

School of Geography and the Environment

Corporate Water Risk – and Return

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Abstract

Corporate water risk is a function of resource dependence, which exposes firms to uncertainty. Firms rationally seek to reduce this risk, and this shapes their disclosure strategies. However, the consequence is that corporate water risk disclosure is becoming increasingly unfit for purpose. As current approaches begin to acquire institutional legitimacy and the path-dependent label of best practice, a status quo is becoming embedded, reinforced through mimetic behaviour. The agency problem that this creates is unchecked; in part because of the legitimacy acquired by the disclosure strategies, but also because of temporal myopia exhibited by investors, which contributes to unpredictable decision-making. The status quo also results in sub-optimal resource allocation, a problem that is compounded by the large and growing global infrastructure deficit for water supply and services.

This thesis sets out a framework by which the disclosure of corporate water risk can be meaningfully evaluated by investors and other stakeholders; and proposes how the water infrastructure investment gap could be narrowed by the development and application of the corporate water return concept. The research builds on empirical foundations to offer new approaches that address the problems of the status quo. First, it empirically explores perceptions of best practice in terms of water risk disclosure, from the perspective of both listed firms and leading institutional investors (Chapters 3 and 4). Second, it proposes a methodology through which firms can disclose water risks in a systematic format; and advances corporate water return as a complementary concept to water risk, in order to catalyse corporate investment in water infrastructure (Chapters 5 and 6). Resource dependence theory, institutional theory, and stakeholder theory are combined to create a trio of integrative, explicative conceptual narratives that form the overarching thesis structure. The research also draws on other themes from economic geography, including proximity; strategic cognition; transaction costs; and real options theory.

Table of Contents

Abstract.....	2
Acknowledgements.....	10
Chapter 1 Introduction.....	11
1.1 Aims and motivations	11
1.2 Research significance	18
1.3 Theoretical significance.....	21
1.4 Methodological approach	24
1.4.1 Chapter 3.....	24
1.4.2 Chapter 4.....	26
1.4.3 Chapter 5.....	28
1.4.4 Chapter 6.....	29
1.5 Chapter introductions and objectives	30
1.5.1 Chapters 3 and 4	32
1.5.2 Chapters 5 and 6	34
1.6 Summary.....	37
Chapter 2 Survey of Literature.....	39
2.1 Corporate water risk and return.....	40
2.2 Resource dependence theory	41
2.3 Agency theory and information asymmetry	47
2.4 Institutional theory and mimetic process	49
2.5 Stakeholder theory and salience	53
2.6 Proximity and myopia.....	57

2.7	Strategic cognition, implementation and outcomes	60
2.8	Transaction cost theory and hybrid structures.....	64
2.9	Real options theory and uncertainty	67
2.10	Conclusion	69
Chapter 3 A Critique of Prevailing Best Practice		71
3.1	Introduction	71
3.2	Method	79
3.3	Results	85
3.3.1	Historic efficiency	85
3.3.2	Target efficiency	87
3.3.3	Aspiration Multiple	88
3.3.4	Descriptive statistics	90
3.3.5	Marginal efficiency	91
3.4	Discussion.....	92
3.4.1	Resource dependence and rational behaviour	92
3.4.2	Institutional theory and isomorphic behaviour.....	95
3.4.3	Coercive pressure	95
3.4.4	Mimetic process.....	97
3.4.5	Normative behaviour	100
3.4.6	Summary: resource dependence and institutional theory	102
3.5	Conclusion	103
Chapter 4 Investor Tolerance of the Status Quo		105
4.1	Introduction	105
4.2	Conceptual framework	106
4.2.1	Proximity.....	106

4.2.2	Myopia	107
4.3	Method	110
4.4	Approach	112
4.5	Discussion	114
4.5.1	Dimensions of proximity	115
4.5.2	Boundaries of proximity	118
4.5.3	Dimensions of predictability	119
4.6	Conclusion	132
Chapter 5	Evaluating Issue Salience	134
5.1	Introduction	134
5.2	Attribute definitions	137
5.2.1	Materiality	138
5.2.2	Specificity	139
5.2.3	Urgency	140
5.3	Strategic cognition	141
5.4	Corporate Water Risk	145
5.5	Framework for issue salience	148
5.5.1	Issue has no salience	152
5.5.2	Issue is material	152
5.5.3	Issue is specific	152
5.5.4	Issue is urgent	153
5.5.5	Issue is material and specific	153
5.5.6	Issue is material and urgent	154
5.5.7	Issue is specific and urgent	154
5.5.8	Issue is material, specific and urgent	155
5.6	Summary	156

5.7	Practical application of the salience framework.....	157
5.8	Implications for management and research	161
5.9	Conclusion	165
Chapter 6	Corporate Water Return	168
6.1	Introduction	168
6.2	Conceptual structure	172
6.3	Corporate Water Return	178
6.4	Five Factor Framework (5FF).....	183
6.4.1	5FF Factor 1: Action	186
6.4.2	5FF Factor 2: Advantage	187
6.4.3	5FF Factor 3: Alternative	187
6.4.4	5FF Factor 4: Attribution	188
6.4.5	5FF Factor 5: Awareness	189
6.5	Discussion.....	190
6.6	Conclusion	196
Chapter 7	Conclusion	200
7.1	The problem this thesis addresses.....	200
7.2	The solution this thesis proposes	210
7.3	Contribution to theory	218
7.4	Contribution to practice	222
7.5.	Limitations of this research	226
7.6	Avenues for future research	228
Bibliography	230
Appendices	261

List of Figures

Figure 1: MAW Stakeholder Typology. One, Two, or Three Attributes Present	55
Figure 2: Relationship Between Embeddedness and Performance	60
Figure 3: Strategic Cognition – An Integrative Framework	62
Figure 4: Consumer Staples Company Sample	84
Figure 5: Annualised Historic Change in Water Efficiency	86
Figure 6: CAGR in Water Efficiency Required to Achieve Target.....	87
Figure 7: Water Efficiency Aspiration Multiples (ASMULs).....	89, 202
Figure 8: Descriptive Statistics	90
Figure 9: CAGR Improvements in Historic Water Efficiency.....	91, 203
Figure 10: Temporal Myopia and Probabilistic Events	111, 206
Figure 11: Predictability of Investor Behaviour	114, 207
Figure 12: A Framework for Issue Salience	148
Figure 13: Issue Salience and Managerial Response	151, 212
Figure 14: Issue Salience and Corporate Water Risk Examples	157
Figure 15: Issue Salience Scorecard.....	160, 213
Figure 16: A Five Factor Framework (5FF)	186, 216

List of Appendices

Appendix 1A: Qualified ASMUL data.....	262
Appendix 1B: Historic and Target Data	263
Appendix 1C: Company data templates	264
Appendix 2A: Letter of Introduction	322
Appendix 2B: CIO contact list.....	324
Appendix 2C: Survey Form	325
Appendix 2D: Investor Responses	334
Appendix 2E: Response Matrix	357

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*Alex Money
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Oxford, May Day 2014*

INTRODUCTION

Chapter 1

INTRODUCTION

1.1 Aims and motivations

The concepts of “corporate water risk” and “corporate water return” are at once evocative and elusive. A survey by the World Economic Forum ranked water supply crises as one of the business world’s top five risks in terms of probability, and the second most severe risk that the business world faces in terms of impact (Howell, 2013). And yet no consensus exists on what the specific issues are, the seriousness of the consequences, or the options for mitigation.

Corporate water risk is probably most commonly understood as “a set of material business risks that fall into four broad categories: physical, reputational, regulatory, and litigation risk. The significance of these water-related risks varies by sector and by company” (Barton, 2010, p. 17). In fact, common definitions of corporate water risk have shifted somewhat over the past two decades. Following the Valdez oil spill in 1989, where Exxon was forced to pay out over US\$4 billion in compensation (Carson et al., 2003), legislative changes meant that, for the subsequent decade or so, corporate water risk was largely perceived in terms of the financial penalties that a company faced as a result of its impact on the environment. However, the publication of the Third Intergovernmental Panel on Climate Change (IPCC) Assessment Report

INTRODUCTION

in 2001 marked the start of a gradual shift in the perception of corporate water risk from the impact of companies on the environment to the impact of the environment on companies. Corporate water risk has come to embody those challenges that companies face in ensuring their 'licence to operate' (Sarni, 2011), in an environment of scarcity and increasing variability of available water resources.

For its part, the concept of corporate water return has almost no antecedents in either the academic or practitioner literature. A survey by the Carbon Disclosure Project in 2012 found that 70% of respondents believed that there was potential for changes in their water use to improve profitability at their firm through cost savings, sales of new products, or increased brand value (CDP, 2012). But these are best described as derivative benefits, with consequential rather than fundamental implications for the cognitive strategy of firms.

This thesis has two aims:

- To set out a framework by which the disclosure of corporate water risk can be meaningfully evaluated by investors and other stakeholders.
- To propose how the water infrastructure investment gap could be narrowed by the development and application of the corporate water return concept.

There are two motivations associated with these aims.

First, in terms of the disclosure of corporate water risk, my motivation stems from twenty years of professional experience in the investment industry. As a trainee emerging markets fund manager at Citibank Global Asset Management (CGAM) in the mid-1990s, I travelled extensively to water scarce geographies in Latin America, Africa and Asia where CGAM managed investments in companies across a broad range of industry sectors, from mining to finance to consumer staples. Frequently these

INTRODUCTION

companies were the subsidiaries of listed multi-national firms, with global headquarters many thousands of miles away from these local operations. In trying to evaluate the profit potential of these subsidiaries, I was struck by the heterogeneity of the operating environments in which they did business. This ranged from the physical (e.g. quality of public infrastructure such as transport networks), to technological (e.g. communications facilities), social (e.g. employee relations and productivity) and cultural (e.g. levels of petty corruption that were a precondition for doing business). I was particularly interested in the agency problems associated with this heterogeneity, both intra-firm and between managers and institutional owners such as CGAM. From an intra-firm perspective, I was intrigued by the processes that local management (i.e. those running the subsidiary company) would use to engage with their reporting line (i.e. those running the parent company), and to what extent these differences were incorporated within some form of integrated disclosure framework.

From an institutional ownership perspective, I was curious to understand not just how well senior management understood the differences in the operating environment of their subsidiaries and the extent to which this was integrated into their strategic cognition framework; but also how these senior managers disclosed this information to institutional owners such as CGAM. For much of the 1990s this type of 'non-financial disclosure' was regarded by many institutional owners as being within the ambit of corporate social responsibility (CSR). As a consequence, CSR reporting took on a universality through which disclosure often became conflated and confused, straying into many areas of corporate performance (Aguilera & Jackson, 2003; Bertels & Pelozo, 2008; Brønn & Vidaver-Cohen, 2009) , often without specific design or intent. In many ways this exacerbated the agency problem, as corporate disclosure to

INTRODUCTION

external stakeholders became a management tool; an end in itself, rather than a means to an end.

With the benefit of insight that came from being able to observe, in situ, the heterogeneous operating environments that subsidiary companies faced, and then comparing this with the CSR reporting by the multi-national parent, I eventually concluded that much of the non-financial disclosure was fundamentally unfit for purpose. This purpose being, from my perspective as an institutional owner, to evaluate the firm holistically as an investment prospect, based on the opportunities and risks that it faced, and the process in place to respectively capitalise and mitigate. The poor quality disclosure made it difficult not just to make absolute judgments about a firm's investment prospects but also – and in many ways this was the more important failing – to make relative judgments about a firm's prospects, compared to other companies. These might include competitors operating in the same markets, or companies operating in different markets where economic (financial) returns may be lower, but the risks associated with achieving those returns were lower too, which would obviously affect the comparative attractiveness of these companies as investment prospects.

This is not, of course, a particularly unique or revelatory observation. The literature on the limitations of CSR is well established, from perspectives of nationally bounded governance (Aguilera & Cuervo-Cazurra, 2009; Lubatkin, Lane, Collin, & Very, 2005) through to information asymmetry (Core, 2001; Healy & Palepu, 2001), agency (Rediker & Seth, 1995; Tosi, Katz, & Gomez-Mejia, 1997; Ward, Brown, & Rodriguez, 2009; Zajac & Westphal, 1994) and valuation (Dhaliwal, Li, Tsang, & Yang, 2011; Plumlee, Brown, & Marshall, 2007). However, much of this scholarship is theoretical, and the empirical work tends to emphasise attributive and correlative aspects of CSR

INTRODUCTION

on firm performance, where invariably (although not exclusively) share prices are used as the dependent variable.

Notwithstanding some revealing research of this nature (e.g. Eccles, Ioannou, & Serafeim, 2012) from a practitioner perspective, such approaches can seem rather unsatisfying, not least because of the inherent presumption of omniscience, associated with the Efficient Markets Hypothesis, or EMH (see e.g. Fama, 1970; Malkiel, 2003). It may be that the EMH applies only weakly – that is, it can be many years before such differentials are captured within the company valuation – or it may not apply at all, i.e. some of the relative risks and opportunities accruing from the approach that different firms take when operating in heterogeneous environments may never be reflected in market valuations, making reductive empirical analyses based on share price regressions ultimately somewhat redundant. In contrast, research that has focused on the economic inefficiency of corporate secrecy, and on owners forcing increased transparency and disclosure, has been more revealing (Hebb, 2006b).

My motivation to set out a framework by which the disclosure of corporate water risk can be meaningfully evaluated by investors and other stakeholders can therefore be framed within this context. My research interest in heterogeneous approaches to corporate water use specifically was established well before I commenced this thesis. Water is, in the language of the resource based view, a strategic asset (Barney, 1991). As a factor of production, water is valuable, scarce, imperfectly imitable, and without substitute. It is also highly fungible, facilitating analysis that does not require extensive contextual caveats. In order to gain a broader perspective than that afforded by my investment industry background, I read for a Master's degree in Water Science, Policy and Management at Oxford in 2009-10, subsequently remaining at the University to commence this research project.

INTRODUCTION

Second, in terms of my motivation for exploring the concept of corporate water return as a mechanism for narrowing the water infrastructure investment gap: in contrast to heterogeneous approaches to corporate water use, my interest in this area is comparatively recent, and emerged as an indirect consequence of the empirical research that I carried out in the earlier stages of my thesis.

That there is a large and growing global deficit of capital infrastructure – affecting *inter alia* the power, transport and communications sectors, in addition to water – is well documented. According to the management consultants McKinsey, the world's estimated need for water infrastructure investment between 2013 and 2030 is US\$ 11.7 trillion (Dobbs & Pohl, 2013), rising alongside GDP and population growth. Meanwhile, the OECD projects that the average annual world infrastructure expenditure on water between 2020 and 2030 will need to be US\$ 1,037 billion or 1.03% of world GDP, and more than the combined expenditure on road, rail, telecoms and electricity, over the period (OECD, 2006). Financing this investment in the post-crisis environment presents particular difficulties, given the deterioration in many public sector balance sheets (O'Brien & Keith, 2009), increased risk aversion by lenders and financial intermediaries, and the relatively small proportion of institutional asset allocation to infrastructure investment from within the private sector, although this is increasing (Clark, 2000b; Hagerman, Clark, & Hebb, 2007; Hebb, 2006a, 2007).

In terms of water infrastructure specifically, the deficit challenge is exacerbated by population growth and increasing urbanisation, which puts greater strain on supply, treatment, distribution and sanitation networks. In a 2007 report, consultants Booz Allen estimated that, over the next 25 years, modernising and expanding the water systems of the world's cities would cost US\$ 22.6 trillion (Hamilton, 2007). Meanwhile exogenous anthropogenic activity that creates system-wide effects such as greater

INTRODUCTION

climate variability add a further dimension of stress to the infrastructure, which may need to cope with ever greater instances of extreme conditions, such as drought or flooding. In *Charting our Water Future*, a widely cited report authored principally by management consultants, it was estimated that that under 'business as usual', competing demands for water resources might lead to a 40% output gap compared to available supply by 2030 (2030 Water Resources Group, 2010). This gap remains even allowing for improvements in water productivity and increases in supply under business as usual.

In short, this is one area on which a broad level of consensus exists: more infrastructure is needed, but the mechanisms currently in place to allocate capital from various pools of collective savings (such as pension funds) to these types of projects are doing their job poorly. According to another industry report, global spending on basic infrastructure currently amounts to US\$ 2.7 trillion per annum, compared to an optimal \$3.7 trillion per annum that is required to close the output gap of lost economic activity (World Economic Forum, 2013).

In this thesis I propose corporate water return as an intermediate, catalytic concept, which can be developed to 'crowd in' (Agosin & Machado, 2005) corporate investment into water infrastructure. It is an intermediate concept because it requires integration with other processes, variously explored in the organisational change (Cyert & March, 1963; March & Simon, 1958; Williamson, 1985) and strategic cognition (see e.g. Narayanan, Zane, & Kemmerer, 2010) literature, to effect strategy formulation and implementation. And it is a catalytic concept because, I propose, all the antecedent conditions exist for such investment to take place. What is lacking is a catalyst, and in the Five Factor Framework that I develop in Chapter 6, I make the theoretical case as to why corporate water return can serve exactly that function. However, this is not all

INTRODUCTION

an exercise in theory. For example, “green bond” issuance (an instrument that is, in effect, an applied manifestation of the framework in Chapter 6) increased dramatically (by 500%) in 2013, and is likely to exceed US\$ 50 billion in 2014. A small sum still, in the context of the infrastructure deficit, but even a muted extrapolation of current growth rates would render green bonds a significant source of incremental infrastructure finance by the end of this decade.

1.2 Research significance

This thesis has four objectives:

1. To identify what is currently perceived to be best practice in terms of water risk disclosure by listed companies
2. To establish the process employed by leading institutional investors in evaluating corporate water risk in their portfolios
3. To propose a methodology by which companies disclose water risks in a systematic format framed by materiality, specificity and urgency
4. To advance corporate water return as a complementary concept to water risk, in order to catalyse corporate investment in water infrastructure

To consider the research significance of each in turn. ‘Best practice’ enjoys a paradigmatic status in the lexicon of corporate sustainability and in many adjacent fields. However, outside accredited management standards (such as e.g. ISO 9000), or well-defined case studies (e.g. Clark & Urwin, 2008) there is often remarkably little rigour in the process to establish what constitutes best, good, or even adequate practice (Bardach, 2012), and the evolution of approaches may in fact be better

INTRODUCTION

understood with reference to contingency theory (Hofer, 1975). Nonetheless, perceptions of best practice drive institutional and mimetic process within firms, and risk entrenching sub-optimal approaches within operating structures. My first objective was to identify what best practice meant in terms of water risk disclosure. This involved a longitudinal review of relevant corporate disclosure for a quorum of large firms within an industry sector. In comparing approaches between firms, and taking the agenda set by the self-selecting 'early adopter' firms as a proxy for best practice, it was possible to identify – through a lowest common denominator analysis – how perceptions of best practice emerged, solidified and then became entrenched. An empirical critique of these perceptions followed thereafter.

If institutional and mimetic processes are widespread within firms, there is also strong evidence of this amongst investors. The reasons for this are well understood. Many institutional investors use their performance relative to benchmarks as part of their competitive differentiation and marketing armoury (assuming that they can find a suitable time period during which their performance was better than their benchmark). As the competition amongst institutional investors to gather and retain assets has intensified, this has created an environment of "closet benchmarking" (Dubil & Harjoto, 2003) where investors have little incentive to accept high tracking error, i.e. to take positions that are widely different from the benchmark, and, by extension, from each other. One consequence of this is that their capacity to critically evaluate what is being presented as 'best practice' by current and prospective investee firms is conditioned by the capacity of their competitors to undertake this same critical evaluation, particularly as such activities are not costless. By interviewing leading institutional investors at different firms and in different countries, it was possible to better

INTRODUCTION

understand the processes they employed to evaluate corporate water risk in their portfolios.

The first two objectives of this thesis are essentially to critique the status quo and entrenched practices by firms and investment managers. I would submit that this critique has high research significance, as it is a necessary and important part of the process in understanding why change is desirable and necessary, and what can be done within the research agenda to help effect this change. The empirical papers that form the first two substantive chapters critiquing the status quo are conceptually rooted in very well established and widely explored areas of the academic literature. However, the second two substantive chapters are conceptually oriented and take an inductive approach, proposing frameworks that are themselves open to critique. This is a necessary condition of any attempt to make a meaningful contribution to the extant body of research.

In proposing an interface through which companies disclose water risks in a systematic format framed by materiality, specificity and urgency, I set out two separate objectives. The first objective is to demonstrate that it is possible for companies to disclose corporate water risk in a systematic format, which allows for the mitigation of agency problems that result from environmental heterogeneity, as discussed in the previous section. The second objective is to argue that the attributes that I define and develop within Chapter 5 are indeed fit for the purpose of systematic disclosure, evaluation of salience, and strategy formulation and implementation. These are admittedly ambitious thresholds. While the two objectives are obviously interconnected, the arguments that underpin each are not dependent on the other, and so it is possible to sustain one argument while acknowledging challenges to the other. The research significance is derived from the fact that there is, at present, no

INTRODUCTION

framework being applied in either practitioner or academic literature which attempts to achieve either of the two objectives that are set out here.

Finally, in advancing corporate water return as a complementary concept to water risk in order to catalyse corporate investment in water infrastructure, I again set out two separate objectives. The first objective is to propose the validity of the corporate water return concept, and to make a case for its usefulness as a complementary concept to corporate water risk. The second objective is to propose that corporate investment can make a meaningful contribution to closing the deficit in water infrastructure, provided necessary conditions are met. I believe that both of these objectives have profound research significance. In proposing corporate water return as a concept I build on ideas about corporate water risk that already have some traction within the practitioner (and to a lesser extent, academic) community. Moreover, I make the case with recourse to literature that is very well established and widely followed, including transaction cost theory and real options theory. And in proposing that corporate investment can play a role in addressing the infrastructure deficit, I make a fresh contribution to a debate that has gained momentum, particularly following the financial crises of 2008, and the subsequent reduction in the availability of risk capital to finance infrastructure investment.

1.3 Theoretical significance

This thesis has been approached from the perspective that theory should be built from empirical experience, rather than seeking empirical information to meet theoretical expectations. That is, theory is one half of a dialectic with empirical information (Clark,

INTRODUCTION

1998). The substantive chapters follow this iterative process, with empirical analysis being used to validate or challenge existing and well established theoretical frameworks, from which new theory has been proposed, to be validated or challenged in subsequent scholarship.

The locus of this thesis is within the conceptual theories of resource dependence, institutionalism and stakeholder salience, which are combined through the course of this project into an explicative narrative framework, supplemented by research themes including agency theory; proximity and myopia; strategic cognition; transaction cost theory; and real options theory. These themes are explored in detail within the survey of literature in the following chapter. There emerged, over the course of this project, a natural interconnectedness in the overarching themes that anchor each substantive chapter to the aims and objectives of this thesis. This became particularly evident when seeking out explicative theory to help understand why, for example, corporate disclosure of water risk was not more useful than it was, given its fundamental unfitness of purpose. Or, to help understand why senior investment managers around the world did not seem to take more of an interest in the disclosure of water risk within their portfolio of companies, despite the heterogeneity of their operating environment. The answers did not come from complex, nuanced theories of behavioural finance or market psychometrics but instead could be understood and explained relatively easily with recourse to these three traditional – venerable, even – conceptual theories of resource dependence, institutionalism and stakeholder theory.

The extent of theoretical interconnectedness between the substantive chapters was a gratifying and slightly unexpected output from the project. At the start of the process I had only a generic awareness of the associated literature, and it has been a source of small surprise and great satisfaction that the empirical observations can be explained

INTRODUCTION

through extant literature relatively seamlessly and with sufficient conviction to provide a suitably durable and robust foundation to then develop theory and build new, original conceptual frameworks that address problems of profound significance to the research agenda.

This thesis is sympathetic to the idea of an 'evolutionary economic geography', and in particular the concept of path dependence, which is held to be a characteristic of a system or process whose outcomes evolve as a consequence of its own history (P. A. David, 2001; Martin & Sunley, 2006), along with the associated concept of lock-in; notwithstanding the debate amongst economic geographers over conceptions of equilibrium over evolution (Martin, 2009). This is explored in Chapters 3 and 4, particularly with reference to mimetic process and myopia. One of the main points in this research is the existence of a status quo (despite various protestations to the contrary) in how companies engage with themselves, with each other and with their owners and other stakeholders on corporate water risk. Path dependence is a helpful concept in understanding this state of affairs, as well in explaining why presumptions of best practice can often remain unchallenged, despite the evidence that many practices are anything but the best. While the notion of lock-in – more of the same – implies an embeddedness of the status quo, I believe that paradigmatic shifts, potentially delivered via catalysts such as the corporate water concept, ensure that the field will continue to involve.

