practices and goals are expressed in quantifiable terms which can easily leave out hard to measure initiatives.

Paradoxically, the nature of sustainability resides in the long term while the audit culture privileges immediate results and those issues that cannot be quantified, though important, might be left aside or only considered implicitly. Not only are large corporations like Cemex inserted in this model, but all people are a part of this. Consumption patterns, dependence on cars and even the understanding

of comfort are elements of culture that must be considered when sustainability is being constructed.

The physical limitations of the planet have become more evident and there are thorough scientific reports and calculations available that report on climate change, earth's carrying capacity and the unintended environmental impacts of previously considered harmless or even beneficial substances are well known such as DDT. The definitions of comfort and development need to be reconsidered to meet the needs of increasing population without necessarily setting economic growth as a desirable objective. These material limitations remind us of the power of non human actants, since they are also contributing forces in the building of sustainability.

#### 7.4. The diversity of the construction crew, power and translation devices

The human actors that shape sustainability as it is being built come from contrasting life-worlds; their experiences and expectations are as diverse as the goals of sustainability and the material expressions that result from their participation are also varied. Some might attempt to reshape the issue of sustainability rather than changing the status quo while others would try the opposite. While for some individuals the economic system is the leading force in their lives informing their relations with sustainability and people; for others, it is

the rhythm of the seasons which dictates their daily practices directed by nature; still others are inserted in spheres such as engineering or medical fields that filter their experiences through different lenses. All actors meet through the shared interest in sustainability by their participation as stakeholders who build sustainability at the same time that are shaped by it. They communicate through sustainability as a boundary object that incorporates the interests of them all and, through its mere loose structure and ambiguity makes room for everyone's conception.

Auditing mechanisms also attempt to balance the input of powerful stakeholders by presenting multiple publics with seemingly objective parameters to assess sustainability pathways. The claim of objectivity is one of the advantages offered by accreditation mechanisms and certification processes that impact the construction of sustainability. While it might be easier to compare the degree of sustainability through these mechanisms, they also pose a barrier through the multiple steps and familiarity with expert knowledge/vocabulary that can alienate the less powerful actors. Inadvertently, the power of expert communities is enhanced and the interests that align with them are benefited.

## 7.5. The case for sustainability is rational and affective

The rationale that underlies sustainability policy implementation in businesses and government agencies alike not only offers objectivity as if it was achievable but assumes that reasoning and market are the engines for the spreading

of sustainability. However, affect is also an important motor that guides the acquisition of sustainability and its interpretation as advertisers have known for long. The affective processes through which people relate to sustainability help it to become meaningful weighing in the three pillars of the triple bottom line in each case. Even thorough sustainability strategies grounded in detailed auditing mechanisms such as LEED are experienced through the senses and compared to existing knowledge by lay people unfamiliar with the credentialization that accompanies sustainability at the policy level. They will simply feel the increased insulation that sustainable buildings offer or the better absorption of porous concrete after a rain and weight them intuitively following different logics which might be more aligned to affective motives than to reason.

## 7.6. Sustainability is intertwined with ethics and audits

Ethical considerations are ever present when sustainability is involved. Whether because future generations of people are at stake, or because humans have the obligation to preserve the environment; the ethics of care and the recognition of the importance of human impacts underlie the introduction of sustainability in the business world and in government objectives. Simultaneously, it is through ethics that the responsibility of human impact is split among all actors, while the unintended negative consequences of previous acts are often distributed among the more vulnerable groups. Similarly, through the inclusion of sustainability as a parameter of performance, the market system is legitimated on ethical grounds at

the time that it also transforms the meaning of sustainability to perpetuate itself. Also on ethical grounds, the auditing mechanisms offer to avoid partiality and promise objective and efficient pathways towards sustainability.

For the auditing mechanisms to be successful in creating sustainable subjects who govern themselves in favor of the planet and the collective well being, the acceptance of ethical imperatives is of paramount importance. Hence, it is a circular process that touches on ethics to deal with the planetary risks, then to define and share responsibilities, and again to create committed and self-regulating subjects who embrace sustainability on ethical grounds. Similarly, it is through auditing mechanisms that the circular movement of sustainability takes place within this complex ecology given that they provide the scripts to define sustainability, the procedures to evaluate advancement and make it material, and the discursive elements that individuals appropriate to become sustainable subjects.

## 7.7. The political ecology of sustainability

Sustainability offers a field of practice that shows the interaction between powerful and not so powerful social actors when addressing global issues that impact everyone. The academic institutions and the communities of experts play an important role in tackling the challenges of becoming sustainable. At the same time, they support and are supported by the market, performativity and quantification paradigms that guide their knowledge production and their priorities. It is a



complex ecology where all actors are interdependent and no one can escape these forces.

In this context, even large corporations like Cemex which are important global players whose resources and maneuverability seem immense in comparison to any employee or stakeholder with whom they interact, are reduced to following the path to sustainability dictated by forces that are beyond its control such as the market and auditing. While no single actor is capable of resisting these forces, the edifice of sustainability might be one more supporting pillar of these institutions that seem to have acquired a life independent from its creators. Whether these serve the interests of humankind and the planet is still unknown, since there are elements to hint that affectively, sustainability is becoming engrained in the mindsets of more people who might act outside the prevailing system.