At any rate, my research leaves me with the firm belief that it is within the field of economic geography, rather than, say, economics, or geography, that the objectives of this thesis have the highest chance of being fulfilled. The issues can best be characterised by their inter-disciplinarity, and the holistic examination of the various research themes requires breadth as much as depth. Corporate water risk and return

INTRODUCTION

incorporate a plethora of issues typically seen at the intersection of enterprise and the environment, including environmental management, resource economics, sustainable finance, natural capital, stranded assets and shared value. While this project does not find answers to all of the questions it raises, there are strong grounds to argue that when these answers do come, they will hail from the field of economic geography.

1.4 Methodological approach

Of the four substantive chapters that this thesis comprises, the first two (Chapters 3 and 4) are empirical and the second two (Chapters 5 and 6) are conceptual. These four chapters appear in this thesis in the same chronological sequence as when they were researched and written, with Chapter 3 researched in the autumn and winter of 2011 (with a first draft written up by the spring of 2012); Chapter 4 researched in the summer of 2012 (first draft written up in early 2013), the Chapter 5 researched over the spring and summer of 2013 (written up in the autumn of 2013), and Chapter 6 researched and written up over the winter of 2013/14. A mixed methods approach was used; and a brief description of the methodological approach for each paper follows. A more detailed account appears in the relevant chapters. The description of the methodological approach for Chapters 5 and 6 is rather shorter than for those of the preceding chapters, obviously reflecting the conceptual rather than empirical orientation of the latter two chapters.

1.4.1 Chapter 3

Empirical analysis in this chapter focuses on firms' use of water efficiency targets as a disclosed yardstick by which they measure their management of corporate water

INTRODUCTION

risk. The objective is to build an improved understanding of the relationship between firms' management of their dependencies within heterogeneous operating environments and their disclosure of this management within comparable frameworks. The sample is drawn from the 58 firms in the consumer staples sector identified by the Carbon Disclosure Project (CDP) in their second annual Water Disclosure report (CDP, 2011).

Between September 2011 and January 2012 the CSR reports, annual reports and other public filings for the previous six years were reviewed for each of the 58 firms in the sample. Only data from publicly accessible online documents was included. After an initial review of the information, a template was created in order to capture data in a systematic, rigorous and replicable manner.

The template identified each firm by its name, the website address from which data has been collected, the date of collection, and its response status to the CDP questionnaire. It recorded whether a CSR or sustainability report was available for the firm, and the latest year for which it was available. Using the Global Reporting Initiative's G3.1 guidelines (Global Reporting Initiative, 2011) the template captured, where available, structured firm-level data on water withdrawals (EN 8); regions affected by withdrawal (EN 9); the amount of water reused (EN 10); and total water discharged (EN 21). It also collected data on the type of water source, and whether a metric has been provided for water efficiency. The template also recorded the extent to which the current disclosure could be reconciled with what had been disclosed in prior years. Further, the template captured semi-structured information as disclosed by the firm, including the target(s) it had set with regard to water use; the tools that it used to measure water risk; the financial impact of mitigation or adaptation strategies; and its description of the risks and/or opportunities it faced in terms of water use. For

INTRODUCTION

the 42 companies in the sample that completed the CDP Water Disclosure questionnaire and allowed their responses to be made public, the information from their CSR reports was cross-referenced and verified, inconsistencies noted, and data in the template was augmented with supplementary disclosure in the CDP filing.

In order to generate a standardised proxy for water efficiency disclosure, each firm's reported water efficiency ratio for the previous six years was tabulated, and a definition noted of the metric used. This was most commonly reported as the number of units of water consumed per unit of product, or equivalent. For firms in the sample where six years of data was not available, data was recorded for whatever years were available. In total, at least 2 comparative data points were available for 33 firms of the 58 in the sample (57%). Using the tabulated data, the annualised growth rate (CAGR) of changes in the efficiency ratio were calculated for 1, 2, 3, 4 and 5 year periods for each firm, and recorded together with the mean. Each firm's reported water efficiency target was similarly tabulated, based on the most recent year of available disclosure. This was recorded as a single CAGR number, based on the proposed efficiency target and the number of years the company had set itself to achieve it by. For example if a firm had set a target of a 20% improvement in its efficiency ratio from current levels over the next 10 years, this would be calculated as $0.8^{(1/10)} - 1 = a 2.21\%$ annualised target improvement.

Appendix 1 of this thesis includes a copy of the template information collected for each company in the sample, along with the underlying disaggregated data.

1.4.2 Chapter 4

Empirical analysis for this chapter involved interviewing senior investors, usually Chief Investment Officers, at a sampled selection of fund management firms. The sample

INTRODUCTION

was screened to include only those fund management firms that were signatories to both the UN Principles for Responsible Investment (UNPRI), and the Carbon Disclosure Project's Water Disclosure (CDPW) report. As such, they could be considered 'exemplar' investors from the perspective of engagement with corporate water risk. At the time of analysis (June 2012) there were approximately 980 investment manager and asset owner signatories to the UNPRI worldwide, and some 470 comparable signatories to the CDPW. Asset owners were excluded on the basis that the management of these assets was often contracted out, and a further geographical screen was applied to the signatory lists. Only qualifying firms based in Australia, South Africa, the UK and the USA were approached. This filter was applied to make the administration of telephone interviews more manageable in terms of common language, volume of respondents and timeframes. The choice of countries was also deliberate to facilitate comparisons. Based on these screening criteria, a total of 60 investment managers were identified, of which 12 were based in Australia, 6 in South Africa, 24 in the UK and 18 in the USA.

Semi-structured close dialogue interviews involve an element of planned questions and an element of inductive discovery (Clark, 1998). However, from a grounded theory perspective, it was important not to describe a "pre-existing reality", but instead to continually reflect on the relationship between different sets of data and the respondents' experiences (Strauss & Corbin, 1998). Interviews were conducted between June and August 2012 via Skype during the respondents' local business hours, recorded as digital audio files, and transcribed thereafter. A series of semi-structured questions was developed for the calls. It was made clear when contacting investors that all responses would be gathered on an anonymous and non-attributable basis, and that any requests for additional confidentiality would be observed. In total,

INTRODUCTION

responses were received from 20 of the institutions contacted, and telephone interviews were completed with 12 investment managers. The response rate varied markedly by country, with Australia at 33%, South Africa at 50%, the UK at 8% and the USA at 17%. Each interview lasted an average of 19 minutes, so while the sample size is small the extent of individual engagement was meaningful. The respondents were generally highly experienced, with 75% stating they had held an equivalent position for at least ten years. They represent firms of various size, with 50% running investment teams of 5-20 professionals, 42% running teams of more than 20 professionals, and the remainder between 1-4 professionals.

The questionnaire covered six topics: perceptions towards corporate water risk disclosure; engagement with their portfolio companies; internal processes and decision making; the relevance of proximity; a self-assessment of their salience as stakeholders; and future priorities. All respondents were invited to comment on any other aspects of the topic that they wished to.

Appendix 2 of this thesis includes abridged transcriptions of conversations with these respondents along with associated categorical information

1.4.3 Chapter 5

Conceptual framing of this chapter involved disaggregating Mitchell et al.'s (1997) typology of stakeholder salience based on three attributes, and recombining it with different attributes and an alternative configuration to produce a typology of issue salience. Their original stakeholder classification is based on the following attributes: 1) the stakeholder's power to influence the firm, 2) the legitimacy of the stakeholder's relationship with the firm, and 3) the urgency of the stakeholder's claim on the firm. The typology of issue salience proposed in this thesis is based on the following

INTRODUCTION

attributes: 1) the materiality of the issue as a criterion of salience, 2) the specificity of the issue as a criterion of salience, and 3) the urgency of the issue as a criterion of salience.

In addition, I propose a methodology to qualitatively test the framework, which seeks to address the practical challenges of scale, scope and signalling. The methodology combines the presence (or absence) of the three attributes of materiality, specificity and urgency to deliver a score of an issue's salience. Each attribute has a binary classification, that is, present (1) or absent (0). The primacy of the urgency attribute is embedded within the scoring method so that the salience score is the sum of an issue's materiality and specificity, multiplied by its urgency:

$$\text{salience}_{\text{issue}} = \text{urgent}_{\text{issue}} \times (\text{material}_{\text{issue}} + \text{specific}_{\text{issue}})$$

There are eight combinations in which these three attributes can be present or absent, with possible combined scores of 0, 1 and 2.

1.4.4 Chapter 6

Conceptual framing of this chapter involved the origination of an entirely new Five Factor Framework (5FF). The framework requires that a firm meets five conditions. The first is that the firm is considering an action that has lower transaction costs when it occurs outside its own integrated structure. The second is that, in taking an action, the firm lowers the transaction costs associated with the activity, due to a comparative advantage that the firm brings to the transaction. The third is that there is, in practice, an alternative structure to the status quo, under which the firm engages in the action with another actor; on a Pareto improved basis. The fourth condition of the 5FF is that, beyond a Pareto improvement, the benefits accruing to the lower transaction cost are attributable to the respective beneficiaries. The final condition is that the beneficiaries

INTRODUCTION

of the action, beyond the transacting parties themselves, are aware that they are better off as a consequence of the transaction taking place.

1.5 Chapter introductions and objectives

Chapter 3 considers corporate water risk from the perspective of company disclosure. An empirical study, it reviews six years' disclosure for 58 companies in the global consumer staples sector. Drawing on a conceptual framework of institutional theory and resource dependence, it examines the disclosed yardsticks by which multinational companies measure their management of water risk. The first empirical study of its kind, it suggests that companies target future improvements that are generally less aspirational than their historic achievements. This appears to be a function of diminishing marginal returns on efficiency investment, exacerbated by a rational reluctance to venture beyond the 'fence line'. The evidence suggests that corporate water risk is increasingly viewed as a political rather than operational issue within the disclosure matrix. Current perceptions of best practice are entrenching a status quo that is fundamentally unfit for purpose given the scale of the challenges that need to be addressed over the rest of this decade, and beyond.

Meanwhile, Chapter 4 considers corporate water risk disclosure from the perspective of professional investors. An empirical study, it draws on findings from detailed interviews conducted with Chief Investment Officers and other senior investment professionals at fund management firms in Australia, South Africa, the UK and the USA. It establishes that investors generally regard extant corporate water risk disclosure as unfit for purpose, and explains why investors nonetheless tolerate the

INTRODUCTION

status quo. The study draws on a conceptual framework of stakeholder salience, myopia and proximity to describe a 'predictability discount' that exists in terms of investor decision making behaviour in the face of actual or perceived water risk. The extent of this discount is shaped by four temporal conditions: the near past; the distant past; the near future; and the distant future. The research also finds that investors assume companies are more cognisant of water risk than their disclosure implies.

In Chapter 5, I argue that firms are ill equipped to respond substantively to issues that are salient to their managers and stakeholders, where these issues lack an evaluation framework of materiality, specificity and urgency that is necessary for an effective response. Using corporate water risk as an exemplar issue I propose a typology to construct such a framework, based on an adaptive interpretation of Mitchell et al.'s (1997) theory of stakeholder identification and salience. The approach allows firms to make absolute and relative evaluations of issue salience, and to apply these judgments within their strategic cognition process. The chapter breaks new ground in providing a conceptual bridge between the extant literature on stakeholder salience and issue salience, while simultaneously offering a practical tool for firms to deploy.

Finally, in Chapter 6, I present a Five Factor Framework, based on an interpretation of transaction cost theory, to explain how and why firms might rationally venture "beyond the fence line", and invest in natural capital assets through hybrid governance structures. The framework is illustrated through the twinned exemplars of corporate water risk, a topic of growing salience within the literature, and the more nascent concept of corporate water return. The five factors of the framework are: action by the firm; comparative advantage associated with the action; benefits shared by stakeholders; attribution of benefits to the firm's action; and awareness by stakeholders that they have benefitted. The framework offers a practicable and

INTRODUCTION

empirically cohesive model to explore how corporate investment in natural capital might be catalysed in order to avoid, or at least mitigate, the risks associated with relative scarcity and the paucity of infrastructure, exacerbated by the challenges of demographics, economic activity and climate variability. It is relevant to firms and a broad array of their stakeholders, in particular economic policy makers, shareholders and regulators.

Secondly, in terms of the chapters' objectives, it may be useful to consider Chapters 3 and 4 as one discrete block, and Chapters 5 and 6 as another. This division is consistent with the cadence of the thesis, and also marks the change when the thesis departs from validating empirical observations with recourse to the literature, and instead builds on theory to develop new frameworks and propose new concepts. A description of the objectives of these two chapter sets follows.

1.5.1 Chapters 3 and 4

Chapters 3 and 4 set out the problem that this thesis seeks to engage with and address. The problem can be summarised in six points:

What passes for best practice in corporate water risk disclosure is a fundamentally flawed approach. Firms are setting future targets that are markedly less demanding than their historic achievements.

This does not necessarily reflect a lack of awareness or ambition amongst managers of these firms. The approach is flawed because of the inevitability of diminishing marginal returns on efficiency investments

INTRODUCTION

In terms of company practices, there appears to be considerable momentum behind the flawed approach. This is a function of both resource dependence, as companies seek to manage uncertainty; and institutional mimetic process, as second tier companies follow the practices of leading companies, on the perception that they represent best practice.

Meanwhile, institutional investment managers, who exercise a fiduciary duty of ownership of these companies, appear to recognise that current practices of disclosure are unfit for purpose.

This does not necessarily reflect a lack of professional responsibility on the part of institutional owners. Rather, it appears that owners believe that managers are more cognisant of risk than their disclosure implies.

In terms of investor practices, there appears to be little momentum to agitate for changes to the flawed approach. This is a function of myopia and path dependence, a consequence of proximity lock-in; and institutional mimetic process, as investors align themselves to the behaviours of closely-followed peers.

A critical voice might suggest that what has been set out is, essentially, an empirical validation of outcomes predicted by resource dependence and institutional theory (and indeed, that is the case). But, the critic might say, so what? Beyond validating theory, why does it matter if the status quo does exist? Change may be slow, but eventually an inflection point is likely to be reached.

Taken together, the chapters offer a broader, contextual riposte to this challenge. First, let us consider what is at stake. Without descending into hyperbole and platitudes about the innate preciousness of water as a resource, the thesis proposes as its starting point that water is a strategic asset: valuable, scarce and impossible to

INTRODUCTION

substitute. The operating challenges that companies in many sectors would face if their access to water supplies and services were curtailed is difficult to overstate. So if their disclosure of these risks (and how they are being managed) are unfit for purpose, then the potential consequences in terms of the company's long term vulnerability are similarly impossible to ignore. As a comparison: consider a company's Environmental, Social and Governance (ESG) report. If, in that report, the company was seen to misrepresent for example, its gender diversity, or the total remuneration of its most senior managers, it should indisputably feel the sanction of its owners, such as institutional fund managers, along with other stakeholders. But if it gives an unrepresentative assessment of its water risk, the consequences could potentially be much more serious to its long term prospects as a going concern. And yet, the research here suggests that investors downplay or even dismiss these considerations.

As Chapter 3 sets out the prevailing situation in terms of disclosure, so Chapter 4, which explores the four temporal conditions through which investors evaluate these consequences, provides some insight on why these circumstances prevail. In short: current disclosure is unfit for purpose, and the relational mechanisms that might be expected to address these issues, are not working. That is the problem.

1.5.2 Chapters 5 and 6

Chapters 5 and 6 set out the solution that this thesis proposes, and for which it seeks critical validation and future empirical development. The solution can be summarised in six points:

If the problem is that the format for corporate water risk disclosure is unfit for purpose, a solution would be to develop a framework by which the salience of the issue could

INTRODUCTION

be systematically presented, both within and outside the firm. The proposed typology of issue salience provided in this thesis is just such a framework.

Presenting an issue is only part of a remedial solution, however. What is also required is a methodological approach by which salient attributes can be ranked over temporal and spatial dimensions; both within a firm's strategic cognition framework, and by investors allocating priorities for their attention. The proposed methodology for evaluating issue salience provided in this thesis is just such an approach.

While the methodological approach proposed in this thesis is pioneering and therefore untested, the theoretical precedents on which it is substantiated are well developed within the academic literature, particularly within stakeholder theory, resource dependence and the resource based view. Indeed the solution builds on the same theoretical base that was empirically validated when defining the problem in prior chapters.

Secure access to water supply and services within a firm's supply chain, rather than just within its direct operations, is key to the sustainability of any solution. This thesis proposes a framework that explains how and why a firm could justify rationally venturing "beyond the fence line" to invest in natural capital assets such as public water infrastructure. It is in this contested area of managing supply chain risk that the thesis makes its most distinct and differentiated contribution to this research agenda, by developing the corporate water return concept.

As firms make investments which may have deferred or delayed payoffs (i.e. growth options), it becomes more challenging to source the financial and intellectual capital that is necessary to finance these investments. With the Five Factor Framework

INTRODUCTION

proposed in this thesis, a positive feedback loop is created between investment source and investment destination, reinforcing the framework.

While the concept of corporate water return proposed in this thesis is pioneering and therefore untested, the theoretical precedents on which it is substantiated are well developed within the academic literature, particularly within transaction cost theory, resource dependence and the resource based view. This provides a robust base for critical examination of the concept, and empirical testing of the framework.

A critical voice might suggest that the conceptual development of frameworks and methodologies are useful to a point, but any genuine solution to an applied problem must be validated in terms of practicability, and this thesis does not offer much in the way of such validation. This is a reasonable criticism, and the temptation to respond defensively by pleading limitations of scope is strong. However, the methodological approach proposed herein has been contextualised against a series of real-world corporate water risk challenges, both past and present. At the very least, this provides a point of departure for future research.

Finally, the overall value of the contribution made by this thesis is contingent on both its theoretical and research significance. It must address a genuinely unmet need, rather than being a solution that is chasing a problem. From a theoretical perspective, I would argue that by taking an evolutionary approach to the literature, this thesis helps to close a large and widening gap in which there has been a paucity of academically rigorous interrogation of the presumption of best practice by companies, within corporate water risk disclosure at the very least. And from a practical perspective, I would highlight the dramatic expansion of the green bond market (Bolger, 2014; Edwards, 2014) over the past twelve months – and certainly a considerable time after

INTRODUCTION

this research proposal was conceived – as at least circumstantial evidence of the growing importance of this research agenda. In short: the corporate water return concept contributes to a new basis of engagement between enterprise and the environment. That is the proposed solution.

1.6 Summary

This thesis has been prepared using the “published papers” format, with the substantive chapters each making up one of four scientific papers, which have been submitted for publication in peer reviewed journals. The arguments made in each paper are iterative, and contribute to the broader conception of the problems and their solutions. Each paper was formatted to meet the strict word counts of the target publications, and these formats have been maintained within the chapter structures herein.

The research is original in various aspects. Chapter 3 is the first empirical study of corporate water risk disclosure by companies. Specifically it is a unique attempt to homogenise individual company approaches by synthesising a metric through which historic improvements and target improvements can be compared over time, and across companies. Chapter 4 is the first empirical study of senior investor perceptions to corporate water risk. By targeting Chief Investment Officers rather than other investment professionals, it procures a unique perspective on the relationship between managers and owners in this context. Chapter 5 is the first attempt in the literature (to my knowledge) that develops a methodological framework of issue salience that facilitates the relative ranking and evaluation of issues within a cognitive structure of

INTRODUCTION

strategy formulation and implementation. It has been designed to enable both intra- and inter-firm analysis, as well as external stakeholder evaluation. Finally, Chapter 6 is the first time that the concept of corporate water return has been introduced to the literature within an explicit and systematic structure. It is also the first time that a self-reinforcing framework for corporate investment activity beyond the fence line has been proposed.

In addition to the original research in these chapters, the overall body of work is unique in offering an integrative conceptual narrative from problem to solution. At the time of thesis submission, the papers that comprise Chapters 3 and 4 have been accepted for inclusion in the Journal of Management and Sustainability (JMS), published by the Canadian Centre of Science and Education. JMS is an international, double-blind peer-reviewed open-access journal for academics and practitioners of sustainable management. The paper that comprises Chapter 5 has been submitted to one journal so far, where it has been peer reviewed and is awaiting an editorial decision. The paper that comprises Chapter 6 will be submitted to its first journal for review imminently.

The remainder of this thesis is set out as follows. Chapter 2 provides a survey of the literature, and develops the conceptual narrative. Chapters 3 and 4 set out the problem as described above, while Chapters 5 and 6 detailed the proposed solution. Finally, Chapter 7 concludes the thesis, integrating its components, describing its limitations and proposing areas of future research.

Chapter 2

SURVEY OF LITERATURE

Although there remains to date a relative paucity of literature specifically on corporate water risk, the concept is eminently suited to examination within the field of economic geography in general, and through the lens of corporate environmental management in particular. The four substantive chapters of this thesis are connected to each other by the conceptual framework of resource dependence theory. This framework is reinforced with institutional theory in the empirically-based chapters (3 and 4), in particular isomorphism; and with stakeholder theory in the conceptually-based chapters (5 and 6), in particular salience. Resource dependence theory, institutional theory, and stakeholder theory are combined to create a trio of integrative, explicative conceptual narratives that form the overarching structure for this thesis. However, it also draws more broadly on other themes of research in economic geography, including agency theory; proximity and myopia; strategic cognition; transaction cost theory; and real options theory. This chapter frames the literature in context, and outlines the relevance of these conceptual frameworks to the substantive chapters of this thesis.

2.1 Corporate water risk and return

While the academic literature on corporate water use itself is very limited, there is considerable empirical and conceptual research in the field of water policy and management. These are generally themed around mediating the relationship between water and humans through science, technology, governance, politics, finance or socio-cultural dimensions. Much of the policy related research implicates water in contested relationships of power and authority (Bakker, 2012), with a focus on its materiality. More generally, the use and management of the world's freshwater has become a critical focus of scholarly engagement (Barnes & Alatout, 2012). Of particular relevance to the arguments developed in this thesis are the many ontologies of water that have developed in the literature, reflecting the various dimensions of anthropological engagement with water. Indeed, several scholars have highlighted how deeply embedded water is within social, cultural, spiritual and political domains (Alley, 2002; Anand, 2011; Kaplan, 2011; Lansing, 1991).

As water is not a singular object of epistemology, scholars have focused on its multi-layered identities, depending on the associations being made (DeLanda, 2006; Deluze & Guattari, 1987; Mol, 2002). Geographers have developed theory on the linkages between water's material and symbolic dimensions in terms of hybridity and the 'hydrosocial cycle' (Budds, 2008; Linton, 2008; Swyngedouw, 2004). These linkages emphasise the politics generated by uneven patterns of access to water (Bakker, 2003; O'Reilly, Halvorson, Sultana, & Laurie, 2009; Sneddon & Fox, 2006), and indeed it is this association with politics and policy that underpins the conceptual relevance of corporate water risk.

SURVEY OF LITERATURE

Meanwhile scholarship in the field of science and technology studies has increasingly engaged with questions of water (see e.g. Alatout, 2009; Bijker, 2007; De Laet & Mol, 2000; Helmreich, 2011; S. Lee & Roth, 2001; Pritchard, 2012) and this has injected a welcome dynamism into the sometimes entrenched positions that result from debates based on policy or ethics of water use. The opportunity for innovation afforded through science and technology underpins the conceptual relevance of corporate water return.

2.2 Resource dependence theory

The literature on resource dependence theory (RDT) is at least sixty years old (e.g. Selznick, 1949; J. D. Thompson & McEwen, 1958; Zald, 1969), although modern RDT can be dated to the publication in 1978 of *The External Control of Organisations*, by Jeff Pfeffer and Gerry Salancik. Their research analysed the sources and consequences of power in inter-firm relations: where power and dependence came from, and how managers used power to manage a firm's dependencies (Pfeffer & Salancik, 1978). At the core of their work are three ideas. First, social context matters. Second, firms have strategies to enhance their autonomy and pursue interests. Third, power is important for understanding internal and external actions of firms. It is this emphasis on power – in terms of control over vital resources – that is fundamental to RDT (Barney, 1991; Ulrich & Barney, 1984); as a strategy, firms seek to reduce others' power over them, while often attempting to increase their power over others (Hillman, Withers, & Collins, 2009). Pfeffer (1987, pp. 26–7) presents the resource dependence perspective thus:

SURVEY OF LITERATURE

1) the fundamental units for understanding inter-corporate relations and society are organizations; 2) these organizations are not autonomous, but rather are constrained by a network of interdependencies with other organizations; 3) interdependence, when coupled with uncertainty about what the actions will be of those with which the organization is interdependent, leads to a situation in which survival and continued success are uncertain; therefore 4) organizations take actions to manage external interdependencies, although such actions are inevitably never completely successful and produce new patterns of dependence and interdependence; and 5) these patterns of dependence produce inter-organisational as well as intra-organisational power, where such power has some effect on organizational behaviour.

In *The External Control of Organisations*, Pfeffer and Salancik set out five actions that firms can take to minimise their environmental dependencies. There are a) mergers or vertical integration; b) joint ventures or other inter-organisational relationships; c) boards of directors; d) political action; and e) executive succession. As each of these have either a direct or peripheral significance to subsequent chapters of this thesis, they merit a brief discussion here.

Before that, however, it is necessary to introduce a complementary theory to RDT, which is the resource-based view (Wernerfelt, 1984). This proposes that some factors of production may be inelastic in supply (Barney, 1991; Dierickx & Cool, 1989), and firms which possess these resources are able to generate 'super-normal profits' in the short term, and potentially even in the long term. In other words, supply inelasticity can become a source of sustained competitive advantage (Peteraf, 1993). For a firm resource to have the potential of sustained competitive advantage, it must possess four attributes (Barney, 1991). First, it must be valuable, in that it exploits opportunities and/ or neutralises threats in a firm's environment. Second, that it must be rare (or scarce) among a firm's current and potential competition. Third, it must be imperfectly

SURVEY OF LITERATURE

imitable. Fourth, there cannot be strategically equivalent substitutes that are valuable, but neither rare nor imperfectly imitable.

This thesis proposes that, consistent with the resource based view, water can be regarded as a strategic factor of production. It is a resource that can provide firms with sustainable competitive advantage, based on its qualification against the four criteria above. As a factor of production, water is valuable, scarce, imperfectly imitable, and without substitute. This thesis also proposes that, as a strategic asset, water gives rise to organisational interdependencies which firms will seek to mitigate through the five actions that they can take, consistent with resource dependence theory.

The first of these is mergers or vertical integration, where RDT offers an externally focused perspective on why firms acquire others (Haleblian, Devers, McNamara, Carpenter, & Davison, 2009), based on reducing the competitive threat; managing interdependence on suppliers or buyers; or diversification. This is consistent with empirical research (e.g. Burt, 1980; Walter & Barney, 1990) although other contextual considerations also matter: environmental interdependency is a significant predictor of integration, but is not the only predictor (Finkelstein, 1997; Heeley, King, & Covin, 2006; Hitt & Tyler, 1991; Palmer & Barber, 2001). While RDT has been critiqued for its failure to distinguish between power imbalance and mutual dependence (e.g. Casciaro & Piskorski, 2005), there is strong support that mergers occur between firms that depend on one another, as a mechanism to reduce dependence. This idea is explored further in Chapter 6, with reference to hierarchical structures and transaction cost theory (Yin & Shanley, 2008).

The second action of RDT that firms can take to reduce interdependence is also closely associated with transaction cost theory. Joint ventures (JVs) and other inter-

SURVEY OF LITERATURE

organisational relationships such as strategic alliances, R&D agreements, research consortia, joint-marketing agreements and buyer-supplier relationships (Barringer & Harrison, 2000; Oliver, 1990) have been explored to understand how their formation helps firms reduce uncertainty (Auster, 1994; Harrigan & Newman, 1990; Pfeffer & Salancik, 1978). Empirical evidence generally supports research predictions (Elg, 2000; Goes & Park, 1997; Stearns, Hoffman, & Heide, 1987) although RDT is often augmented with other perspectives such as network theory (Gulati, 1995), game theory (Saxton, 1997), agency theory (Kumar & Seth, 1998) and transaction cost theory (Steensma, Marino, Weaver, & Dickson, 2000) in order to consider the dynamic nature of dependency and power, as well as the multiplicity of interdependency (Hillman et al., 2009). Chapter 6 explores this dynamic in greater detail, from the perspective of the hybrid structures described by transaction cost theory.

The third action – on boards of directors – is more commonly applied to agency theory (D. R. Dalton, Hitt, Certo, & Dalton, 2007; Johnson, Daily, & Ellstrand, 1996; Zahra & Pearce, 1989), although the empirical research suggests that RDT is a more consistent framework for understanding boards. Empirical studies have correlated board size to environmental complexity (e.g. Sanders & Carpenter, 1998), as well as board size and firm performance (for a meta-analysis see D. Dalton, Daily, Johnson, & Ellstrand, 1999), although various researchers have also proposed that it is not just board size that matters, but board composition. According to Pfeffer and Salancik (1978), directors bring four benefits to firms: advice and counsel; access to information; access to resources; and legitimacy. More recent research has focused on the dynamic nature of boards, and has included creating a taxonomy of RDT benefits that directors provide (Hillman, Cannella, & Paetzold, 2000). Chapter 4 makes an empirical contribution to this area in terms of investor perceptions, and considers

SURVEY OF LITERATURE

the role that investors perceive that boards of directors can offer in helping firms manage changes in operational uncertainty.

The fourth is political action, where a firm “through political mechanisms, attempts to create for itself an environment that is better for its interest” (Pfeffer & Salancik, 1978, pp. 189–90). Empirical study points to connections between firm dependency on regulatory agency and propensity to political action (Meznar & Nigh, 1995), while research on the heterogeneity of dependence (e.g. Lester, Hillman, Zardkoohi, & Cannella, 2008) has explored some of the various forms of dependency management that firms can apply. The literature can be summarised thus (Hillman et al., 2009): i) political action by a firm is correlated to the degree of environmental dependency that it faces, ii) firms within the same environment are likely to use similar forms of environmental behaviour to manage it, and iii) performance benefits accrue to those firms that create linkages with the political environment. The following chapter of this thesis (Chapter 3) offers empirical insight into these relationships, from the perspective of corporate disclosure of water risk.

The fifth action presents executive succession as a strategic response to environmental contingencies. That is, poor firm performance may be a consequence of organisational behaviour being inconsistent with the firm’s requirements in response to environmental dependency. Indeed there is a great deal of empirical research that points to a relationship between poor firm performance and executive succession (e.g. Arthaud-Day, Certo, Dalton, & Dalton, 2006; Zhang, 2006), although for change to take place the interest in initiating change must be greater than the power of the incumbent to prevent replacement. RDT’s application to external succession can be summarised by the general support in the empirical literature for Pfeffer and Salancik’s (1978) assertions that: i) intra-organisational power is affected by external

SURVEY OF LITERATURE

dependencies, and ii) executive succession can reduce environmental dependency. This theme forms part of the narrative in Chapter 5 in terms of the strategic cognition processes that shapes how top management 'give sense' to issues (D. Gioia, Thomas, Clarke, & Chittipeddi, 1994).

In summary, resource dependence theory is an integrative conceptual framework for the following four substantive chapters of this thesis. In Chapter 3, corporate disclosure of water risk for 58 companies in the global consumer staples sector is examined empirically. The outputs suggest that these firms respond to their environmental dependencies in similar ways, consistent with political action responses predicted by RDT. In Chapter 4, firms' corporate water risk disclosure is empirically considered from the perspective of professional investors. It finds that investors' tolerance of the status quo is consistent with their expectations of boards of directors in responding to changes in dependency or uncertainty, as predicted by RDT. In Chapter 5, a methodology for evaluating the salience of issues to managers is proposed: the extent of its efficacy is consequential, i.e. do responses shape the firm's performance, and is that associated with tenure and succession of senior management. And in Chapter 6, a five factor framework is proposed to explain how and why firms may engage in transactions via hierarchical (e.g. M&A) or hybrid (e.g. JV) structures.

In each of these chapters, corporate water use features either as the base of the empirical analysis, or as an example of how the methodology and framework proposed could be applied in practice. Corporate water use has been granted its role as an 'exemplar' across the thesis because it has been proposed a strategic factor of production as per the resource based view: valuable, scarce, imperfectly imitable, and without substitute. The resource based view has been closely integrated within the

SURVEY OF LITERATURE

perspective of RDT used herein: dependencies and uncertainties associated with corporate water use represent a risk to firms; but the sustainable comparative advantage associated with access to water supply and services represents opportunity, or returns, to firms.

Even the most ardent advocates of RDT as a conceptual framework accept that in none of the five areas identified by Pfeffer and Salancik (1978) is the theory sufficiently explicative to comprehensively examine interdependency and uncertainty for firms. In addition to the resource based view (Barney, 1991), where the complementarity is self-evident, RDT has been productively integrated with other theoretical perspectives including agency theory (D. R. Dalton et al., 2007), institutional theory (DiMaggio & Powell, 1983; Oliver, 1990), stakeholder theory (Mitchell, Agle, & Wood, 1997), transaction cost theory (Yin & Shanley, 2008), and real options theory (Bowman & Hurry, 1993; McGrath, Ferrier, & Mendelow, 2004). An integrative approach is also applied in this thesis, with the juxtaposition of RDT with complementary approaches in each substantive chapter. Following an outline of these approaches, below, their relevance to each chapter will be summarised.

2.3 Agency theory and information asymmetry

The central tenet of agency theory is that “there is potential for mischief when the interests of owners and those of managers diverge” (D. R. Dalton et al., 2007, p. 2). As a theory it predates all of the others in this review, and, at least since the publication of *The Modern Corporation and Private Property* (Berle & Means, 1932) it has been the dominant perspective of firm governance. It is not the objective here to provide any

SURVEY OF LITERATURE

detailed overview of agency theory, or to critically examine the approaches that have been variously proposed to mitigate the fundamental agency problem. Instead, it is to consider the relevance of these approaches – in conjunction with RDT – to the arguments set out in the forthcoming chapters, and to the overarching structure of the thesis.

Dalton et al. (2007) set out the three principal approaches developed to minimise the agency problem. These are, firstly, the “independence” approach, where boards of directors monitor managers to ensure their interests do not diverge from those of owners (Fama & Jensen, 1983; Fama, 1980; Jensen & Meckling, 1976). Secondly the “equity” approach, where managers with equity in the firm are deemed more to have aligned interests with other owners (Jensen & Meckling, 1976). Thirdly the “market for corporate control”, where self-serving managers subject the firm to acquisition by other firms (Fama & Jensen, 1983). The relationship between a firm’s owners and managers is most directly explored in the two empirical chapters.

As previously noted, Board independence is also associated with RDT. Agency theory literature suggests that, in practice, boards are unlikely to be independent where directors report directly to senior management, and/or where their positions or remuneration are influenced by senior management (Baysinger & Hoskisson, 1990). However, from a resource dependence perspective, boards can function to reduce uncertainty on much the same grounds, by providing advice, information, resources, and legitimacy. The implication of these theories on firm performance are – if not quite diametrically opposed – certainly not complementary. The scope of opacity and confusion is reflected in the empirical studies of Chapters 3 and 4, and provide theoretical foundation to the proposition that current approaches by managers to

SURVEY OF LITERATURE

corporate water risk disclosure are unfit for purpose; and that owners are prepared, for now, to tolerate the status quo.

The equity approach to managing the agency problem is not a substantive part of this thesis, and does not, for example, feature amongst investor responses in the analysis summarised in Chapter 4. The efficacy of the approach is in any event fairly widely contested within the empirical literature (e.g. Bainbridge, 2013).

The market for corporate control can be described as governance of the last resort, and is typically criticised as a “blunt instrument” (Hawley & Williams, 2000) by which to mitigate the agency problem. Its popularity as a theory appears to be cyclical, determined by prevailing mergers and acquisitions (M&A) activity, which waned in the years following the global financial crisis of 2008, but has once again gained momentum. The approach is appealing for the conceptual chapters in this thesis, as it provides a narrative of consequence for strategic cognition and firm responsiveness (Chapter 5); and is a driver of both risk and opportunity motivations in the five factor framework (Chapter 6).

2.4 Institutional theory and mimetic process

In common with RDT, institutional theory is an integrative framework, and it provides a theoretical underpinning to the empirical observations of the following two chapters. Indeed it is relevant to both the conceptual chapters that follow thereafter, for example in terms of understanding why responses to salient issues may be symbolic rather than substantive; and in terms of understanding the conditions necessary for the success of initiatives within hybrid structures. The objective here is not to provide an

SURVEY OF LITERATURE

extensive review of the institutional theory literature, but rather to highlight key points of both commonality and difference with both RDT, and the resource based view. Thereafter, a summary is provided on how the theory is relevant to the findings of the substantive chapters that follow.

The complementarity between institutional theory and RDT has been extensively explored in the literature (for a review see Oliver, 1991). In both perspectives, organisational choice is seen to be limited by a variety of external pressures, environments are collective and interconnected, and organisations must be responsive to external demands and expectations in order to survive. However, while RDT emphasises the interdependence of various actors, institutional theory focuses more on the constraints of regulatory structures, such as governmental agencies, laws, courts and professions (W Richard Scott, 1987). Institutional theorists emphasise the survival value of conformity with the institutional environment and external norms (DiMaggio & Powell, 1983; Meyer & Rowan, 1977) whereas resource dependence theorists stress the importance of adapting to environmental uncertainty and firm interdependence (Pfeffer & Salancik, 1978). RDT also focuses on active choice behaviours by firms; while institutional theory emphasises structures of conformity, explaining non-choice behaviours as a function of externally validated norms. That is, “institutional and resource dependence theorists have attributed different degrees of resistance, activeness, and self-interested awareness to the behaviour of organisations responding to external constraints and demands” (Oliver, 1991, p. 149).

Institutional theory emphasises the importance of interrelated processes at manager, firm and industry levels of analysis. At the manager level, habit and unconscious conformity to tradition accounts for institutionalised activity. At the firm level,

SURVEY OF LITERATURE

institutional process is embedded through corporate culture, shared belief systems and political processes. At the industry level, pressures from government, industry alliances and societal expectations define socially acceptable firm conduct; and pressures that are common to all firms within an industry result in those firms exhibiting similar structures and activities (DiMaggio & Powell, 1983).

The basic premise of institutional theory can be summarised as firms' tendencies towards conformity, which leads to *homogeneity* amongst firms in their structures and activities: with firms that are perceived to be successful being those that gain support and legitimacy by conforming to social pressures. This can be contrasted with the resource based view, which is that resources that are valuable, scarce, imperfectly imitable, and without substitute leads to *heterogeneity* amongst firms in their responses to acquire and maintain resources that can deliver sustainable comparative advantage.

The implications of institutional theory for a resource based view of the firm can be summarised as follows (Oliver, 1997). First, firms can make inappropriate resource decisions based on their embedded corporate culture and belief systems. Second, sunk costs may be cognitive – reflecting conformity to tradition, for example – rather than economic, also leading to suboptimal resource choices. Third, a precondition for successful investments to reduce resource dependence may be cultural support. Fourth, firms may be unwilling – rather than unable – to acquire resources that reduce dependence, because their acquisition may lack legitimacy or social approval. Finally, social influences exerted on firms are homogenising, and reduce their capacity for heterogeneous action to reduce uncertainty.

SURVEY OF LITERATURE

This thesis proposes that the juxtaposition of institutional theory with resource dependence has an influence on the behaviours, beliefs and actions of managers, firms and industries. Where RDT would anticipate responses that reduce uncertainty and dependence, in reality these actions are mitigated, controlled and (it is argued) compromised by institutional structures that impose pressures to conform.

To provide empirical substance to this proposition, the resource based view of the firm has been applied, using corporate water use as an exemplar factor of production that can offer sustainable comparative advantage. In Chapter 3, the analysis contrasts firms' desires to reduce uncertainty and supply chain dependence with normative pressures on managers, firms and industries to be 'good corporate citizens' and to use water in a way that is consistent with their social responsibilities. This duality of pressure is manifest in corporate disclosure of water risk, where the disclosure by firms of action to reduce uncertainty may only be a subset of the actual measures being taken, as managers treat disclosure as a political mechanism; one of RDT's five responsive actions. The divergence between *de jure* disclosed responses to dependence (such as setting targets for water efficiency) and the *de facto* actions that managers actually take to reduce dependence (that may lack social approval, given for example perceptions of water as a human right), give rise to obvious concerns over agency. Inasmuch as some firms may be making more optimal resource choices than others – leading to sustainable comparative advantage – a disclosure framework which does not facilitate this distinction becomes unfit for purpose.

Chapter 3 argues that the normative pressures that firms face, which result in poorly structured disclosure frameworks and inappropriate targets, are likely be reinforced by mimetic process, as firms copy those that are perceived to be most successful. It might

SURVEY OF LITERATURE

be expected that, as the problem of agency grows, owners put pressure on managers to improve the quality of their disclosure.

Chapter 4 approaches this issue empirically, and finds that the institutional pressures on firms and industries that were identified in the preceding chapter for consumer staples companies also appear to be manifest for fund managers and investment management firms, who have institutionalised fiduciary responsibilities of ownership. However, various other intensifying and attenuating forces are also at work within these relationships, including issues of proximity and myopia. These are outlined in a subsequent section; first, it is instructive to consider the contribution that stakeholder theory makes to the research.

2.5 Stakeholder theory and salience

Along with resource dependence theory and institutional theory, stakeholder theory completes the trio of integrative, explicative conceptual narratives that form the overarching structure for this thesis.

Given what is today one of the dominant approaches for analysing the normative obligations of those engaged in business (Hasnas, 2013), there is a remarkable lack of consensus as to what stakeholder theory is, or isn't. R. Edward Freeman (1984) has provided one of the most widely cited definitions in the literature, proposing that a stakeholder is "any group or individual who can affect or is affected by the achievement of the organisation's objectives" (R E Freeman, 1984, p. 46) although many scholars have since sought to challenge the value and validity of a definition so broad that it would be "bewilderingly complex" (Mitchell et al., 1997, p. 857) for managers to apply.

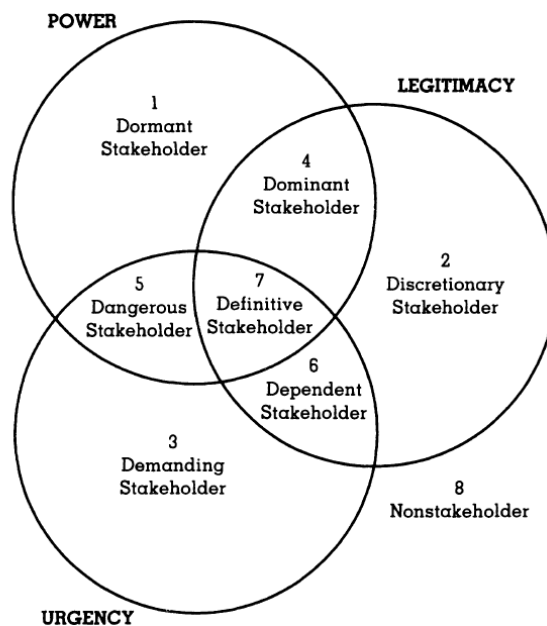
SURVEY OF LITERATURE

Narrower definitions have abounded, including Clarkson's proposal that stakeholders are voluntary or involuntary risk-bearers: "without the element of risk, there is no stake" (Clarkson, 1994, p. 5). Other definitions place stakeholders in the context of a firm's survival (e.g. Bowie, 1988), or in terms of their contractual or exchange relationships with the firm (Cornell & Shapiro, 1987; Hill & Jones, 1992; J. K. Thompson, Wartick, & Smith, 1991). This thesis does not set out to challenge extant definitions of stakeholder theory; rather, it takes a generic position that stakeholder theory concerns the nature of the relationships between organisations and their respective stakeholders, and the processes and outcomes of these relationships for organisations and their stakeholders (T M Jones & Wicks, 1999).

In their 1997 paper Mitchell, Agle and Wood ('MAW'), contribute to a theory of stakeholder identification and salience that eschews definitions based on 'narrow' and 'broad' categorisation. Instead, they classify stakeholders on the basis of their possession of one or more of the following attributes: 1) the stakeholder's power to influence the firm, 2) the legitimacy of the stakeholder's relationship with the firm, and 3) the urgency of the stakeholder's claim on the firm. The theory produces a typology (Figure 2) that normatively defines stakeholders as those to whom managers should pay attention; and dynamically identifies the combination of specific circumstances and managerial behaviour that establishes the salience of that stakeholder. MAW's typological framework relies on a dynamic relationship between stakeholders and a firm's managers which they summarise thus: 1) Stakeholder attributes are variable, not steady state. 2) Stakeholder attributes are socially constructed, not objective, reality. 3) Consciousness and wilful exercise may or may not be present.

SURVEY OF LITERATURE

Figure 1: MAW Stakeholder Typology. One, Two, or Three Attributes Present



Source: (Mitchell et al., 1997)

MAW propose that stakeholder salience will be positively related to the cumulative number of stakeholder attributes – power, legitimacy, and urgency – that are perceived by managers to be present. Where the perception is that just one attribute is present, salience will be low. Where two are perceived to be present, salience will be moderate. Where it is all three, salience will be high. The typology classifies stakeholders on this basis, with eight categories of stakeholder (including non-stakeholder) identified.

MAW's theory has since received empirical support from various researchers (e.g. Agle, Mitchell, & Sonnenfeld, 1999; Eesley & Lenox, 2006; Knox & Gruar, 2007; Magness, 2008; Parent & Deephouse, 2007), several of whom have sought to refine the approach, although it has been suggested (B. A. Neville, Bell, & Whitwell, 2011) that overall, development has been relatively limited. There are four aspects of MAW's stakeholder typology that make it particularly appealing as a conceptual framework to

SURVEY OF LITERATURE

anchor interviews with investors, which is the empirical basis of Chapter 4. They are: i) distinct attributes that accommodate a shareholder-centric approach, ii) the absence of an explicit 'normative core' in defining stakeholder legitimacy, iii) the impermanence of relationships between variables, and iv) attributes that allow for intra-stakeholder heterogeneity.

Distinct attributes. This paper is principally interested in the shareholder-firm relationship, albeit within a broader stakeholder context. While it has been proposed that having more than three attributes would enhance the theory (Driscoll & Starik, 2004), the typology captures the nature and dynamics of the relationship between shareholders and managers effectively and parsimoniously.

No normative core. While many scholars emphasise ethical or moral dimensions to stakeholder theory (T M Jones & Wicks, 1999; e.g. Phillips, Freeman, & Wicks, 2003), MAW do not offer a normative core in their typology, merely acknowledging its significance (Magness, 2008). While some see this as a limitation in their approach, it supports structural simplicity and cohesion within the conceptual framework.

Impermanence of relationships. At the heart of MAW's typology are the dynamics within and between the three attributes. Power, legitimacy and urgency can all be lost as well as acquired. Relative shifts in salience have been variously explored in the literature (Jawahar & McLaughlin, 2001; e.g. T M Jones, Felps, & Bigley, 2007; Pfarrer, Decelles, Smith, & Taylor, 2008): moreover the intrinsic impermanence of the status quo is recognisable within 'real world' scenarios and is a feature of the empirical data in this thesis.

SURVEY OF LITERATURE

Stakeholder heterogeneity. The typology accommodates the simplification of shareholders as a discrete and wholly fungible stakeholder class. For example, this paper assumes no distinction between different shareholders' time horizons, fiduciary responsibilities, investment objectives and so forth.

In summary, stakeholder theory is a helpful if malleable construct for providing context to engagement between shareholders and firms. As an essentially contested concept, its interpretation is subjective, and this thesis accepts the limitations of exclusively applying stakeholder theory to validate its empirical observation, when the appropriateness of its application lacks consensus within the academic literature.

That said, the MAW approach offers fertile ground for developing conceptual typologies that evaluate salience, and Chapter 5 pays the regard that is due to the work of Mitchell and his colleagues. In particular, it is the clear and parsimonious approach that they apply in order to demonstrate the structural interconnectedness of attributes which provides inspiration.

2.6 Proximity and myopia

Institutional theory demonstrates how non-choice behaviours can occur within firms, even where it does not appear to serve the owners' interests (Tolbert & Zucker, 1983; Zucker, 1983). This may reflect a contextual dominance of state, societal or professional pressures over market forces and resource scarcity on firm behaviour. However, institutional theory is focused on structural conformity and isomorphism, and tends to ignore the role of active agency; that is, the capacity for resistance,

SURVEY OF LITERATURE

awareness, proactivity, influence and self-interest, within and amongst firms (Covaleski & Dirsmith, 1988).

This thesis peripherally explores this capacity to act via an empirical analysis of investor perceptions towards corporate water risk. Corporate water risk disclosure is identified as unfit for purpose in Chapter 3; Chapter 4 seeks to reconcile why investors tolerate the status quo. It draws on the functions of proximity and myopia in shaping investor behaviour. The relevant literature on myopia is summarised in Chapter 4, and draws on research by various scholars (e.g. Clark, 2011; Guttentag & Herring, 1986; Tversky & Kahneman, 1973) who conceptualise the predictability of individual behaviour in response to probabilistic events. In the interest of brevity and to avoid duplication, this section focuses on proximity, and expands upon some of the theoretical implications that follow from the empirical analysis in Chapter 4.