The emergence of the sustainable subject is happening while each individual actor remains able to exercise a certain degree of agency and creativity in the way in which sustainability is approached and made meaningful; gender, educational level, income level, historical traditions and personal beliefs influence this meaning making process as well; auditing mechanisms continue to improve and incorporate more sustainability parameters though they also absorb huge time and resources in the efforts to record and improve performance; the built environment is slowly shifting to express a 'new' sustainable design discourse that invites its inhabitants to embrace different practices in the urban environment to avoid the dependence on cars, save energy and optimize the use of land in urban settings.

## 7.8. The outlook of sustainability

Transforming the minds and the market through the enactment of governmentality technologies that policy makers introduce through audit culture is a task that re-shapes individuals and corporations while maintaining the idea of free subjects who voluntarily engage with sustainability. In the neoliberal arena, this is highly valued since sustainability is not imposed or forced into businesses or people though it is still introduced through subtle governmental institutions which might be generated by national agencies, supra-national organizations or other policy oriented institutions. The outcome of this construction project remains unknown; whether society will successfully transition towards a feasible sustainable world where aesthetics, built environment, economy and actors switch values and practices on time to avoid environmental catastrophe and depletion is difficult to determine. It requires recognizing that the future can only be built as a common one where the challenges ahead must be shared, while opposition and confrontation get displaced by negotiation and trust is built along with sustainability. The concerted efforts to move in that direction have begun and the scale of change is of such a magnitude that the pre-existing mechanisms for transformation are being put to a test that has never before been attempted.

Market and auditing technologies developed throughout the industrialization era to efficiently optimize profits while creating economic subjects immersed in capitalist logics; today the same mechanisms are embracing sustainability and re-directioning their engines to adopt the triple bottom line logics and consider

stakeholders instead of only shareholders developing a new sustainable subjectivity in the process. The institutions created to support the nation state and the industrial society are the tools being used to re-invent the narrative of growth and progress to incorporate society, environment and limits that switches the role of humans from exploiters of resources to managers and stewards of the planet. Informants are aware of the challenges, they propose alternatives, create products and change their ways; at the same time, they bear witness to the difficult negotiations between the three pillars of the bottom line, the inertia of traditional bottom line and the demands of fast paced competition in the market system to show results in the very short term. These contrast sharply with the scale and tempo of sustainability.

### 7.9. Some ideas about where future research might be directed

The concepts of sustainability in industry and in the field of civil engineering seem to be evolving towards resiliency. The Concrete Joint Sustainability Initiative defines resiliency as “the capacity to anticipate and minimize potential destructive forces through adaptation or resistance” (Resiliency | Concrete Joint Sustainability Initiative n.d.). Furthermore, when referring to the sustainable value of concrete when facing climate change and global warming, they state that “while the discussion of sustainability is often dominated by environmental concerns, when you scratch the surface it is really the desire for safety and stability, the protection of our lives and livelihoods, that drives sustainability” (Resiliency | Concrete Joint Sustainability Initiative n.d.). This interpretation of the challenges faced by society is

recent and did not come up during my fieldwork; it would be valuable to study whether sustainability switches its emphasis from mitigating human impact towards perpetuating current practices.

These changing understandings and applications of sustainability could be explored by future research. Particularly, it would be important to track the evolving synergy between audit culture and sustainability definition to determine whether the trend towards resiliency is linked to the prescribed sustainability assessment parameters emerging from audit culture. Similarly, it would be helpful for policy makers, activist organizations, companies and the whole array of stakeholders to know the weights given by different actors to each pillar of the triple bottom line. This way it would be possible to diagnose the advancement of environmental and social priorities among social actors and if they continue to be rooted in economic performance criteria, educational and communicating strategies would need to be tailored accordingly.

In relation to subjectivity, the notions of market and capitalism seem to be so ingrained in the mindset of people, that they have become naturalized. It would be relevant to explore the prevalence of capitalist subjectivity separately from the emergence of the sustainable subject. This research could include different social groups to determine if there is any subjective transition taking place when sustainability is not purposely introduced and in what instances.

Participant observation and unstructured interviews are valuable to begin understanding nascent social phenomena such as sustainability, building knowledge

from informants input without limiting the kind of answers that they can provide. At the current stage of this project, it would be helpful to complement this research project through the use of surveys and other tools outside of traditional anthropology such as focus groups, psychological tests and online polls to further explore the sustainability meaning making logics, the attitudes towards the different tools of audit culture, and the awareness of sustainability policies in general.

Similarly, software and computational technologies would be useful to create maps that compare audit culture prevalence with economic, environmental and social performance in the cement industry throughout regions with the use of global information systems technology (GIS), the demographic changes related to the presence of quarries or cement producing facilities.<sup>39</sup>

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<sup>39</sup> This dissertation has been formatted using Rice University's Dissertation template (Carey 2011)

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