Much of the literature on proximity and competitive advantage in financial geography points to a positive network effect, for example in terms of local bias in investment portfolios (Coval & Moskowitz, 1999; Hau, 2001; Wojcik, 2009), irrespective of the local preference effect (Hong, Kubik, & Stein, 2005). However, the negative network effects of proximity are less well studied (Boschma, 2005). And while it has been recognised that other dimensions of proximity beyond geography (Gilly & Torre, 2000) can contribute to competitive advantage by facilitating learning and innovation (Bunnell & Coe, 2001; Gertler, 2003), the literature (beyond e.g. Boschma, 2005; Knoben & Oerlemans, 2006) is light on the relationships between these proximities.

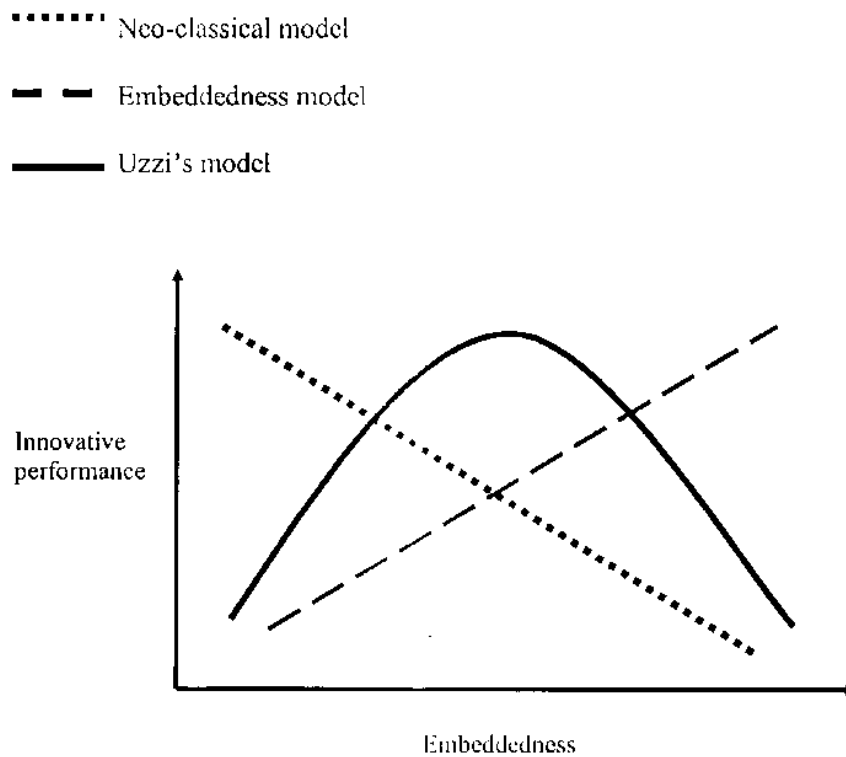
This thesis makes an empirical contribution to the outputs theorised by Boschma (2005), Knoben & Oerlemans (2006), and others. Chapter 4 considers the multiple dimensions of proximity in terms of four discrete relationship sets. First, the

SURVEY OF LITERATURE

relationship between interviewees and investee firms. Second, the relationship between interviewees and the investment firm they work for (typically where s/he is the most senior employee). Third, the relationship between interviewees and other geographically proximate investment firms. Fourth, the relationship between the interviewees and other non-geographically proximate investment firms.

To gain a suitable contextual perspective on how and why institutional investors engage with investee companies and other investment firms, a perusal of the extant scholarship is merited (see e.g. Clark, Hebb, & Wójcik, 2007; Clark & Hebb, 2005; Clark, 2000a; Hebb & Wójcik, 2005). However, in focusing specifically on the boundaries of proximity, the literature proposes (Boschma, Lambooy, & Schutjens, 2002; from Uzzi, 1997) that an inverted 'U' relationship exists (see Figure 2) between embeddedness (taken here to mean high cognitive, social and institutional proximity) and innovative performance (taken here to mean investor engagement with corporate water risk). Boschma (2005) argues that proximity has a positive influence on engagement up to a certain threshold (contrary to neo-classical thinking, which emphasises the risk of lock-in and inertia), after which these positive effects can turn negative when the embedded relationships become too closely tied.

Figure 2: Relationship Between Embeddedness and Performance



Source: (Boschma et al., 2002)

2.7 Strategic cognition, implementation and outcomes

The term 'strategic cognition' (SC) is relatively new to the academic literature. It focuses on the "linkages between 'cognitive structures' and decision processes in strategic management with respect to strategy formulation and implementation" (Porac & Thomas, 2002, p. 165). Cognitive structures include senior management's beliefs about environment, strategy, business portfolio, and the state of the organisation (Porac & Thomas, 2002). So whereas institutional theorists emphasise the value of conformity (DiMaggio & Powell, 1983; Meyer & Rowan, 1977), and

SURVEY OF LITERATURE

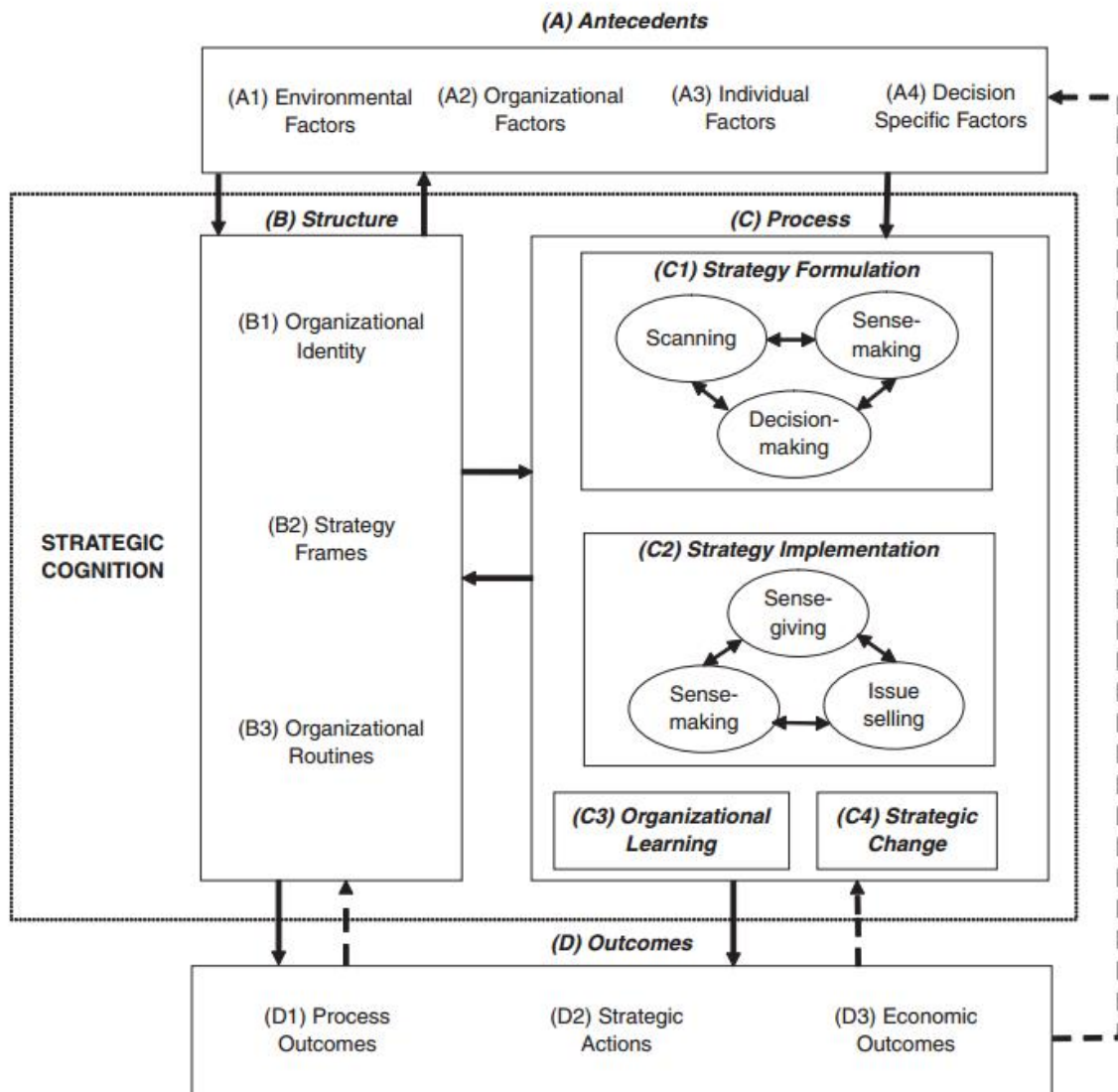
resource dependence theorists stress the importance of adapting to uncertainty and interdependence (Pfeffer & Salancik, 1978), strategic cognition can be seen as a bridge between both approaches. It highlights how cognitive structures and processes develop within firms (consistent with institutional theory), how these processes generate business definitions and corporate and business strategy, and how these strategies result in adaptation and action (consistent with resource dependence theory).

In common with institutional theory and resource dependence theory, strategic cognition can be applied at manager, firm and industry levels of analysis. At the manager level, SC attention has generally been focused exclusively on the CEO, in trying to explain how that individual's cognitive structures and processes, when applied to a firm's specific context, influence strategic choices. Attempts to extend SC theory to wider groups of senior management have been problematic, with issues of aggregation suggesting that contextual factors and social influence processes (Chattopadhyay, Glick, Miller, & Huber, 1999) are also needed to explain thought processes at the team level. At the firm level SC has been used to explain firm performance (Nadkarni & Narayanan, 2007), although the size and power of the firm versus CEO create boundary conditions for this analysis.

SC research is embedded within a fairly narrow area of managerial and firm cognition, but by focusing on the structures that enable sense-making and interpretation SC can contribute to understanding "the reciprocal interaction of information seeking, meaning ascription, and action" (Thomas, Clarke, & Gioia, 1993, p. 240). From Narayanan et al. (2010), Figure 3 provides a categorical definition of the three factors relevant to SC research: antecedents, strategic cognition, and outcomes:

SURVEY OF LITERATURE

Figure 3: Strategic Cognition – An Integrative Framework



Source: (Narayanan et al., 2010, p. 310)

Of interest in this thesis is the strategy frames element of SC structure; the strategy implementation element of SC process; and the three outcomes. Strategy frames (Huff, 2006) refers to the knowledge structure that informs strategic decisions, a cognitive template that individuals impose on the information environment to give it

SURVEY OF LITERATURE

form and meaning (Nisbett & Ross, 1980; Walsh, 1995), providing filters for managers to pay attention to. In Chapter 5 a conceptual framework to evaluate issue salience is proposed, and it requires the scope for managers to identify issues that potentially cannot be left within the conformist response boundaries of their institutionalised environment, but may instead require an active, adaptive response in order to mitigate uncertainty, manage interdependence, and contribute to firm performance.

Strategy implementation refers to an ongoing cycle of sense-giving by top managers (D. A. Gioia & Chittipeddi, 1991; D. Gioia et al., 1994); sense-making by middle and lower managers; and issue selling by lower managers (Dutton, Ashford, O'Neill, & Lawrence, 2001). It requires the architecture and deployment of labels (e.g. Jackson & Dutton, 1988), which are analogous to the issue attributes developed in the methodological framework, introduced in Chapter 5. Issue selling is the process by which individuals affect others' attention to and understanding of the events, trends and developments that carry implications for firm performance (Ansoff, 1980; Dutton & Ashford, 1993). In a sense it is where the 'rubber hits the road' as strategy drives changes in execution. This layering is helpful and important for the conceptual chapters of this thesis, as it provides a roadmap to where, how, and why the theoretical frameworks that have been developed herein could be applied within a practical real-world context. As the value of this thesis as a cohesive whole is to some degree a function of its practicability in implementation, the SC literature provides an important connection between thought and deed.

Finally, SC incorporates three types of outcomes. Process outcomes concern the quality, speed and risk characteristics of a decision. Strategic actions concern internally and externally oriented actions, such as resource allocation, competitive moves, and timings of action, or delays in action. Economic outcomes might include

SURVEY OF LITERATURE

changes in stock market valuation, revenues, profit margins, cash flows and so on (Narayanan et al., 2010). These outcomes are embedded in the propositions that make up the framework for issue salience in Chapter 5, and are closely integrated with Mitchell et al.'s typological framework of stakeholder salience. In turn, stakeholder theory is one of the three components that comprise the overarching explicative narrative of this thesis.

Despite its acknowledged limitations in terms of narrowness of scope, the strategic cognition literature is valued and valuable to this thesis for its process approach that incorporates antecedents such as firm profile or industry structure, through to final consequence. It is part of the mortar that binds the conceptual narrative of the different frameworks applied, and it creates the licence to explore practical applications and consequences that follow from the empirical and conceptual contribution that this thesis makes.

2.8 Transaction cost theory and hybrid structures

Transaction cost theory (TCT) proposes that transactions across workgroups can be organised into one of three structural alternatives: markets, hybrids, or hierarchies; which managers should select from in order to minimise transaction costs that arise due to imperfect information. Chapter 6 presents a five factor framework to explain how and why firms might rationally venture “beyond the fence line”, and invest in natural capital assets through hybrid governance structures.

The literature incorporates a wide spectrum of structures that exist between market and hierarchy that are variously described as hybrid (Hennart, 1993; Hodgson, 2002;

SURVEY OF LITERATURE

Makadok & Coff, 2009; Ménard, 2004; Williamson, 1991), plural (Bradach & Eccles, 1989; Cannon, Achrol, & Gundlach, 2000), intermediate (Kasch & Dowling, 2008) or non-standard (Helper, MacDuffie, & Sabel, 2000) forms of governance. Moreover there is a broad range of views as to how these structures are conceptualised and measured (e.g. Bruce & Jordan, 2007; Ménard, 2004). However, for the purpose of this thesis, all governance structures that are neither markets nor hierarchies are deemed to be hybrid structures, as this is the most widely applied notion.

Hybrids are intermediate forms of governance that realise a mix of market and hierarchical mechanisms (Makadok & Coff, 2009) with respect to incentives, adaptability and bureaucratic costs. As Williamson (1991, p. 283) says, “As compared with the market, the hybrid sacrifices incentives in favour of superior coordination among the parts. As compared with the hierarchy, the hybrid sacrifices cooperativeness in favour of greater incentive intensity.”

Of the various theories that have been applied to explain why hybrids exist (Jolink & Niesten, 2012; Parmigiani & Rivera-Santos, 2011), two perspectives dominate the literature: institutional economics and dependence. The first perspective of institutional economics explains hybrids in terms of cost efficiency considerations, such as making investments more efficient by reducing transaction costs arising from e.g. incomplete contracting; and by reducing transaction costs arising from appropriation risk, uncertainty, and/or coordination problems, due e.g. to misaligned incentives (Gibbons, 2005).

The second perspective traces hybrid structures back to the dependence of firms on a broader social structure. It is via this avenue that the TCT literature in general, and around hybrids in particular, is integrated within the trio of explicative conceptual

SURVEY OF LITERATURE

narratives that bind the components of this thesis; in particular RDT and institutional theory. In terms of RDT, it has already been shown that joint ventures – a hybrid archetype – are a form of action that firms take to reduce uncertainty and interdependence. Institutional theorists, meanwhile, submit that hybrid governance structures can be a response to coercive, normative or mimetic forces that drive firms to comply with norms that are established, legitimate or taken for granted within a particular domain. The literature on hybrids moreover abuts the proximity literature via social network theory and embeddedness (see e.g. Uzzi, 1997): although outside the scope of this thesis, these connections present an interesting area for further research.

In juxtaposing the TCT literature within the broader framework of reference, the five factor framework that is proposed in Chapter 6 is – it is hoped – relatively seamlessly integrated into the narrative of the preceding substantive chapters, and indeed this literature review. This is an important association for three reasons. First, as a conceptual chapter which builds on earlier empirical outputs for its foundation, its embeddedness is essentially *sine qua non* to its integrity. Second, as the chapter which introduces corporate water return – a hitherto undeveloped concept across the related academic and applied literature – it is important that it has strong structural support if the concept is to stand up to wider scrutiny within and beyond academia. Third, inasmuch as it is a precondition that any successful thesis delivers original insight that is synthetic and interdisciplinary, a seamless integration of components and ideas is as necessary as it is satisfying.

2.9 Real options theory and uncertainty

Four different concepts can be identified within the real options literature (McGrath et al., 2004). First, the idea of option value as a component of the total value of the firm, where it represents growth opportunities. Second, a specific investment proposal with option-like properties. Third, choices that might pertain to one or more proposals. Fourth, the use of options reasoning as a heuristic for strategy.

Option value as a component of firm value derives from the field of finance, where a firm's market value comprises the present value of future cash flows earned on current assets; plus the present value of growth opportunities (Miller & Modigliani, 1961). Myers & Turnbull (1977) proposed the existence of real options by suggesting that the value of growth opportunities represented intangible assets, or "options to purchase additional units of productive capacity in future periods" (Myers & Turnbull, 1977, pp. 331–2).

The definition of real option as a specific investment is widely used in the management literature, where option value is related to the preservation of choice. That is, firms can take a variety of actions (such as scale up or down, abandon, change direction or delay) when uncertainty is lower, rather than make a total commitment at the outset of a project. This can be applied to actions including capacity investment, joint ventures (Kogut, 1991), R&D investments, venture capital investments (Hurry, Miller, & Bowman, 1992) and governance choices (Folta & Miller, 2002; Folta, 1998). The rationale is summarised thus:

SURVEY OF LITERATURE

“The future is uncertain (if it were not, there would be no need to create options because we know now what we will do later) and in an uncertain environment having the flexibility to decide what to do after some of that uncertainty is resolved definitely has value.” (Merton, 1998, p. 339)

Definitions of real options as choices involve the manager's decisions (or choices) as the option, rather than the underlying asset on which the choice is being made. These decisions might include the option to defer; the option to stage and sequence investment; the option to abandon; the option to switch inputs or outputs, and so on (Trigeorgis, 1993). Research using this definition principally consists of analytical attempts to determine the effect of making different choices on valuation; for example, the benefit of having a factory capable of operating using abstracted ground water in addition to municipally supplied water: options analysis would evaluate whether the extra cost that accrues from building in this switching technology is worthwhile (Merton, 1998).

A final way options are defined are as a process heuristic for understanding the economics of sequential resource investment choices (McGrath et al., 2004). This is based on the premise that resources create the future potential for managers to act in ways that could not have been foreseen at the time that a specific investment decision was made. In other words, resources with option value allow preferential access to future opportunities (Bowman & Hurry, 1993).

This broader survey of the real options theory literature here is useful as Chapter 6 makes only selective reference to these definitions. The emphasis for the Five Factor Framework proposed in Chapter 6 is on the second definition; real options as strategic investment that preserves manager choice for processes that are uncertain, incremental and path-dependent. The financial approach is also relevant: real options can be seen to combine intrinsic and extrinsic value, much as financial options do. The

SURVEY OF LITERATURE

intrinsic value reflects the potential future contribution to firm performance – economic outcomes, in the strategic cognition literature – while the extrinsic value is derived from reducing the impact of uncertainty associated with this potential future contribution.

A core concept in the real options literature is that some forms of uncertainty reduction are a function of exogenous forces outside a firm's direct influence, while others are endogenous. The distinction between exogenous and endogenous uncertainty is important: firstly, because these forces can create opposing pressures. Managers will prefer uncertainty that is outside their control to be reduced before taking action. On the other hand, managers will want to take action where if doing so will directly reduce uncertainty. This leads to the observation that the endogeneity and exogeneity of uncertainty combine to create interdependence for the firm, which managers seek to reduce. It also reconciles real options theory with RDT, and brings it within the integrative narrative framework that overarches this thesis.

2.10 Conclusion

This survey of the literature has focused on the prominent conceptual theories of resource dependence, institutionalism and stakeholder salience, which are combined through the course of this thesis into an explicative narrative framework, supplemented by research themes including agency theory; proximity and myopia; strategic cognition; transaction cost theory; and real options theory. The ground covered is broader than it is deep, but this is a deliberate and desired objective of the review. Corporate water risk is a pre-paradigmatic concept in search of consensus, and the paucity of academically rigorous, original or enlightening literature was one of the

SURVEY OF LITERATURE

primary motivations for undertaking this research project in the summer of 2010. Now, nearly four years later, the concept has undoubtedly gained traction, although much of the extant contributions to the literature are from commercial service providers, who arguably offer more in the way of heat than light. However, the status quo has necessitated this framing of corporate water risk – and return – within the broader literature. While it has touched on a wide sweep of research from cognitive behaviourism through to applied finance, the thesis is firmly associated with the sphere of economic geography. Indeed, if the reader was to draw just one observation from the literature, is hoped that it might be the extent of the topic's interdisciplinarity. It is the author's firmly held conviction that it is within the sphere of economic geography – and only economic geography – that the concept of corporate water risk and return will in time emerge fully formed to make its explicative and predictive contributions to the empirical and theoretical literature.

Chapter 3

A CRITIQUE OF PREVAILING BEST PRACTICE

3.1 Introduction

Corporate water risk is a concept in search of consensus. Barton describes it as “a set of material business risks that fall into four broad categories: physical, reputational, regulatory, and litigation risk” (Barton, 2010, p. 17). The significance of these water-related risks varies by sector and by company. Within the academic literature the term is still emergent, but has come to embody those challenges that companies face in ensuring their licence to operate (Sarni, 2011), in an environment of increasing water insecurity; a function of resource scarcity, variability and volatility. Perceptions of water insecurity as a corporate risk issue appear to be increasing, at least in relative terms. The annual Global Risks Report measures changes in the perceptions of 1,000 respondents, selected by the World Economic Forum (WEF) from industry, government, academia and civil society, towards 50 different risks identified by the WEF. In the seventh edition of this report (Howell, 2012), water supply crises were ranked for the first time as a top 5 risk in terms of both likelihood and impact. It appeared on both lists again in the eighth edition (Howell, 2013), and was ranked as the second most severe risk that the business world faces, in terms of impact.

A CRITIQUE OF PREVAILING BEST PRACTICE

The scale of the challenge is arresting. According to a meta-analysis of independent forecasts compiled by the management consultants McKinsey, the world's estimated need for water infrastructure investment between 2013 and 2030 is US\$ 11.7 trillion (Dobbs & Pohl, 2013), rising alongside GDP and population growth. Meanwhile, the OECD projects that the average annual world infrastructure expenditure on water between 2020 and 2030 will be US\$ 1,037 billion or 1.03% of world GDP, and more than the combined expenditure on road, rail, telecoms and electricity, over the period (OECD, 2006). Financing this investment in the post-crisis environment presents particular difficulties, given the deterioration in many public sector balance sheets, increased risk aversion by lenders and financial intermediaries, and the relatively small proportion of institutional asset allocation to infrastructure investment from within the private sector. Under these conditions, it seems likely, if not inevitable, that corporate users of water that are the most exposed to the risks associated with insufficient infrastructure will have to bear an increasing share of the financial costs that will be incurred to ensure adequate provision. Given that the estimated requirement to 2030 equates to nearly 90% of the current market capitalisation of the entire S&P 500 combined, corporate water risk is – or should be – a clear and present issue of concern to companies and long term capital providers.

Water has unique attributes in terms of a company's operating performance and Environmental, Social & Governance (ESG) considerations: as a factor of production it is scarce, unevenly distributed, expensive to transport and has no substitute (Postel, 2000; Seckler, Barker, & Amarasinghe, 1999). The demand for water is rising worldwide and projections are for continued growth (Butler & Memon, 2006) due to population expansion and migration, changes in lifestyle and the consequences of climate change (Butler & Memon, 2006; Pittock & Lankford, 2010) exacerbating

A CRITIQUE OF PREVAILING BEST PRACTICE

concerns of future water insecurity. The corporate accountability reporting frameworks of a firm's water use are therefore relevant to an extensive set of stakeholders including suppliers, employees, customers, shareholders, regulators and special interests, and this in turn has an important bearing on the firm's wider strategic and policy choices.

Growth rates in the global economy are increasingly asymmetric, with annualised GDP growth of 1.8% forecast for the so-called advanced economies over the next two years, compared with 5.7% for the emerging market and developing economies (IMF, 2013). Companies pursuing rational, profit-maximising behaviour have sought to expand their activities within these faster-growing regions, and the success of such initiatives have been an important component of the value that has been created for the institutional and private owners of these companies. However, these faster-growing economies often have a relatively smaller stock of infrastructure per capita, and require a relatively larger investment in infrastructure per unit of GDP if these growth rates are to be maintained. Global estimates of required infrastructure investment can underplay the size of the challenge. For example, applying McKinsey's heuristic, Japan's economic growth over the past 18 years would 'justify' infrastructure investment of 3% of GDP; significantly lower than the 5% actually spent. Conversely, Brazil's indicative infrastructure spending requirement is 4.8% of GDP on a comparative annual basis; significantly higher than the 1.5% actually spent over the past 18 years (Dobbs & Pohl, 2013). The point can be summarised by the observation that where companies seek higher returns, they may have to accept a higher level of risk.

While there appears to be some common agreement in understanding what corporate water risk means within a macro context, this paper asks whether such risks are

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appropriately identified at the company level. It is an empirical analysis, and uses information on water risk disclosure by 35 large, listed multinational companies (median market value of US\$ 43 billion) within the consumer staples sector as a proxy. The chapter explores four questions. First, have companies identified with the scale of the challenge faced, and is this reflected within their disclosed targets? Second, how do companies evaluate their supply chain within their current disclosure matrix, given the potential returns that might exist on investments 'beyond the fence line'? Third, to what extent do companies recognise corporate water risk as a politicised issue, rather than an operational challenge to be addressed directly? Fourth, does the current dynamic of engagement between companies and investors appear fit for purpose in the context of the challenges faced? Given the interconnections within these questions, a conceptual framework is proposed that rationalises corporate approaches to water risk, and embeds these approaches in an institutional environment that encourages propagation and reinforcement. The next section sets out this framework with reference to the literature.

This paper is framed principally within the literature of resource dependence theory and institutional theory. Other constructs, such as neo-Gramscian theory (Daniel & Sojamo, 2012) have been applied elsewhere in an attempt to account for the dynamics of governance, power and so forth in corporate disclosure strategies (Levy & Newell, 2005). However, every approach brings its own limitations, and this chapter's attempt at presenting empirical outputs within a clear if parsimonious conceptual framework is a deliberate one.

A CRITIQUE OF PREVAILING BEST PRACTICE

Resource Dependence Theory (RDT)

Corporate water use is characterised by resource dependence and organisational interdependence. Both local and multinational firms frequently operate within complex supply chains where intermediate goods have an extensive water footprint (Gerbens-Leenes & Hoekstra, 2008) and account for significant inter-country flows of 'virtual water' (Allen, 2003; Chapagain, Hoekstra, Savenije, & Gautam, 2006; Hoekstra & Chapagain, 2008). This creates a requirement for firms to manage their dependencies, both in terms of their organisational relationships, and in terms of environmental uncertainty.

The concept of power – in terms of control over vital resources – is fundamental to resource dependence theory (RDT) (Ulrich & Barney, 1984); as a strategy, firms seek to reduce others' power over them, while often attempting to increase their power over others (Hillman et al., 2009). The associated literature is at least sixty years old (Selznick, 1949; J. D. Thompson & McEwen, 1958; Zald, 1969), although modern RDT can be dated to the publication of a book in 1978 by Pfeffer and Salancik, in which they proposed a series of actions that firms could engage in to minimise their environmental dependencies (Pfeffer & Salancik, 1978). Of these, inter-organisational relationships are of particular interest in the context of this chapter.

RDT offers a perspective from which to understand inter-organisational engagement (Barringer & Harrison, 2000; Hillman et al., 2000; Oliver, 1990), by exploring how inter-organisational relationships help an organisation acquire resources to reduce uncertainty and interdependence (Auster, 1994; Harrigan & Newman, 1990; Pfeffer & Salancik, 1978). Inter-organisational relationships differ from mergers in that they provide only partial absorption of the interdependencies (Hillman et al., 2009).

A CRITIQUE OF PREVAILING BEST PRACTICE

Empirical evidence in the literature is consistent with the theory that such relationships gain resources and reduce domestic and international uncertainty (Elg, 2000; Goes & Park, 1997; Stearns et al., 1987). The literature also offers evidence that inter-organisational relationships are most likely to develop within the supply chain where mutual interdependencies are strongest, such as between buyers and suppliers (Murray, Kotabe, & Zhou, 2004; Provan & Gassenheimer, 1994; Skinner, Donnelly, & Ivancevich, 1987).

For example, a firm that is a multinational packaged food processor may source its raw material inputs such as wheat, sugar and cocoa from a network of farmers. The interdependencies are strong. Without the network, the food processor has no product to sell. Equally, the food processor is likely to be a major buyer of the farmers' produce, and may even be the sole customer for many. The food processor may seek to strengthen inter-organisational relationships by, for example, paying for farmers to receive training in the latest methods of crop husbandry, or providing low-interest loans for farmers to buy equipment. In exchange, they might require farmers to commit to sell an agreed quantity at an agreed price.

The food processor will also seek to minimise the impact of any perceived vulnerabilities of the farmers on its own operations. Farmers are particularly susceptible to risks associated with water variability, given its materiality as an agricultural input. In principle this variability represents a direct risk for the food processor too, inasmuch as it faces constraints on alternative sources for procurement. However, the food processor may be able to leverage its power to reduce resource dependence, for example by concluding an agreement which commits farmers' collectives to supply a given quantity at a set price, or otherwise face sanction. If the agreement is durable, it enables the food processor to 'lay off' that

A CRITIQUE OF PREVAILING BEST PRACTICE

portion of its water risk, and any costs (or possible benefits) as a consequence of water variability are borne by the farmer. If the processor measures corporate water risk from the point at which the raw material input enters the factory, this inter-organisational relationship may have materially lowered the firm's risk profile. Of course, the risk itself is still manifest.

Institutional Theory

The general premise of institutional theory is that firms conform to the expectations of their institutionalised environment in order to gain legitimacy and increase their survival prospects (Meyer & Rowan, 1977; W R Scott & Meyer, 1994). To the extent that firms incorporate the practices and procedures expected of them in response to three identified behavioural pressures (coercive, mimetic and normative), those operating within a common institutional environment will begin to look more similar than they do different (Brown, de Jong, & Levy, 2009; DiMaggio & Powell, 1983; Giddens, 1984).

In terms of the three behaviours, coercive pressures may have economic, legal, ethical and discretionary dimensions (Carroll, 1979), while the drivers of mimetic process include poor understanding of a firm's technologies, ambiguous goals, or an uncertain environment (DiMaggio & Powell, 1983). Normative pressures to homogeneity come from common professional attitudes and approaches that employees in one firm have with those in others. DiMaggio and Powell posit that the rate of 'institutional isomorphism' – that is, homogeneity of organisational structures in an institutional environment – increases when firms are highly dependent on that environment; operate under conditions of uncertainty or ambiguity; or rely heavily on professionals.

A CRITIQUE OF PREVAILING BEST PRACTICE

For the food processor, coercive pressures on ESG disclosure may come from a legal requirement of regulatory compliance, or from activist shareholders, vocal NGOs or other stakeholders demanding that the food processor discloses information about its water use in order to preserve its societal legitimacy. Coercive pressures may also be embedded within social media as a channel for the rapid dissemination of information, given that this can have a material impact on corporate reputation. Coercive pressures can impose common societal expectations across competing firms about how inputs should be combined and deployed in production (Oliver, 1997). Firms may model their CSR disclosure on those they perceive to be more legitimate or successful (DiMaggio & Powell, 1983; Kostova, Roth, & Dacin, 2008; Rao & Sivakumar, 1999).

The specific uses of water within the food processor's operations may be complex and difficult for non-specialists to understand, encouraging mimetic process. Common metrics that simplify the information for stakeholders such as financial analysts may be widely adopted by other food processors, creating path dependency. Goals regarding water risk management can also be ambiguous. One firm may target reducing the absolute amount of water being used by changing its mix of business activities rather than by improving efficiency of water use; while another may target improved efficiency while accepting absolute consumption may rise. Reconciling these different approaches may require the adoption of a 'lowest common denominator' in terms of disclosure. Also, uncertainty in terms of water risk may be driven by various factors, including demographic dynamics, volatility in economic activity, and variability as a consequence of climate change. As uncertainty increases, so does mimetic process.

Normative behaviours are shaped by the relatively small number of corporate water risk specialists that exist, and the collegiate characteristics of the wider ESG

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profession. Their interchange of knowledge, beliefs and approaches to best practice may primarily occur during industry-specific conferences and other collective events. This may encourage homogeneity in attitudes over how water risk should best be understood and communicated to other stakeholders. If the ESG disclosure specialist at the food processor firm leaves, they likely will be replaced by someone with a similar background and experience. Inasmuch as the new hire also has a similar attitude to disclosure, the existing approach gains further institutional legitimacy. And where the new hire has a different attitude, they may push for a change in approach, particularly if they come from a firm that is perceived to be more legitimate or successful.

In summary, resource dependence theory provides some insight into corporate water risk in context, and the motivations that might drive individual firms' behaviour on disclosure. Institutional theory frames this behaviour in terms of organisational structure and perceptions of legitimacy. This conceptual framework articulates how a firm's self-interested actions in managing corporate water risk can become embedded into wider ESG disclosure that is homogenised, widely accepted, and considered best practice.

3.2 Method

The empirical analysis in this chapter focuses on firms' use of water efficiency targets. The sample is drawn from the 58 firms in the consumer staples sector identified by the Carbon Disclosure Project (CDP) in their second annual Water Disclosure report (CDP, 2011). Using the FTSE Global Equity Index of the world's 500 largest quoted companies by market capitalisation (Q4 2010 values), the CDP invited a total of 315

A CRITIQUE OF PREVAILING BEST PRACTICE

constituent firms that it judged to be in either water-intensive sectors or in sectors that were sensitive to water issues in their supply chain to respond to a questionnaire on water disclosure. A total of 190 of these firms responded (60% response rate). By sector, 37 firms in the Global 500 consumer staples sector were invited to respond, and 27 did so (73% response rate). In addition to the Global 500 index, the CDP invited 54 of the 100 largest firms in Australia and 56 of the 100 largest firms in South Africa to respond to the questionnaire. Of the five consumer staples sector companies in Australia three responded (60% response rate) and, of the 13 consumer staples sector companies in South Africa, six responded (46% response rate). In addition, another six consumer staples companies that were not originally invited to respond by the CDP did so voluntarily. This yields a total of 61 consumer staples companies (37 in Global 500, 18 in country lists and six voluntary respondents) of which three appear in both the Global 500 and country lists, which, eliminating double counting, results in a sample size of 58 companies.

Consumer staples comprise the following sub-industries: beverages; food & staples retailing; food products; household products; personal products; and tobacco. The decision to base the sample on firms from the consumer staples sector was taken for four reasons. First, the high response rate of the sector to the CDP Water Disclosure questionnaires offered a relatively rich source of supplementary and corroborative information. Second, the firms in the sector have primary listings in 13 separate countries, allowing a more cohesive interpretation of the findings within an international context. Third, the sector offered a good balance between local and multinational firms, given CDP's country focus on South Africa and Australia. Fourth, the consumer staples sector is characterised by complex supply chains, suggesting relatively high organisational interdependencies. However, the approach used to

A CRITIQUE OF PREVAILING BEST PRACTICE

evaluate disclosure is not sector-specific and could be extended to firms in any of the other sectors in the CDP report (consumer discretionary; energy; health care; industrials; information technology; materials; and utilities), or indeed to companies more generally.

Between September 2011 and January 2012, the CSR reports, annual reports and other public filings for the previous six years were reviewed for each of the 58 firms in the sample. Only data from publicly accessible online documents was included. After an initial review of the information, a template was created in order to capture data in a systematic, rigorous and replicable manner.

The template identified each firm by its name, the website address from which data had been collected, the date of collection, and its response status to the CDP questionnaire. It recorded whether a CSR or sustainability report was available for the firm, and the latest year for which it was available. Using the Global Reporting Initiative's G3.1 guidelines (Global Reporting Initiative, 2011) the template captured, where available, structured firm-level data on water withdrawals (EN 8); regions affected by withdrawal (EN 9); the amount of water reused (EN 10); and total water discharged (EN 21). It also collected data on the type of water source, and whether a metric had been provided for water efficiency. The template also recorded the extent to which the current disclosure could be reconciled with what had been disclosed in prior years. Further, the template captured semi-structured information as disclosed by the firm, including the target(s) it had set with regard to water use; the tools that it used to measure water risk; the financial impact of mitigation or adaptation strategies; and its description of the risks and/or opportunities it faced in terms of water use. For the 42 companies in the sample that completed the CDP Water Disclosure questionnaire and allowed their responses to be made public, the information from

A CRITIQUE OF PREVAILING BEST PRACTICE

their CSR reports was cross-referenced and verified, inconsistencies noted, and data in the template was augmented with supplementary disclosure in the CDP filing. In addition, data from a Bloomberg terminal was used to collate financial information for all 58 firms in the sample including market capitalisation, changes in reported revenue over the previous five years (as a proxy for firm performance), and changes in reported gross profit margin over the previous five years (as a proxy for firm efficiency). The financial data was collected at the end of the fourth quarter of 2011.

In order to use water efficiency disclosure as a proxy for CSR policy choice, each firm's reported water efficiency ratio for the previous six years was tabulated, and a definition noted of the metric used. This was most commonly reported as the number of units of water consumed per unit of product, or equivalent. For firms in the sample where six years of data was not available, data was recorded for whatever years were available. In total, at least two comparative data points were available for 33 firms of the 58 in the sample (57%). Using the tabulated data, the annualised growth rate (CAGR) of changes in the efficiency ratio were calculated for 1, 2, 3, 4 and 5 year periods for each firm, and recorded together with the mean. Each firm's reported water efficiency target was similarly tabulated, based on the most recent year of available disclosure. This was recorded as a single CAGR number, based on the proposed efficiency target and the number of years the company had set itself to achieve it by. For example, if a firm had set a target of a 20% improvement in its efficiency ratio from current levels over the next 10 years, this would be calculated as $0.8^{(1/10)} - 1 = -0.0221$ a 2.21% annualised target improvement.

A consolidated summary of the data gathered is accessible online: <http://bit.ly/lqV2Hs>.

A CRITIQUE OF PREVAILING BEST PRACTICE

The original 58 firm sample included firms from 13 countries; however, once adjusted to reflect available efficiency disclosure, the sample was reduced to 35 firms from 10 countries. Firms with their headquarters in either the USA or the UK combined comprised 45% of the 58 firm sample, but 57% of the 35 firm sample. In contrast, firms from South Africa accounted for 19% of the 58 firm sample, but a single one of the 35 firm sample: therefore the inclusion of efficiency disclosure as a screen had a material effect on various characteristics of the sample. The possible implications of this, for example in terms of institutional shareholder engagement (Clark & Hebb, 2005), are not explored in detail in this chapter, but would be an important area for further research.

Nonetheless, the adjusted sample can be characterised as comprising large, economically important firms, operating in a complex, multidimensional governance environment. Their median market capitalisation is US\$ 42 billion, and the total reported water used in their operations is over 1.5 trillion litres per year, equating to over half a litre per day for every human being on the planet. The companies own many of the world's most familiar consumer brands, and the collective distribution footprint of their products extends to almost every country in the world. For these reasons the activities of the sample firms – including their ESG strategy and policy choices – are of interest to a broad range of institutional stakeholders.

A CRITIQUE OF PREVAILING BEST PRACTICE

Figure 4: Consumer Staples Company Sample

Name	Country	Mkt Cap	Abstraction	CDP	Historic	Target
Foster's	AU		23,155	DP	-5.69%	-2.60%
Woolworths	AU	33,014	2,970	AQ	-2.41%	-2.07%
AB Inbev	BE	106,327	157,800	AQ	-7.05%	-6.63%
Carlsberg	DK	12,149	38,325	NP	-4.01%	-2.94%
Carrefour	FR	16,317	21,900	NP	-9.36%	
Danone	FR	43,755	34,850	AQ	-9.29%	-3.47%
L'Oreal	FR	68,967	2,956	AQ	-4.08%	-6.70%
Pernod Ricard	FR	27,427	6,155	AQ	-6.36%	-2.09%
Japan Tobacco	JP	54,284	6,346	NR	-9.42%	-2.52%
Kao Corp	JP	13,415	11,617	AQ	-7.84%	-2.35%
Kirin	JP	11,569	89,300	AQ	-3.26%	-1.74%
WalMex	MX	55,969	5,083	NP	-8.90%	-5.43%
Heineken	NL	30,555	83,000	AQ	-3.59%	-1.64%
Unilever	NL	100,461	56,610	AQ	-5.95%	-11.85%
Nestle	CH	204,337	144,000	AQ	-6.31%	-3.20%
British American Tobacco	UK	98,555	4,481	AQ	-8.04%	-2.84%
Diageo	UK	59,516	23,137	AQ	-5.26%	-4.36%
Imperial Tobacco	UK	39,955	1,602	AQ	-1.24%	
Reckitt Benkiser	UK	39,642	5,300	AQ	-6.21%	
SAB Miller	UK	64,909	73,100	AQ	-0.84%	-4.03%
Altria Group Inc	US	61,595	3,566	AQ	-11.63%	-3.19%
Archer Daniels Midland	US	20,947		NR		-1.61%
Coca Cola	US	156,043	309,000	AQ	-2.75%	-2.75%
Colgate Palmolive	US	45,094	5,400	AQ	-7.89%	-4.25%
General Mills	US	24,574	10,900	AQ	-1.90%	-2.45%
Kellogg	US	18,970	12,530	AQ	-3.14%	-2.21%
Kimberley Clark	US	28,300	129,700	AQ	0.64%	-3.80%
Kraft	US	67,437		DP		-3.20%
Pepsico	US	99,417	106,000	AQ	-6.21%	-2.45%
Philip Morris Intl.	US	143,053	4,350	AQ	-2.52%	-4.36%
Procter & Gamble	US	184,159	79,999	AQ	-14.52%	-4.36%
Reynolds American	US	24,106	2,019	AQ	-22.94%	
McCormick	US	6,678	900	AQ	-7.25%	-1.74%
Molson Coors	US	7,966	23,973	AQ	0.12%	-3.88%
HJ Heinz	US	17,115	29,790	NA	-3.11%	-2.21%

Source: (Money, 2014b)

A CRITIQUE OF PREVAILING BEST PRACTICE

Notes

Country: AU = Australia, BE = Belgium, DK = Denmark, FR = France, JP = Japan, MX = Mexico, NL = Netherlands, CH = Switzerland, UK = United Kingdom, US = USA

Mkt Cap: Market Capitalisation in US\$ millions

Abstraction: Reported volume of water abstracted p.a. in thousands of cubic meters ('000 m³)

CDP: CDP Water Disclosure status. AQ = Answered Questionnaire, DP = Declined to Participate, NP = Non Public Response, NR = No Response, NA = Not Invited by CDP

Historic: Average Annualised Change in Disclosed Water Efficiency for 1,2,3,4 and 5 years

Target: Required Annualised Change in Water Efficiency to achieve disclosed target

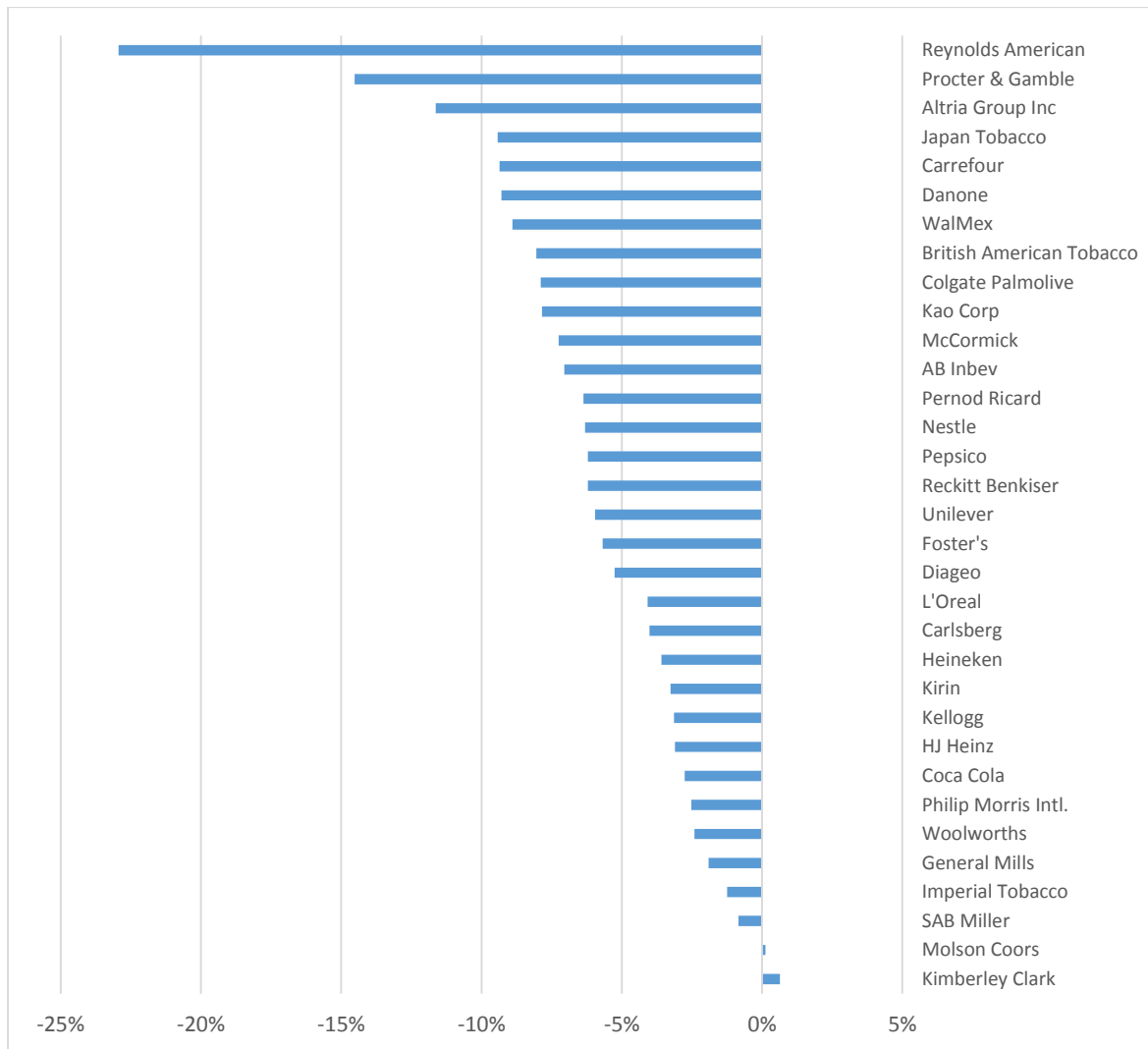
3.3 Results

3.3.1 Historic efficiency

As a proxy for historic efficiency, the average annualised change in the disclosed amount of water used per unit of product for the previous 5 years is used. The data is shown graphically:

A CRITIQUE OF PREVAILING BEST PRACTICE

Figure 5: Annualised Historic Change in Water Efficiency



Source: (Money, 2014b)

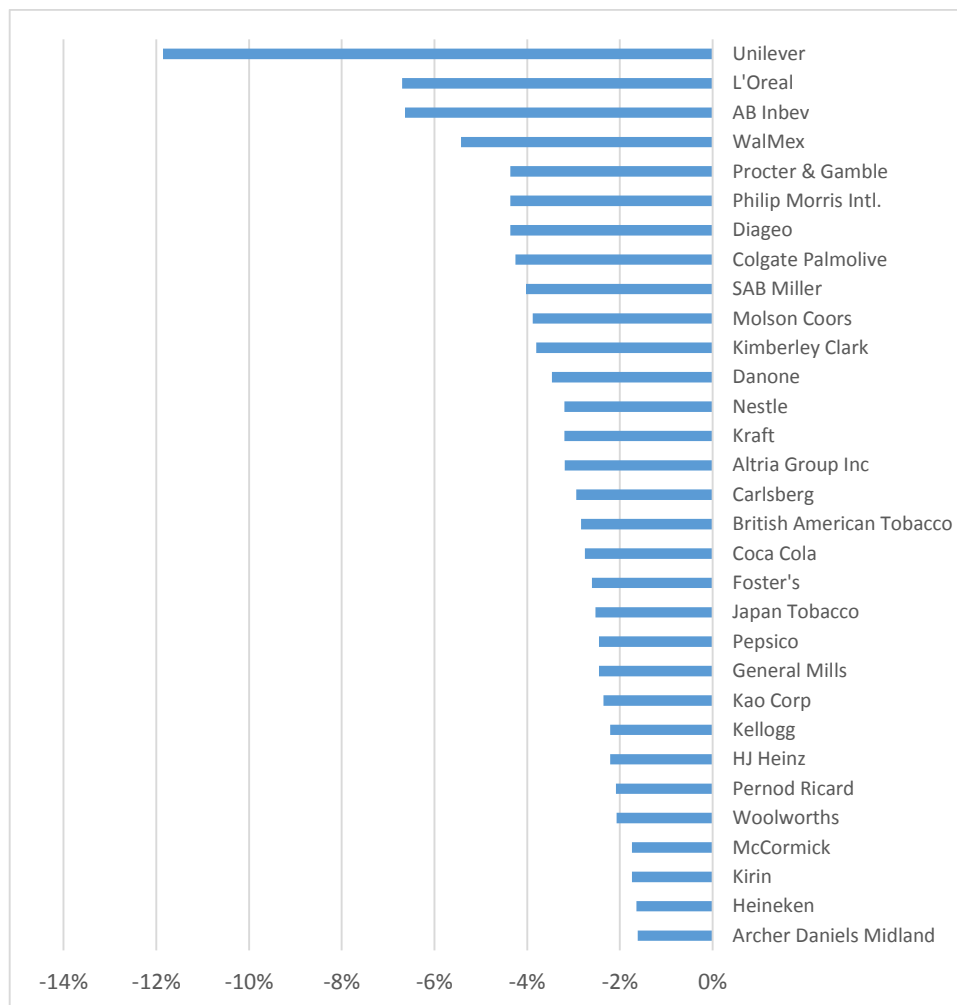
Of the 33 companies disclosing at least two data points of historic change in water efficiency, 31 (94%) reported a reduction in the volume of water used per unit of production. The average reduction in water/unit for the sample was -5.9% (median - 5.9%).

A CRITIQUE OF PREVAILING BEST PRACTICE

3.3.2 Target efficiency

As a proxy for target efficiency, the compound annual growth rate that is necessary for the company to achieve its disclosed efficiency target over the timeframe it has chosen is used. The data is shown below:

Figure 6: CAGR in Water Efficiency Required to Achieve Target



Source: (Money, 2014b)

A CRITIQUE OF PREVAILING BEST PRACTICE

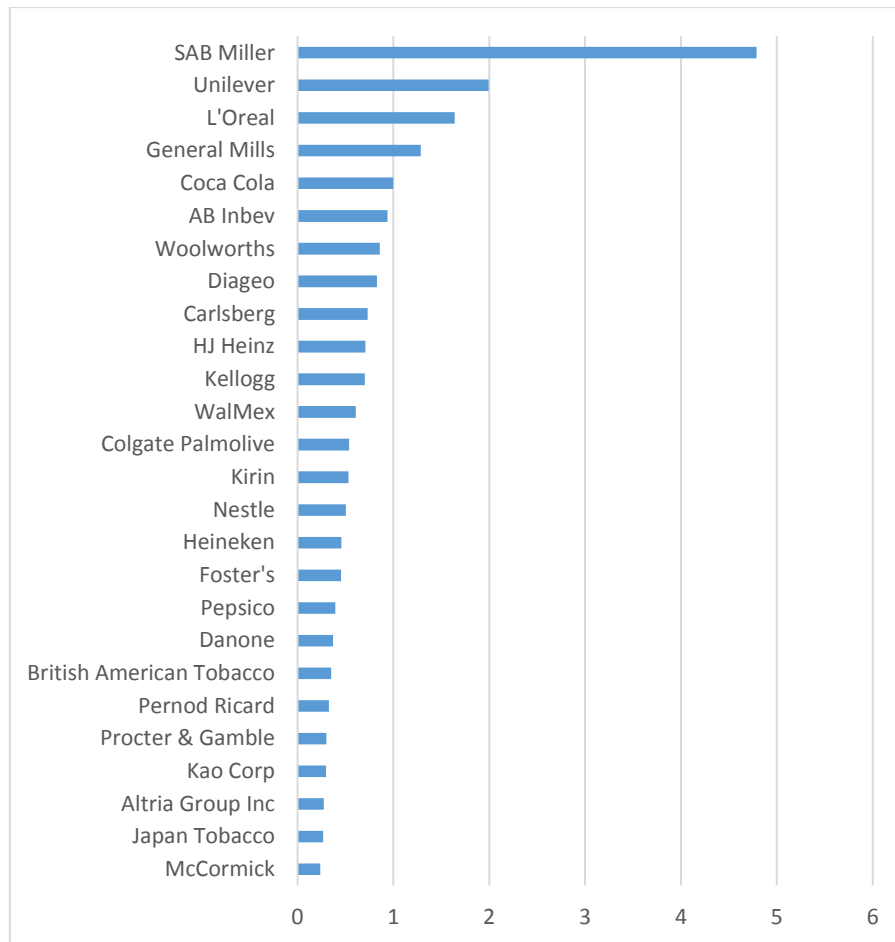
Of the 31 companies disclosing a water efficiency target, all targeted an improvement in efficiency compared to current levels. The average improvement in targeted water/unit for the sample was -3.6% (median -2.9%). That is, the targeted improvement in water efficiency is 230 basis points *lower* on average than the actual historic improvement in efficiency. In terms of the median, the targeted improvement is some 300 basis points lower than the historic improvement.

3.3.3 Aspiration Multiple

For each firm where the data is available, the Target Efficiency is divided by the Historic Efficiency to derive an 'Aspiration Multiple' (ASMUL). An ASMUL of more than 1 indicates that a firm aspires to deliver water efficiencies in the future at a greater rate than it has in the past. An ASMUL of less than 1 indicates that a firm aspires to deliver water efficiencies in the future at a lesser rate than it has in the past. Adjusting for available data and excluding firms who have historically become more inefficient yields a sample size of 26 companies. Their ASUMULs are shown below.

A CRITIQUE OF PREVAILING BEST PRACTICE

Figure 7: Water Efficiency Aspiration Multiples (ASMULs)



Source: (Money, 2014b)

Of the 26 firms, four (15%) have an ASMUL of greater than 1.0. The mean ASMUL for the sample is 0.85x, and the median is 0.54x. The median value is more meaningful. If the two firms with the highest and lowest ASMULs are excluded, the adjusted mean falls to 0.66x. In the case of the firm with the highest ASMUL, this is based on a historic annualised efficiency improvement of just -0.84% compared to the average for the sample of -6.0%. That is, the ASMUL value has been heavily influenced by the low denominator.

A CRITIQUE OF PREVAILING BEST PRACTICE

In summary, it is possible to infer from the ASMUL data that the majority of firms in the sample are targeting a materially lower rate of improvement in their efficiency of water use in the future, compared to what they have achieved historically.

3.3.4 Descriptive statistics

Descriptive statistics associated with the analysis are presented in Table 2. Five year sales and gross profit margins have been included as proxies of firm performance and efficiency, respectively. This paper seeks to build rather than test theory, and the relatively small sample size – a function of the resources required to compile the primary data – precludes the performance of any meaningful statistical analysis. However, the empirical framework has been designed to be both easily replicable and highly scalable. A broader and deeper sample would provide the opportunity to test theory using ASMUL, historic efficiency and target efficiency as possible dependent variables.

Figure 8: Descriptive Statistics

	Mean	Std. Deviation	N
ASMUL (x)	.8474	.91209	27
Historic Efficiency (%)	-.05898	.031991	27
Target Efficiency (%)	-.03571	.021509	27
Abstraction ('000 m3)	49085.93	68603.421	27
Market Cap US\$m	66996.42	55007.734	26
5Y Sales (%)	.056811	.0730785	27
5Y GPM (%)	-.001600	.1045671	24

A CRITIQUE OF PREVAILING BEST PRACTICE

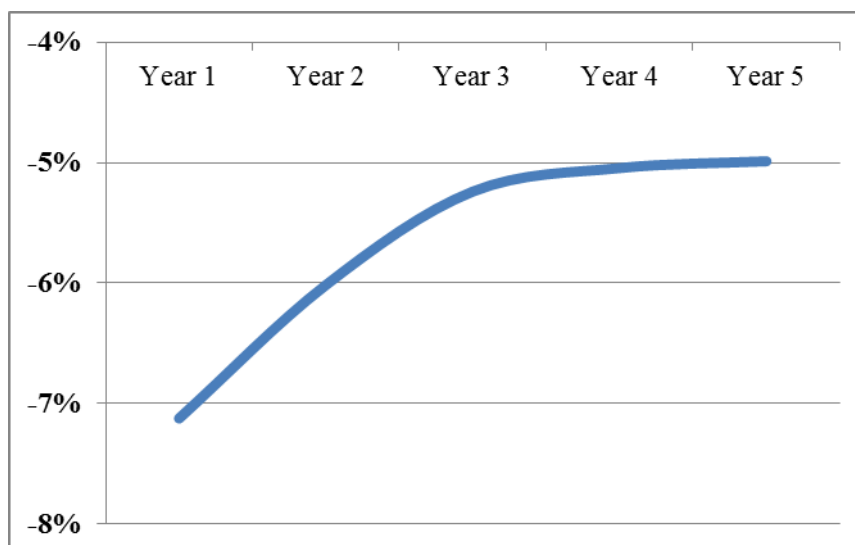
		1	2	3	4	5	6	7
1	ASMUL	1						
2	Historic Efficiency	-.515**	1					
3	Target Efficiency	.390*	.130	1				
4	Abstraction	.101	.151	-.047	1			
5	Market Cap	.107	-.251	-.340	.559**	1		
6	5Y Sales Growth	.044	.134	-.116	.297	.030	1	
7	5Y GPM Growth	.130	.000	-.037	-.208	-.359	.237	1

** p < 0.01 (2-tailed) *p < 0.05 (2-tailed)

3.3.5 Marginal efficiency

Figure 4 plots the average CAGR of historic efficiency improvements over 1, 2, 3, 4 and 5 years for the sample. It shows that, on average, the highest efficiency improvement is achieved in the first year, decreasing in each of the subsequent years. This is consistent with the theory of diminishing returns on efficiency investment; as well as the argument that ASMULs will inevitably fall over time.

Figure 9: CAGR Improvements in Historic Water Efficiency



Source: (Money, 2014b)

3.4 Discussion

Changes in the form and function of narrative disclosure over time point to an increasing emphasis by firms on the measurement and management of corporate water risk. However, the analysis in this chapter suggests that the majority of firms in the sample are currently targeting a materially lower rate of improvement in their efficiency of water use in the future, compared to what they have achieved historically. This is generally at odds with the 'tone' of the recent narrative on water resource management in the firms' CSR disclosure. But, viewed through the lenses of RDT and institutional theory, this apparent variance between what is being said and what is being done reflects entirely rational behaviour on the part of firms, in response to complexity, interdependence and uncertainty. The question is whether the status quo of the prevailing position can be maintained.

3.4.1 Resource dependence and rational behaviour

From an RDT perspective, as a company identifies the threat of dependence it will seek to mitigate the threat as expeditiously as possible without drawing unnecessary attention to it. If the threat is within the company's direct control, such as usage of water within its own operations, management of discharge, replenishment within the watershed etc., the company has greatest capacity to mitigate the threat, and will do so where the cost of mitigation is perceived to be lower than the benefit from mitigation. As the company's ability to incrementally reduce the threat via direct action lessens, it may give greater consideration to the scope that it has to reduce threats associated with its dependency on its supply chain. This is consistent with the broader literature on corporate water risk practice (Morrison, Schulte, & Schenck, 2010).

A CRITIQUE OF PREVAILING BEST PRACTICE

Importantly RDT does not necessarily require the company to be interested in reducing any supplier's *own* dependence on water, but rather the company's dependence on that supplier. For consumer staples companies such as food and beverage manufacturers, suppliers might include agricultural commodity producers with a significant water footprint. To mitigate the implicit threat of the supplier's water risk exposure combined with the company's dependence on that supplier for its raw material inputs, the company might rationally seek to exclude any form of explicit management or measurement of the supplier's water usage within its own quantitative disclosure, despite – or more likely because of – its recognition of the significance of that usage.

However, the company will still recognise that the threat exists within the minds of its stakeholders, including shareholders, consumers and others, regarding water risk in the supply chain. In order to mitigate this threat, the company might emphasise in its narrative disclosure, *inter alia*, the importance it ascribes to working with its supply chain to reduce usage, improve efficiency, support community access and so on. This is anticipated in RDT literature as a rational response by companies, and is consistent with the observed outputs in this study where narrative disclosure on corporate water risk has increased in breadth and scope (Daniel & Sojamo, 2012), without a corresponding expansion of quantitative disclosure.

Indeed, similar observations are widely evident within the broader literature, and over time these have coalesced into a call for better corporate disclosure of water risks “beyond the fence line”. This approach exhorts companies to take a more holistic approach to the watershed, and to engage local participation in the collective management of water resources. Contemporary literature identifies “a number of leading companies” (WBCSD, 2013) that have started to develop this approach, while

A CRITIQUE OF PREVAILING BEST PRACTICE

outlining the challenges that businesses face in its adoption, including a lack of established governance systems, weak participatory process, and the “difficulty of getting internal high-level commitment in the absence of clear quantifiable benefits” (WBCSD, 2013).

Applying RDT, the benefits to companies of such forms of engagement become clearer and more quantifiable in proportion to the perceived threat of interdependency. In fact, (Pfeffer & Salancik, 1978) identified political action as one response that firms could engage in to minimise their environmental dependencies. This approach might eliminate some of the difficulties that businesses associate with governance and participation, albeit by engaging at a level removed from the watershed. Anecdotal evidence for the increasing popularity in companies politicising their engagement with water risk can be gleaned from the website content of the CEO Water Mandate, which, according to its mission statement, involves “mobilising a critical mass of business leaders to advance water sustainability solutions – in partnership with the United Nations, civil society organisations, governments and other stakeholders” (Mandate, 2013).

The 2030 Water Resources Group goes further, claiming to work with governments “on a comprehensive water reform strategy” and supporting its implementation (WRG, 2013). It includes India, Jordan, Mexico, Mongolia and South Africa as its government partners, with Nestle, PepsiCo, SABMiller and Coca-Cola as private sector partners (WRG, 2013). These companies are all members of the consumer staples sample in this report. Each has complex interdependencies within its supply chain; each produces extensive narrative disclosure on corporate water risk; and none quantifies the impact of water use outside their direct operations within their disclosure. As such they exhibit entirely rational behaviour as anticipated by RDT.

3.4.2 Institutional theory and isomorphic behaviour

The empirical findings of this study are wholly consistent with the various coercive, mimetic and normative behaviours associated with institutional theory. Companies seek to create and maintain their legitimacy through practices and procedures that embed isomorphism. This contributes to the preservation of a status quo in which most institutional actors are satisfied in the short term, but at the cost of delaying, deferring or denying the steps that are necessary to mitigate corporate water risk in the longer term. So, while resource dependence shapes the tone and tangent of corporate disclosure and engagement with water risk, it is through the lens of institutional isomorphism that the variance between what is being said and what is being done can be most clearly understood. The contextual attributes of coercion, mimetic process and normative behaviour are discussed briefly below.

3.4.3 Coercive pressure

The companies chosen for this paper were drawn from the consumer staples sector of the CDP Water Disclosure Report. The sample was selected to represent exemplars of best-in-class disclosers of corporate water risk. And while the CDP's objectives in terms of seeking greater transparency in corporate water disclosure are laudable, there is evidence of coercive pressure on firms from the very first page of their latest Water Disclosure Report, which states that the initiative has the formal support of 470 investors representing US\$ 50 trillion in assets (CDP, 2012). Although the nature of this support is not explicitly set out in the report, the impression conveyed in the report's narrative is that the CDP survey comprises questions that their owners want – and expect – answers to. A reasonable interpretation of this narrative might be that there are implicit if unstated consequences for companies who make a decision not to participate in the survey.

A CRITIQUE OF PREVAILING BEST PRACTICE

The motivations for the CDP to deliver a high rate of participation in its surveys are self-evident. The credibility of its research is a function of its perceived representativeness. As a voluntary form of disclosure that requires time and effort on the part of companies to complete a questionnaire, the CDP applies a nuanced combination of incentives and sanctions in order to drive participation. The extent to which these measures are effective depends on the impact that companies perceive the report has on their actual and potential investor base, and the level of scrutiny that will be applied to their responses. In practice, while the 470 investors in question undeniably husband a large quantum of assets, the thresholds set for them to become signatories are not especially onerous. Any financial institution managing assets may become a CDP signatory at no charge, and on becoming a signatory can access all company responses to the questionnaires they endorse. In addition they receive “public recognition of [their] commitment to engaging with companies on the issues of climate change and water” (CDP, n.d.).

There are obvious interdependencies between the CDP, responding companies and signatory investors. For the CDP to preserve or enhance its authoritative standing amongst disclosing companies, it is important that it is seen to carry a significant quorum of their investor base as signatories. It is in turn logical for the CDP to set thresholds for membership that can be achieved and maintained fairly easily. Meanwhile for the investor signatory, membership of the CDP may be seen as a source of distinction and differentiation, and carry a value to the institution in terms of the competitive marketplace. These interdependencies combine to drive coercive pressure on companies to disclose, although the magnitude of this pressure should not be overstated. In their latest report, the CDP records a response rate of 60% to its questionnaire, which is unchanged on the prior year (CDP, 2013).

A CRITIQUE OF PREVAILING BEST PRACTICE

Coercive pressures on companies to disclose their exposure to water risk have been explored more widely in the literature (Barton, 2010; N. Hepworth & Orr, 2013). Reputational water risks garnered in the course of conducting 'business as usual' can affect a company's brand value and market share (Orr & Cartwright, 2010), which in turn have potentially long-term financial implications (WBCSD, 2013). Companies have responded to pressures to maintain a so-called social licence to operate (N. Hepworth & Orr, 2013; Sarni, 2011), and as discussed previously corporate water risk is frequently split in the literature into four components: physical, reputational, regulatory, and litigation risk (Barton, 2010). Coercive pressures from a physical, regulatory or litigation risk perspective are self-evidently a function of doing business; it is this chapter's contention that it is the pressure on corporate reputation that principally shapes the form and function of water risk disclosure.

3.4.4 Mimetic process

If coercive pressure helps to explain companies' motivations for disclosing water risk, the nature of their disclosure is better understood with reference to mimetic process. In their development of institutional theory, (DiMaggio & Powell, 1983) identified the drivers of mimetic process to include a poor understanding of a firm's technologies, ambiguous goals, or an uncertain environment. These drivers are contextually appropriate to water risk disclosure.

Definitions of corporate water risk are themselves contested, and so the basis of measurement and disclosure similarly lacks consensus. As a factor of production, water is perhaps uniquely complicated, given the considerations of supply, access, discharge and replenishment which are each sensitive to spatial, temporal, political, economic and even philosophical heterogeneity. As a result a holistic understanding of corporate water risk is often elusive within companies themselves, let alone external

A CRITIQUE OF PREVAILING BEST PRACTICE

stakeholders. And where, as in the case of this study, each company operates in multiple geographies and produces a diverse range of products, the level of complexity increases exponentially. Such circumstances inevitably result in a poor understanding of a company's true water risk exposure and it is rational for companies to look to their peers as benchmarks for disclosure.

This complexity has an inevitable impact on the formulation of corporate strategy, particularly where that strategy concerns water resource management. RDT suggests that it is rational for companies to emphasise their narrative disclosure when considering wider supply chain impacts, but for operations within their direct control, measurement and management of water risk is a threat mitigation strategy. However, this begs the question as to what the most appropriate goals are for this mitigation. For example, a goal to reduce water use in absolute terms might drive efficiency in the short term, but would potentially impede revenue growth, which will likely be another, higher priority, strategic objective. Moreover, water's complexity as a factor of production will also contribute to goal ambiguity.

The literature on corporate water risk in recent years has increasingly been framed in the context of an uncertain operating environment. Economic geographers cite various dimensions to this uncertainty, including climate change (Butler & Memon, 2006; Pittock & Lankford, 2010), demographics and urbanisation (Baker & Toft, 2003), and the energy-food-water-climate nexus (Vaughray, 2011). Inasmuch as uncertainty is a proxy for risk, these dynamics may have played a greater part in determining corporate strategies of avoidance, mitigation and adoption, but in practical terms the vulnerabilities remain, as evidenced for example by Dell Computer, following the floods in Thailand in 2012. An uncertain environment creates greater reasons for

A CRITIQUE OF PREVAILING BEST PRACTICE

companies to 'stay with the pack' in terms of strategy and disclosure, contributing to mimetic process.

This paper identifies evidence of mimetic process in various aspects of corporate water risk disclosure. For example, of the firms disclosing quantitative data on water use, water efficiency is the only metric that was used by the majority of companies, possibly because at a superficial level it is the most straightforward to measure: units of water used per unit of output. However, in the course of interrogating the longitudinal data, it became evident that companies do not apply this benchmark consistently or comparably. Several firms exclude various facilities for which they say data is unavailable. Some firms exclude the operations of businesses which they have recently acquired. Others change the basis of calculation from one year to the next, typically on the pretext that they have improved their (internal and undisclosed) methodology of calculation. Still others adjust for replenishment and reuse. The reasons for these variations are clear, and relate to the drivers of mimetic process itself: poor understanding, goal ambiguity and operational uncertainty.

The point that this raises is that while generic approaches to measuring and managing water risk may become widely adopted in response to mimetic process and augmented by perceptions of best practice, the institutional legitimacy conferred by such adoption may not be justified at any practical level. In other words, the status quo that emerges from the pursuit of 'best practice' corporate water risk disclosure might in fact unintentionally entrench poor understanding, goal ambiguity and operational uncertainty that are characteristics of mimetic process.

3.4.5 Normative behaviour

An entrenched status quo that is unfit for purpose may be one outcome from the headlong pursuit of best practice in water risk disclosure, but it is not an inevitable outcome. Various stakeholders with an interest in this disclosure are in principle empowered to challenge the approaches taken by companies, and exhort them to change. These include activist and socially responsible investment (SRI) funds, several of which are owned and managed by large institutional investors. Hebb describes the power that defined benefit pension funds can also bring to this process, due to their long term investment time horizon, diverse ownership and international exposure (Hebb, 2008).

The literature on the correlation between a company's ESG performance and its long term financial performance is as broad as it is deep (see e.g. (J Pelozo, 2009) for a summary), and the conclusions are contested. Equally ambiguous, however, are the motivations of SRI analysts who are tasked with interpreting ESG information in order to evaluate companies. The typical outcome of this process is a relative ranking, where company X can be judged as qualitatively superior to company Y in terms of ESG disclosure, which is often based on a quantitative evaluation of the ESG disclosure metrics applied by company X and Y.

It is often difficult to compare companies on a like-for-like basis in this way; indeed it is why standards such as the Global Reporting Initiative were developed, although none of these are universally adopted. As a consequence SRI analysts might find themselves spending the majority of their time attempting to reconcile different disclosure formats in order to normalise the data for comparability. In these circumstances, it is understandable that the investment firms where these analysts work will enjoin companies to develop common metrics and standards.

A CRITIQUE OF PREVAILING BEST PRACTICE

An unintentional consequence of companies responding to these demands may be that in the quest to provide granular and ostensibly comparable quantitative data, the qualitative value of this data is compromised. For example, companies might produce a measure of their water efficiency that SRI analysts can benchmark against other companies, but, for the reasons discussed above, the metric itself is fundamentally comprised: that is, accuracy is traded in exchange for precision. DiMaggio and Powell (1983) describe normative pressures to homogeneity as coming from common professional attitudes and approaches that employees in one firm have with those in others. So for example the CSR specialist at the company is motivated to produce an efficiency metric, firstly because that is what is asked for by the investor, and secondly because he knows that is what his CSR colleagues in other companies are producing also. Meanwhile the SRI analyst at the investment firm is motivated to ask companies for an efficiency metric, firstly because it offers a comparative data set, and secondly because she knows this is what her SRI colleagues at other investment firms are using too.

Normative behaviour on the part of both company and investor representatives is often reinforced by third parties acting as consultants or information aggregators, who have unambiguous commercial incentives to mediate engagement between the company and the investor. As these third parties increase in size and influence, the status quo might become yet further entrenched and legitimised.

3.4.6 Summary: resource dependence and institutional theory

Amongst the outputs of this analysis of corporate water risk disclosure, there are four observations to highlight. First, the sample companies have historically achieved greater annualised improvements in their own water efficiency than the targets that they have set out for the future, i.e. ASMULs are declining. Second, the sample companies appear to exhibit diminishing marginal returns on efficiency investment, due to restricting this investment to their own operations rather than the supply chain. Third, the sample companies have expanded their narrative disclosure on water risk and are increasingly politicising their engagement. Fourth, a status quo of perceived best practice disclosure of corporate water risk is emerging, reinforced by companies, investors and third parties.

These observed outputs are congruent with the theoretical framework set out in this paper. First, companies seek to mitigate the threat of their resource dependence. It is logical to invest in reducing dependence on water until the point where the marginal benefit of reduced dependence is equal to the marginal cost of that investment. As the marginal benefit falls and the marginal cost rises, the aspiration multiple (ASMUL) will decline. Second, companies are highly interdependent on their supply chain, which in turn presents vulnerabilities. Exposing the level of water risk in the supply chain without having the control necessary to reduce that risk could make this vulnerability even more visible. Instead, it is rational to be highly cautious about the extent of direct investment within the supply chain, given that investment brings exposure. Alternative approaches to mitigate the threat include public and political engagement on the positive activities being undertaken by the company.

Corporate responses of this type to the threat of resource dependence are only sustainable if these responses are considered legitimate within an institutional

A CRITIQUE OF PREVAILING BEST PRACTICE

framework. Companies face coercive pressure to articulate their responses through corporate water risk disclosure. The format of narrative disclosure allows companies to emphasise aspects of their threat mitigation strategy selectively, and as the threats have expanded so too has their narrative disclosure. Operating in an environment of complexity, ambiguity and uncertainty has encouraged companies to take their cues from their peers, and mimetic process has created a received wisdom of what is best practice in corporate water risk disclosure. Sources that might traditionally be expected to challenge this received wisdom, such as shareholders and other stakeholders, have instead responded to normative behavioural pressures that have, crudely speaking, cherished form over substance. As a result, a status quo has become entrenched, acquiring a legitimacy that is arguably unjustified given what is at stake.

3.5 Conclusion

Current approaches to corporate water risk disclosure are fundamentally unsatisfactory when applied to understand the scale of the challenges faced. Efficiency targets offer a superficially attractive benchmark of improvements in company performance, but diminishing marginal returns on efficiency investment will inevitably render such measures progressively less meaningful. A more useful approach would incorporate targets 'beyond the fence line', but companies behaving rationally are unlikely to expose themselves to the execution risk that this implies; notwithstanding the momentum towards greater transparency identified in the literature (Meyer J., 2010).

A CRITIQUE OF PREVAILING BEST PRACTICE

This paper raises questions on the quality of corporate engagement with water risk. Institutionalism and resource dependence combine to render companies risk averse and path dependent in terms of their disclosure. Complexity, uncertainty and normative pressures appear to entrench the status quo. And while company management are likely to be cognisant of the operational consequences of physical, reputational, regulatory, and litigation issues, their response – inasmuch as the disclosure is a barometer – appears to focus on socialising water risk as concept amongst a broad group of external stakeholders. The fact is that the challenges faced are granular rather than conceptual, and this approach is diffuse, often incoherent, and fundamentally unfit for purpose.

So what will break the status quo? The consequences of inadequate investment in mitigating water risk would probably eventually manifest themselves in a company's financial statements, although the timing and impact of this is obviously difficult to call. However, if the OECD projections are accurate, there is a requirement for some US\$ 100 billion to be invested in water infrastructure *every year for a decade* between 2020 and 2030. These are difficult numbers to contextualise, but it seems reasonable to assume that the absence of this investment will have a very real impact on the societies where this infrastructure is most needed.

Who is capable of making such investments, and what is their motivation to do so? To the extent that future water infrastructure is financed by companies' balance sheets, this is the real corporate water risk. While risk aversion and path dependence might be responsible for disclosure that is not fit for purpose today, these same behavioural paths may be the catalysts for a new form of corporate engagement tomorrow. The models for this engagement are still embryonic, but given what is at stake they represent an exciting and important vein for future research.

Chapter 4

INVESTOR TOLERANCE OF THE STATUS QUO

4.1 Introduction

Investors appear to care more about water risk in their portfolio companies now than at any time in the past. According to the CDP, whose global water report has become a benchmark of corporate water risk disclosure, the number of investor signatories has almost quadrupled in the four years since the programme began, and is now issued on behalf of 530 investors representing US\$ 57 trillion in assets (CDP, 2013). The CDP's publicity literature claims that investors are "requesting companies to disclose business critical water-related information to inform their decision making processes and drive strategic investment" (CDP, 2013). However, while there is a growing body of both academic and practitioner literature on the topic of corporate water risk (for a sample, see Larson et al. 2012; Hepworth 2012; Sarni 2011; Barton 2010) there is almost no publicly available information that suggests how investors actually use corporate water risk disclosure to inform decision making or drive strategic investment.

This chapter seeks to understand whether investors perceive that a gap exists between the quantum of information that even the best-in-class companies disclose on water risk, and the value of this information to investors in evaluating this risk. And if there is a perceived gap, why does it exist?

INVESTOR TOLERANCE OF THE STATUS QUO

This chapter combines the extant scholarship on proximity and myopia to hypothesise a temporal relationship in the predictability of investor behaviour, in response to probabilistic events. This is then explored empirically through the lens of corporate water risk. Data has been gathered through a series of telephone interviews, primarily with the Chief Investment Officer (CIO) at fund management firms based in the UK, the USA, South Africa and Australia.

4.2 Conceptual framework

4.2.1 Proximity

While much of the proximity literature within economic geography and indeed more widely is spatially oriented, Boschma (2005) offers a multidimensional perspective that considers cognitive, organisational, social, institutional and geographical proximity. Moreover he uses this disaggregation to make the argument that “too much proximity may be harmful” (Boschma, 2005, p. 62), consistent with the ‘neoclassical’ model of proximity, but at odds with the ‘embeddedness’ model that features heavily in the proximity literature and social network theory. This model of diminishing (and ultimately negative) marginal returns on performance (Uzzi, 1997) is a helpful construct with which to frame the empirical outputs of this paper, particularly in seeking to understand whether and why a gap exists between the volume of corporate disclosure on water risk and the value of this disclosure to investors.

The capacity of actors to acquire new knowledge requires cognitive proximity, where what they learn is close enough to what they know that it be communicated, understood and processed successfully. Organisational proximity describes the level

INVESTOR TOLERANCE OF THE STATUS QUO

of autonomy and control that exists and can be exerted within and between organisations. Social proximity refers to the embedded nature of relations between actors, based on common experience, friendship or familial connections. Institutional proximity is consistent with institutional theory, but emphasises common habits, routines and established practices. Geographical proximity is defined in terms spatial, physical distances between actors.

In terms of geographical proximity, for example, one could hypothesise that an investor based in a relatively water scarce country such as South Africa would exhibit a greater awareness of the relative significance of corporate water risk within her domestic portfolio when compared to an investor based in a relatively water abundant country such as the UK, who invests in South African stocks as part of his international portfolio. This would be consistent with the home bias benefit of having access to superior soft information.

The empirical analysis in this chapter considers the multiple dimensions of proximity in terms of four discrete relationship sets. First, the relationship between interviewees and investee firms. Second, the relationship between interviewees and the investment firm they work for (typically where s/he is the most senior employee). Third, the relationship between interviewees and other geographically proximate investment firms. Fourth, the relationship between the interviewees and other non-geographically proximate investment firms.

4.2.2 Myopia

While it is fairly straightforward to proffer conceptual definitions of corporate water risk, any empirical assessment requires a more nuanced interpretation. The approach this paper takes is to frame corporate water risk in terms of probabilistic events that affect

INVESTOR TOLERANCE OF THE STATUS QUO

the shareholder value of a company. There are limitations to this approach, not least that shareholder value is hardly an all-encompassing benchmark for defining stakeholder relationships. Nonetheless it is a useful reference point to anchor interviews with investors.

One of the objectives in these interviews was to better understand the impact of myopia in investors' decision-making behaviour; in association with uncertain, probabilistic events. This is an area of growing interest in the academic literature, from modelling catastrophe risk (Froot, 2001; Kunreuther, 2002; Patel, 2005; e.g. Posner, 2004) through to understanding the causes and consequences of financial crises (Barrell & Davis, 2008; Clark, 2011; Dallas, 2011; R. Lee, Clark, Pollard, & Leyshon, 2009).

The disaster myopia hypothesis was originally proposed by Guttentag and Herring in 1984, and subsequently developed by them in a series of papers. It was offered as an explanation of the tendency of the financial system to become increasingly vulnerable to major shocks during long periods when no such shocks appear (Guttentag & Herring, 1984, 1986). Their work is being cited more than two decades later by senior central bank officials (e.g. Haldane, 2009), amongst others, mainly because of two heuristics they incorporate which, they argue, characterise human behaviour with regard to low-probability, high risk hazards.

First, the availability heuristic refers to the tendency for decision makers to respond more strongly to risks when instances of those risks are more available to them from memory or imagination. The heuristic was originally described in the literature some forty years ago (Tversky & Kahneman, 1973), and popularised by the outputs from various experiments which consistently showed that, even where probabilities could

INVESTOR TOLERANCE OF THE STATUS QUO

be objectively determined, subjects tended to employ the availability heuristic (Browne & Hoyt, 2000; Cohen, Etner, & Jeleva, 2007; Cortner, Gardner, & Taylor, 1990; e.g. Kahneman, Slovic, & Tversky, 1982). In short, the heuristic is at work when decisions are made using information that more easily captures their attention, rather than baseline data (Clark, Duran-Fernandez, & Strauss, 2009).

Second, the threshold heuristic (Simon, 1978) is an implicit rule whereby managers allocate their attention – a scarce resource – on the basis that when the probability of an event reaches some critically low level, it is treated as if the probability is in fact zero. Guttentag and Herring combine the availability heuristic with the threshold heuristic to define disaster myopia as the tendency to underestimate shock probabilities. The probability of a shock event is inversely correlated to the length of time that has elapsed since the previous shock event, and at some critical point is treated as if it was zero (Guttentag & Herring, 1986).

Other scholarship considers myopia in terms of future rather than past events. As Clark observes, people have steep discount functions such that they value the present and near future much more than the distant future (Clark, 2011), and are not receptive to inter-temporal trade-offs (Ainslie & Haslam, 1992b) where an equivalence in value is applied between the present and the future. That people discount the future, i.e. they prefer a smaller reward now to a bigger reward later, is a widely accepted predisposition. However, attempts have also been made to give shape to people's future expectations, including Ainslie and Haslam who propose hypobolic discount functions where people value the immediate future, sharply discount the intermediate future, but give more weight to the long term over the intermediate future (Ainslie & Haslam, 1992a). However, this is inconsistent with experimental evidence on the shape of people's discount functions (see e.g. Clark, Caerlewy-Smith, & Marshall,

2006), and indeed most empirical data points to individuals' inability or unwillingness to conceptualise their long term interests or to act consistently over time.

4.3 Method

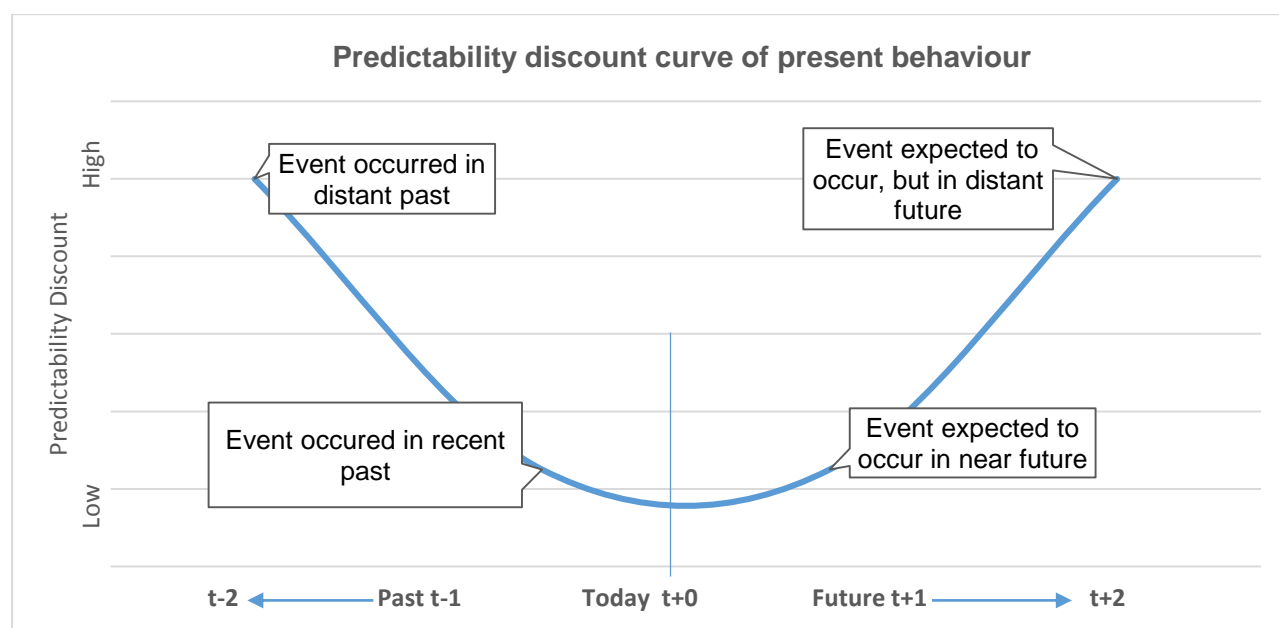
This thesis draws on the literature of proximity, bias and myopia to propose that an asymmetric 'predictability discount curve' exists: where an investor's behaviour *today* in response to a probabilistic event that will affect shareholder value becomes more unpredictable the further into the past (or future) that a comparable event occurred (or was expected to occur).

The proposed predictability discount curve incorporates four hypotheses. First, that where a risk event has occurred in the recent past, investor behaviour is relatively predictable: even though the behaviour itself is afflicted by the 'gambler's fallacy' of underestimating the probability of a repetition (Cortner et al., 1990; Winter & Fried, 2000). Second, that where a risk event is anticipated to occur within the near future, investor behaviour is also relatively predictable: although rare events may be overweighted when prior probabilities are explicitly specified, due to salience and availability heuristic (Cutler & Zeckhauser, 2004). Third, that where a risk event occurred in the distant past, investors apply the threshold heuristic and allocate no attention to its antecedents. Investor behaviour in anticipation of this event is not predictable, as the literature on experience-based choice attests (see e.g. Rakow & Newell, 2010). Fourth, where a new risk event is expected to occur, but not in the near future, investors apply a form of the threshold heuristic and behaviour is again unpredictable. Although small probability events are often underweighted (Hertwig &

INVESTOR TOLERANCE OF THE STATUS QUO

Erev, 2009), salience may be increased by, for example, films featuring a post-apocalyptic future, such as *Avatar* (2009). Critically, no temporal dimension defines an explicit time period; these vary depending on the salience of specific issues.

Figure 10: Temporal Myopia and Probabilistic Events



Source: (Money, 2014c)

In summary, it is hypothesised that investor behaviour is predictable when risk events have occurred in the recent past or are expected to occur in the near future. However, investors underweight the risk of events in the recent past recurring, and overweight the risk of events occurring in the near future. For risk events that last occurred in the distant past, or are only expected to occur beyond the near future, investor behaviour is unpredictable, even where there is a high confidence that the event will occur at some point, and that its impact would be material. However, uncertainties associated with the timing of future risk means that the curve is shaped less by temporal

INVESTOR TOLERANCE OF THE STATUS QUO

discounting and more by salience and the availability heuristic. Meanwhile the threshold heuristic contributes to myopia in present behaviour.

The rest of this chapter attempts to test the conceptual validity of this predictability discount curve empirically, based on interviews with professional investors on the subject of corporate water risk. Uncertainties associated with this topic are particularly high due to complex permutations in terms of cause and consequence. Baseline data such as demographics, changing consumption patterns, climate variability and so on have contributed to a consensus that such risks exist, but there is little agreement on when these risks will impact shareholder value, or the magnitude of the impact (see e.g. M. Crawford & Seidel, 2013).

Some 75% of the interviewees are Chief Investment Officers (CIOs), with more than 10 years' of experience in their current or similar role. By targeting CIOs rather than, for example, Socially Responsible Investment (SRI) personnel, the chapter seeks to extend beyond the territories typically occupied by academic studies in this area.

4.4 Approach

The sample was screened to include only those fund management firms that were signatories to *both* the UN Principles for Responsible Investment (UNPRI), and the Carbon Disclosure Project's Water Disclosure (CDPW) report. As such, they could be considered 'exemplar' investors from the perspective of engagement with corporate water risk. At the time of analysis (June 2012) there were approximately 980 investment manager and asset owner signatories to the UNPRI worldwide, and some 470 comparable signatories to the CDPW. Asset owners were excluded on the basis

INVESTOR TOLERANCE OF THE STATUS QUO

that the management of these assets was often contracted out, and a further geographical screen was applied to the signatory lists. Only qualifying firms based in Australia, South Africa, the UK and the USA were approached. This filter was applied to make the administration of telephone interviews more manageable in terms of common language, volume of respondents and timeframes. The choice of countries was also deliberate to facilitate comparisons. Based on these screening criteria, a total of 60 investment managers were identified, of which 12 were based in Australia, six in South Africa, 24 in the UK and 18 in the USA.

Interviews were conducted between June and August 2012 via Skype during the respondents' local business hours, recorded as digital audio files, and transcribed thereafter. A series of semi-structured questions was developed for the calls. It was made clear when contacting investors that all responses would be gathered on an anonymous and non-attributable basis, and that any requests for additional confidentiality would be observed. In total, responses were received from 20 of the institutions contacted, and telephone interviews were completed with 12 investment managers. The response rate varied markedly by country, with Australia at 33%, South Africa at 50%, the UK at 8% and the USA at 17%. Each interview lasted an average of 19 minutes, so while the sample size is small the extent of individual engagement was meaningful. The respondents were generally highly experienced, with 75% stating they had held an equivalent position for at least ten years. They represent firms of various size, with 50% running investment teams of 5-20 professionals, 42% running teams of more than 20 professionals, and the remainder, between 1-4 professionals.

The questionnaire covered six topics: perceptions towards corporate water risk disclosure; engagement with their portfolio companies; internal processes and decision making; the relevance of proximity; a self-assessment of their salience as

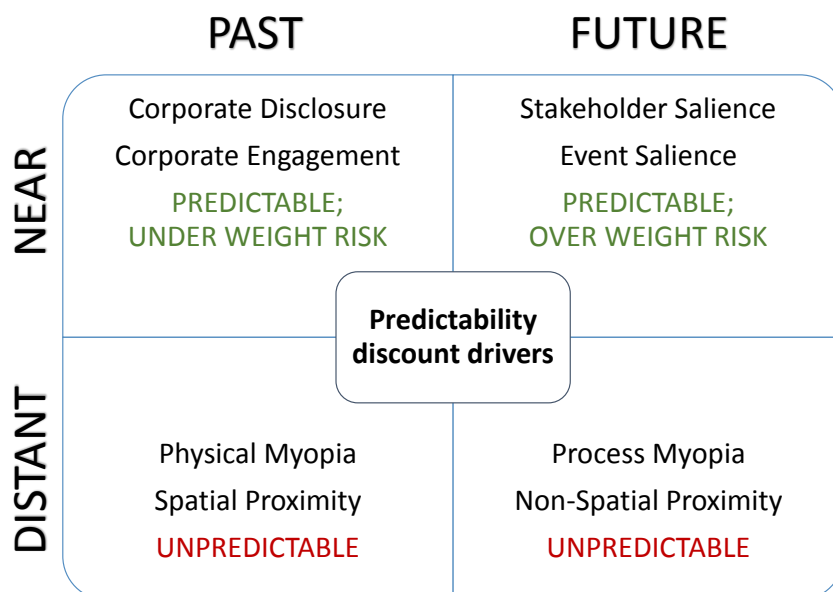
INVESTOR TOLERANCE OF THE STATUS QUO

stakeholders; and future priorities. All respondents were invited to comment on any other aspects of the topic that they wished to.

4.5 Discussion

The discussion incorporates two components. First, the multiple dimensions of proximity, and their boundaries, are considered with reference to the four discrete relationship sets described within the conceptual framework section. Second, the proposed predictability discount curve is framed within four temporal dimensions of the distant past; the near past; the near future; and the distant future. For each dimension, drivers of the predictability discount in investors' present behaviour are identified. For both components, the discussion makes reference to the interviews conducted with CIOs and other senior investors which form the empirical basis of this paper.

Figure 11: Predictability of Investor Behaviour



Source: (Money, 2014c)

4.5.1 Dimensions of proximity

Interviewee and investee firm

In terms of the first relationship set, the hypothesis was that cognitive proximity would be a necessary condition for interviewees to engage with firms regarding disclosure, and indeed it is found that where interviewees have low overlaps in knowledge on water risk their engagement with firms is also very low. However, there was also some tentative evidence that, where the overlap is particularly high, engagement again falls away – perhaps because interviewees feel they ‘know it all’ already, or because it was perceived to be fully ‘priced in’ to the valuation. It was also hypothesised that a positive cognitive relationship would exist between the geographical proximity of the interviewee to the investee firm, consistent with the home bias literature. Here, again, the results were surprising: interviewees based in ‘water scarce’ countries (defined here as South Africa and Australia) appear to discount corporate water risk for local companies in their portfolio to a greater extent than interviewees based in ‘water abundant’ countries (defined here as the UK and USA) would discount this risk for South African or Australian companies in their portfolio. A possible implication is that geographical proximity has less resonance than other forms of proximity, although caution is required given the small sample size.

Interviewee and their firm of employment

In terms of the second relationship set, the hypothesis was that social and institutional proximity are necessary conditions for interviewees to share a common and consistent view on the significance of corporate water risk with the portfolio managers at the firm they lead. This distinction is relevant because the interviewee (usually CIO) is typically not responsible for picking individual stocks for the portfolio; but instead sets (or helps to set) the overall strategy for the firm. If there is a perceptual gap between strategy

INVESTOR TOLERANCE OF THE STATUS QUO

setting and stock selection, this might explain tolerance of the status quo in terms of corporate risk disclosure. The evidence in this paper points to close social proximity, facilitating the exchange of tacit knowledge between the investment team that is consistent with ‘communicative rationality’ (Lundvall, 1993; Maskell & Malmberg, 1999). However, the interviews suggest that there was little in the way of debate or discussion on water risk amongst the senior investment team – even though the firm itself was a public signatory to not just one but two charters that emphasised the importance of exactly this engagement.

Interviewee and geographically proximate competitor

In terms of the third relationship set, the hypothesis was that interviewees benchmark their engagement on corporate water risk against geographically proximate competitors. It assumed that the geographical proximity of the investment firms relative to perceived levels of water risk would combine with organisational and institutional proximity to mean that interviewees showed professional interest and empathy with how their competitors within their home country evaluated corporate water risk, on the basis that the issue was similarly understood. In reality, this assumption did not stand up to any empirical security. Many interviewees appeared to regard their geographical proximity to other investment firms as essentially irrelevant to producing a common view of corporate water risk. While there was evidence of a network effect from geo-social proximity – for example in the commonly cited anecdotes amongst Sydney-based interviewees about Australia’s drought, floods and wildfires – there was the noticeable absence of a network effect from geo-institutional proximity – for example, each of the South African interviewees interviewed regarded their domestic competitors as much more parochial and unsophisticated than they were in engaging on corporate water risk.

INVESTOR TOLERANCE OF THE STATUS QUO

Interviewee and non-geographically proximate competitor

In terms of the fourth relationship set, the hypothesis was that interviewees benchmark their engagement against proximate competitors, where this proximity is explicitly non-geographic. The objective was to identify whether non-spatial network effects could be identified across the geographical parameters of the research, and if so to consider their contextual position against dimensions of proximity. Here, the proximity theory developed by Boschma and others has proven to be reasonably predictive of observed outcome. Many of the largest investment management firms surveyed have headquarters in London, Edinburgh, Boston and New York; all cities in 'water abundant' countries. The interviewees based in these cities appeared to be more engaged on the issue of corporate water risk than the interviewees based in Johannesburg, Cape Town and Sydney. Some of largest firms in the water abundant cities appear the most engaged, but even the smaller firms in water abundant companies were significantly more engaged than the largest firms based in water scarce countries. This appears to be a function of organisational proximity (Kirat & Lung, 1999) – access to dedicated resources committed to evaluating corporate water risk, for example – but other non-geographic dimensions of proximity also appeared salient, in the interviews. Social awareness of the difference in conditions between the investment firm's offices and the local environment faced by the companies in which the firm invested was a common theme amongst the most engaged interviewees. It could also be hypothesised that interviewee awareness of the issue was higher e.g. in London and New York because they are popular destinations for conferences on topics such as these. Indeed this is consistent with, and a possible counterpoint to, scholarship that highlights the axis of influence that global financial centres wield (see also Wojcik, 2013).

4.5.2 Boundaries of proximity

The neoclassical model ascribes a lock-in effect from ‘too much’ social and institutional proximity (Uzzi, 1997), where inertia becomes a preferred response to challenge the status quo, with the perceived adverse consequences this may have for individuals’ self-interests (bonus and promotion prospects, the ‘ear of the CIO’, perceived weakness in front of subordinates etc.). The literature proposes (Boschma et al., 2002; from Uzzi, 1997) an inverted ‘U’ relationship between embeddedness (taken here to mean high cognitive, social and institutional proximity) and innovative performance (taken here to mean investor engagement with corporate water risk). Boschma (2005) argues that proximity has a positive influence on engagement up to a certain threshold (contrary to neoclassical thinking, which emphasises the risk of lock-in and inertia), after which these positive effects can turn negative when the embedded relationships become too closely tied.

One implication of the interview responses – that there may be nothing inherently spatial about networks (Boschma, 2005) – has support in the literature (e.g. Breschi & Lissoni, 2001; Bunnell & Coe, 2001; Malecki & Oinas, 1999; Rallet & Torre, 1999). However, much of the extant empirical work in this area focuses on innovation and learning: this thesis makes a new and unique contribution in considering geo-social and geo-institutional proximity from the inter-firm perspective of CIOs at investment management companies. Finally, the connections in the ‘u’ relationship between embeddedness and performance and the ‘n’ relationship within the predictability discount curve may be a fruitful avenue for future research.

4.5.3 Dimensions of predictability

Near Past

It is proposed that the predictability of investor behaviour in response to risk events in the near past is shaped by corporate disclosure and engagement. Over the last five years, a status quo appears have developed around perceived best practice in corporate water risk disclosure. Money (2013) argues that this is being shaped by companies' resource dependence within their supply chain and mimetic process by their peers. Legitimacy is being accorded to formats of disclosure that emphasise, for example, improvements in water efficiency, or political engagement and collaboration. Moreover, much of the extant corporate water risk disclosure appears to have been shaped by institutionalised normative processes that involve the corporate social responsibility (CSR) functions within a company determining the form and content of disclosure (Money 2013).

In the study, the interview commenced by respondents being asked their views on the CDP Water Disclosure Report (CDP, 2012), the de facto bellwether for water risk disclosure to investors. Strikingly, only 58% of respondents were aware of the existence of this report, let alone that their own firm were signatories to it. Respondents were then asked whether their firm reviewed corporate disclosure against the Global Reporting Initiative (GRI) indicators. Just 17% of respondents claimed to evaluate disclosure of GRI data. Indeed, only 25% of respondents cited company disclosure as their primary source of information when evaluating corporate water risk.

Interviews with CIOs pointed to scepticism – verging on cynicism – of the value of water risk disclosure within CSR reports. At its most benign, it was regarded as of possible descriptive interest, but unlikely to meaningfully affect perceptions of

INVESTOR TOLERANCE OF THE STATUS QUO

shareholder value. Less benign comments included several observations that disclosure was increasingly focused on “managing what is measured”, rather than “managing what is meaningful”, and that materiality of risk did not appear to be an applied criterion. Among the most hostile responses were from investors who regarded the entire approach by corporates to water risk disclosure as little more than a public relations exercise.

In terms of corporate engagement, many respondents expressed frustration at the classification – by companies, asset owners, consultancies and others – of water risk as an ESG issue. Current approaches were described as “a triumph of heat over light”, with shareholder value often being squandered by corporates paying for consultancy services where the outputs were at best derivative and ambiguous. Third party initiatives to provide water risk assessment tools were considered well-meaning but ultimately ineffectual. Several respondents took the view that until water risk was somehow embedded within financial reporting disclosure, corporate engagement on the topic was not going to be taken particularly seriously by investment managers.

The generally dismissive view taken by CIOs on corporate water risk disclosure appears to exist despite – or perhaps because of – their awareness of risk events in the recent past. As one investor put it, “I cannot begin to tell you how many times I’ve heard someone tell me that the floods in Thailand cost Dell millions of dollars. So what? It doesn’t mean it is going to be an annual event.” Indeed, a few anecdotal narratives have achieved a high velocity of circulation. Other examples included the classification of water supply crises as a top 5 global risk by the World Economic Forum (Forum, 2011); and the McKinsey report that warns of a 40% gap between water supply and water demand by 2030 under business as usual (2030 Water Resources Group, 2010).

INVESTOR TOLERANCE OF THE STATUS QUO

The publicity associated with these narratives undoubtedly increases their salience, but respondents commented that the drivers of the publicity were often the consultancies or agencies who were selling an ESG-related service. As a result, investors appeared to apply a discount to the veracity of the narrative (i.e. “well they are bound to say that”) which, combined with the gambler’s fallacy effect, meant that investors possibly underestimate the probability of a recent water risk event recurring.

These findings are supportive of the assertion that shareholders in companies that are exposed to corporate water risk appear to accept the structural inadequacies of the prevailing disclosure regime, because they perceive their salience on this topic to be low. The assertion is also consistent with a dynamic relationship between stakeholders and a firm’s managers, in which stakeholder attributes are variable, not steady state. Moreover, the attributes are socially constructed reality, where it is perception rather than objectivity that matters. It is also important to note that consciousness and wilful exercise may or may not be present. So shareholders may exhibit a passive acceptance of the status quo in terms of lack of salience without having consciously considered the implications with regard to a structurally inadequate disclosure regime.

Based on the responses from this study, at least, investor behaviour in response to corporate disclosure and ESG engagement is generally predictable. Investors widely regard current disclosure as generally unfit for purpose, and – inasmuch as the subject is raised at all – would be exhorting companies to focus on materiality in their disclosure, and to step away from descriptive, qualitative CSR content (“fewer glossy photos of poor kids playing next to sprinklers please”) in favour of data that can be quantitatively evaluated, meaningfully. Arguably the increase in the number of investor signatories to the CDP Water Disclosure Report is symptomatic of this predictive

INVESTOR TOLERANCE OF THE STATUS QUO

behaviour. However, a degree of cynicism is evident amongst some CIOs regarding even these initiatives.

Near Future

It is proposed that the predictability of investor behaviour in anticipation of risk events in the near future is shaped by perceptions of relative salience. This is best understood in terms of stakeholder salience and event salience.

First, in terms of stakeholder salience, only 25% of respondents believed that shareholder interests should be the top priority for companies when managing water risk; while 75% of respondents believed that consumers or regulators should be the top priority:

“Our clients are obviously our priority and similarly for our portfolio companies it might be consumers, or local communities, or maybe government, depending. But the top priority is unlikely to be shareholders.” SA06

“Water regulators in every country know the issues better than anyone. They're working on these things day in and day out. They know much more than investors in London. We're bringing power to the table but not much else. For example, if I want to know about water issues in Mongolia it is easier for me to get a water expert at Coke to talk about them than it is to get the Mongolian regulator. As far as the Mongolian regulator is concerned, my query is not that important. But for Coke, I am powerful [as a shareholder], so they will talk to me, even if they're not the best qualified to answer my questions.” US09

“Our clients say they want us to do ESG stuff and engage with companies in changing behaviour, but in truth they don't want us to spend much of their money doing it. So our mandate is perhaps weaker than it could or probably should be, given our position as shareholders and our belief in sustainable behaviours. There isn't much follow up, and I think a lot of our competitors who claim otherwise are doing some quite cynical green-labelling.” AU08

Investor behaviour is likely to be sensitive to perceptions of changes in regulatory activity or consumer behaviour in the near future, and indeed this is intuitive. However,

INVESTOR TOLERANCE OF THE STATUS QUO

this also suggests a passive role for investors, who apparently perceive their long term interests as beneficial owners of the company to be better served by effective non-involvement in the company's decisions on management of water risk. Certainly this is not a universally held position (Hayek, 2013) and stands apart from the momentum that has built behind increased shareholder activism in recent years (see e.g. Rock, 2013 for a summary). But it is nonetheless consistent with emergent literature that proposes normative arguments for managing shareholder interventions, and rolling back some of the power that activist shareholders have gained (Bainbridge, 2013).

In reality, these relationships are probably more nuanced. Perceptions of relative salience may contribute to investors effectively abrogating their sense of responsibility in influencing corporate behaviour on water risk, while simultaneously taking a more activist position on issues where they regard their relative salience to be much higher, such as executive remuneration. It would also help explain why the status quo has endured for corporate water risk disclosure that is unfit for purpose (Money, 2014b). Separately, whether or not it results in investors over-weighting a probable risk event, as the literature suggests, has not been tested empirically in this paper. It is rare for prior probabilities of a water risk event to be specified explicitly, and so the significance of the availability heuristic may be diminished in the decision making process.

Stakeholder theory literature (Mitchell et al., 1997) describes stakeholders in possession of all three attributes of power, legitimacy and urgency as 'definitive', with the highest salience. Based on this exercise in self-perception, it would be difficult to describe shareholders as definite stakeholders when it comes to water risk. They see their power as moderate, their legitimacy as ambiguous, and exhibit an apparent lack of urgency, both within their own investment decision making process and in terms of

INVESTOR TOLERANCE OF THE STATUS QUO

their expectations of the company. Combining individual attributes does not appear to increase salience.

Second, in terms of event salience, it is proposed that investors typically regard water as a derivative risk, associated with either actual or anticipated events in the near future. That is, corporate water risk is generally secondary to the event itself. An example of such an event would be hydraulic fracturing (fracking) in order to retrieve shale gas:

“We are keenly aware that water is a key resource and increasingly short in supply, but we don't have an overarching view on water. Water comes up not as a top down issue but will be raised informally as a bit of a chat when discussing a topic e.g. shale gas, or the beverage sector. We talk about water risk a lot but don't think it is changing our views.” AU10

“We have seen [from the US] that fracking has the potential to dramatically reduce gas prices, so companies engaging in these activities are obviously of interest to us as investors. But the jury is still out in terms of the implications for water quality and supply. The extractive sector is a concrete example of where we would look to understand water risk.” UK20

In the case of event salience, the relevance of the availability heuristic in framing investor behaviour is likely to be significant. The heuristic is at work when decision makers base judgments on information that more easily captures their attention (Vasiljevic, Weick, Taylor-Gooby, Abrams, & Hopthrow, 2013). The risks associated with fracking would almost certainly be capturing more of this attention now than, say, a decade ago, despite the fact that the process has been in commercial use for more than half a century (Montgomery & Smith, 2010). The subject has garnered exposure in high profile academic journals (e.g. Howarth, Ingraffea, & Engelder, 2011) as well in popular media, which can fuel the availability bias (Maguire & Albright, 2005). When unlikely events are explicitly stated – such as flammable methane escaping from

INVESTOR TOLERANCE OF THE STATUS QUO

household water taps (e.g. Mooney, 2011) – the outcomes become salient. Events that elicit a strong emotional reaction may be given too much weight relative to their probability (Viscusi, Magat, & Huber, 1987). Investors, responding to media coverage of risks to ground water as a consequence of fracking, may overweight this risk relative to its probability within their decision making process.

Taking stakeholder salience and event salience together, it is proposed here that the predictability of investor behaviour in anticipation of corporate water risk events in the near future is relatively high, and that as a consequence of the availability heuristic, investors overweight these risks in their decision making process.

Distant Past

It is proposed that the predictability of investor behaviour in response to risk events in the distant past is shaped by physical myopia and spatial proximity. Physical myopia is defined here as associated with the threshold heuristic, where the probability of a shock event is inversely correlated to the length of time that has elapsed since the previous shock event, and at some critical point is treated as if it was zero (Guttentag & Herring, 1986). The timeframes vary depending on the issue, and respondents' answers suggest that for weather-related events, for example, the threshold heuristic applies after even relatively short periods have elapsed.

Interviews were conducted between June and August 2012, and investors in Australia wryly observed that if questions regarding water risk had been asked two years previously, when the country was exposed to severe drought, responses would likely have been more exercised, as water insecurity “was something of a national obsession.” However once the drought ended it rapidly receded as a topic of discussion during investment review meetings. Meanwhile, in South Africa

INVESTOR TOLERANCE OF THE STATUS QUO

respondents cited the unusually cold winter at the time of the interviews, with rare snowfalls in Johannesburg, as probable evidence of the impact of climate change, and the impact this could likely have on water insecurity. Investors in the UK said that the very wet summer could be indicative of changing weather patterns under anthropogenic influence. And investors in the USA observed that the wild fires in California and drought conditions states such as Arizona had placed issues of climate change and water insecurity “right back on the agenda” in American society and politics.

This arguably implies a myopic focus on current or recent weather patterns in shaping the predictability of investor behaviour in evaluating water risk. Weather patterns of the ‘distant past’ – a timeframe that might be no more than three or four years in this case – are not forgotten, but the attention allocated by investors to evaluating consequential water risk based on this history, effectively moves towards zero. One respondent’s definition of “climate is what you expect; weather is what you get” is an apt, if slightly glib, characterisation of this. Where observed weather is at odds with climate expectations, probabilistic risk evaluation is jettisoned in preference for decision making that is influenced by physical myopia. As a consequence, the predictability of their behaviour based on baseline information from the perceived distant past, is low.

Physical myopia as conceptualised here is distinct from construal level theory, which proposes that temporal distance changes the way people mentally represent events (Trope & Liberman, 2003). Specifically, the notion of ‘high level construals’ – abstract features that capture the perceived essence of the event – that are more likely to be present the greater the temporal distance, does not form part of the conception. Trope and Liberman suggest the informational and evaluative implications of high-level

INVESTOR TOLERANCE OF THE STATUS QUO

construals have more impact on responses to distant-future events than near-future events. However, responses from investors provided no empirical evidence that perceptions of change in climate – a high level construal – played a part in the decision-making process for investment; whereas responses suggested that weather – a low level construal – had some salience in the process. Also, the significance of distance, be it temporal, spatial or societal – which is a defining element of construal level theory (Yaacov Trope & Liberman, 2010) – is less relevant in physical myopia. For example, the weather three years ago appears to have no greater impact on the investment decision making process than the weather ten years ago.

Academic research on ‘home bias’ (Ahearne, Grier, & Warnock, 2004; e.g. French & Poterba, 1991) has focused on the perceived information advantage for local investors, and implicitly assumes a degree of information immobility as knowledge somehow becomes domestically embedded. In this study, investor responses were also contextualised by their physical proximity to water scarcity. Investors based in Australia and South Africa were considered to be more proximate to water scarcity, while investors based in the UK and the USA were considered to be less proximate. Respondents from the USA were based on the east coast.

The majority of respondents (83%) agreed that where they lived affected their perceptions, as an investor, of corporate water risk. However, their responses to the question of how this influenced their investment process were ambiguous. For example, an investor in South Africa pointed out that while he had first-hand exposure to water insecurity and recognised it as an investment risk, he was constrained by his mandate to invest in domestic stocks and made no conscious adjustments to his portfolio as a result. Meanwhile an investor in the UK said that although she had no exposure to water insecurity as part of her domestic arrangements, her job called on

INVESTOR TOLERANCE OF THE STATUS QUO

her to travel extensively to regions that experienced water stress. Herewith a flavour of the verbatim responses in response to a question on whether they perceived where they lived to affect their evaluation of water risk:

"I own a rural property 100 acres NW of Sydney. All the farmers care about is fire and water. Australia is the most urbanised country in the world so city folks and politicians don't understand importance of water to the country." AU02

"I live by the sea, in Cape Town. There are lots of dams but summers are hot and dry and the municipality says you cannot water gardens before 6pm, and only twice a week. Lower rainfall and falling rivers means we cannot use water the way we like. Municipalities have been encouraging households to think about how they use water to promote efficiency, which is good." SA03

"I was visiting a friend in Cape Cod and they are recycling the rain water as wells are so expensive. I go to holiday in the Caribbean where I see them recycling water. I have a condo in Maine and because water is too expensive they don't have hydrants in the street. And I have seen wildfires in Colorado and California this year. It all seems interrelated." US17

"From a UK perspective we are not used to worrying about water, but I have spent time in the Hebrides and even there in the summer there are limitations. Generally there is more of an awareness now than say 10-15 years ago, when the mantra was all about free water. From a UK perspective this is down to the marginal supply cost." UK01

Nearly all investors in South Africa and Australia said that while they felt that *they* understood these issues well, their view was that other domestic investors did not. It was, they thought, therefore largely ignored, and they felt there was no investment advantage to them in applying a premium or discount to local companies variously affected by water risk. They supported this by suggesting that other domestic issues loomed much larger amongst local investors – such as labour relations, energy availability and government policy – such that any adjustments based on water risk would be eclipsed by these bigger considerations.

INVESTOR TOLERANCE OF THE STATUS QUO

While the small sample size of interviewees precludes a meaningful interpolation of responses, it is proposed that the further investors become embedded within their domestic environment, the more they discount their relative proximity to historic and persistent water scarcity (a risk since the distant past) as a factor in evaluating corporate water risk. This may be a result of conditioning to a water-scarce environment, where supply disruptions and a heavy emphasis on recycling are part of the norm. Conversely, for investors conditioned to a water abundant environment since the distant past, their awareness of the contrast in conditions as a result of travelling to water scarce regions translates to a comparative advantage in knowledge and information. Perhaps in these circumstances, home bias actually results in investment under-performance, as non-domestic investors find themselves better able to evaluate corporate water risk in regions where that risk is material. Of course this contention cannot be substantiated by the findings here, and in any event attributing relative investment performance on the basis of water risk evaluation would be a fiendishly complex exercise. However, the relationship between time and spatial proximity to water risk is complex. Where this length of time is perceived – by the investor – to extend into the distant past, the predictability of their behaviour in response to water risk events diminishes, as other considerations increase in influence.

Distant Future

It is proposed that the predictability of investor behaviour in response to risk events in the distant future is shaped by process myopia and non-spatial proximity. Process myopia is defined here as the unconscious unwillingness of investors to adapt their process of risk evaluation in response to changes in baseline information. It is related to hindsight bias where, after an event, investors believe they knew the outcome of

INVESTOR TOLERANCE OF THE STATUS QUO

that event before it actually happened (Roese & Olson, 1996). This provides a false sense of being able to predict the future. Investors who succumb to hindsight bias overestimate their capacity to predict and manage risks (Christensen-Szalanski & Willham, 1991). As a consequence they did not adapt their investment process to incorporate improved baseline information as they 'know it better'. While laboratory research suggests (Hertwig, Fanselow, & Hoffrage, 2003) that the more experience or expertise individuals have, the smaller the hindsight bias, field experiments (Golden, 1992) show that education and years spent with an organisation – a proxy for experience – did not influence recall (Cassar & Craig, 2009). This is supportive of the argument that process myopia can become institutionally embedded within investment management firms. And because the risk event is, or is at least perceived to be, in the distant future, the instances in which these hindsight biases face direct scrutiny may be few and far between.

Investors were asked what proportion of their portfolio companies had proactively engaged them in a discussion about water risk. All respondents said less than one third of companies had engaged, and a heavy majority stated that no company had ever engaged them on the topic. Meanwhile only 25% of respondents claimed to discuss water risk as part of their internal investment process, at least monthly. Of the 58% who said it featured at least quarterly, none claimed a regular, explicit discussion of corporate water risk within their decision-making framework.

"People tend to sit round saying water is the next big risk, but a lot of the research shows that corporate risk looms less large than we perceived to start with. Citigroup did a piece surveying mining projects around the world; which ones were at risk due to water scarcity, and it found that very few are. I send my analysts to meet companies and the management of one ASX 20 says that water is the last thing that keeps him awake at night. This is what I often hear. There is a gap between perception and reality in corporate water risk which is at odds with the social side." AU12

INVESTOR TOLERANCE OF THE STATUS QUO

“We take a rifle rather than shotgun approach to our investing, and look at companies on a bottom-up basis. So while water risk will matter more or less for some companies in our portfolio, I just don’t see it as some big thing that will suddenly lay waste to valuations. We just need to factor it in on a case by case basis.” AU10

Process myopia also appears to become embedded because investors assume, when it comes to risks anticipated over the distant future, that companies are better prepared than their disclosure implies. This assumption does not appear to be empirically substantiated, however. The argument offered is that companies (and by implication their management), are ‘nearer to the coal face’ of water risk, and are better positioned to see, anticipate and respond to water risks. The actions companies take may not feature in their disclosure, according to investors, because it may be competitively sensitive, or more likely may be socially or culturally incompatible with the company’s initiatives in community development. This may seem a somewhat cynical assessment, but is based on a view – evidently held by many CEOs – that legitimate distinctions exist between what a company does and what it discloses when it comes to the husbandry of scarce resources such as water, with the attendant rights and obligations that are associated with their use. It is, however, almost impossible to comprehensively test the veracity of this view, given the difficulty in establishing the counterfactual, i.e. how can one test *ex ante* whether a company’s actions over the distant future are distinct from its disclosure.

It was previously proposed that the predictability of investor behaviour in response to risk events in the distant past is shaped by spatial proximity. When it comes to risk events in the distant future, investor behaviour appears to be associated with other, non-geographic forms of proximity. For example, respondents from firms where CIOs took an active part in the investment decision-making process, and would frequently

INVESTOR TOLERANCE OF THE STATUS QUO

travel around the world to visit investee company operations, would typically have a more common view on water risk than other respondents who might be geographically proximate, but travel less. It suggests that investors at global institutions which share proximate cultures, values and process may collectively exhibit a greater awareness of local issues such as water risk, and may do relatively more to incorporate that risk within their investment process than domestic investors who have more experience of the local issues, but whose collective cultures, values and process results in their doing relatively less to incorporate the risk associated with those issues within their investment process. This paper does not offer substantive empirical evidence to test this hypothesis, and nor indeed was that part of the research question. But it is a potentially fruitful area for further research, particularly if it results in a better understanding of how the cognitive, social, institutional and organisational dimensions of proximity can be extended from Boschma's (2005) work on learning and innovation. In particular, further examination of institutional proximity (Kirat & Lung, 1999), organisational proximity (Meister & Werker, 2004), cultural proximity (Gill & Butler, 2003), social proximity (Bradshaw, 2001) and technological proximity (Greunz, 2003) may even point to patterns of predictability in the future that have not been identified in this research. However, the connections between institutions on this scale remain difficult to make in the context of evaluating water risk, based on the information available.

4.6 Conclusion

This chapter attempts to reconcile investors' tolerance of corporate water risk disclosure that appears to be unfit for purpose with the fact that the salience of water

INVESTOR TOLERANCE OF THE STATUS QUO

risk as an investment issue is greater now than at any time in the past. It has argued that an asymmetric 'predictability discount curve' exists: where an investor's behaviour today in response to a probabilistic event that will affect shareholder value becomes more unpredictable the further into the past (or future) a comparable event occurred (or was expected to occur). The temporal framework can be further broken out into the near past; near future; distant past; and distant future, while the drivers of predictability in investors' decision-making process have been proposed for each quadrant, based in part on responses from Chief Investment Officers to semi-structured interview questions. The status quo appears to be tolerated in part because investors assume that 'firms do more than they let on', partly as a response to managing uncertainty and interdependence, consistent with Resource Dependence Theory. In their responses, investors suggested that boards of directors played a role in ensuring that firm disclosure adapted as required to changes in the operating requirement; in line with Pfeffer and Salacik's (1978) assertion that the four benefits that directors can bring to firms are advice and counsel; channels of information flow; preferential access to resources; and legitimacy. Limitations of this study include a small sample size, but the paper primarily sets itself out to build, rather than test theory. Specifically, it offers a description of the process employed by leading institutional investors in evaluating corporate water risk in their portfolios, and, perhaps most importantly, provides a working explanation of investors' tolerance of the status quo. It also begs the question as to whether a framework can be developed by which the disclosure of corporate water risk can be meaningfully evaluated by investors and other stakeholders, and this is a subject of ongoing research.

Chapter 5

EVALUATING ISSUE SALIENCE

5.1 Introduction

This chapter defines issue salience as the degree to which a stakeholder issue resonates with and is prioritised by management (Bundy, Shropshire, & Buchholtz, 2012). It also makes opportunistic and selective use of the strategic cognition literature (Narayanan et al., 2010), which describes how managers make sense of issues within their decision-making process (Finkelstein, Hambrick, & Cannella, 2009). I explore how sense might be made of salient issues by a firm's managers in the absence of an established and sufficiently robust framework for evaluation.

This is not a study of stakeholder heterogeneity and issue diversity (cf. Roloff, 2007), nor is it an empirical analysis of the efficacy of cognitive process. Instead it draws on a widely cited theory of stakeholder identification and salience (Mitchell et al., 1997); through an interpretive adaption of its typology. This is admittedly not the first attempt to 'do something' more with Mitchell et al.'s theory: indeed it has been empirically tested by various researchers (e.g. Agle et al., 1999; Eesley & Lenox, 2006; Knox & Gruar, 2007; Magness, 2008; Parent & Deephouse, 2007), although almost exclusively in terms of 'who' rather 'what' really counts. However, it has been proposed that the extensibility of the theory has not been widely developed beyond its original conceptualisation (B. A. Neville et al., 2011), and in applying the typology to issue salience this chapter explores ground that is perhaps less well covered in stakeholder

EVALUATING ISSUE SALIENCE

theory. And, while the literature on issue salience is reasonably well developed in terms of institutional attention (e.g. Bonardi & Keim, 2005; Reid & Toffel, 2009) and organisational impact (e.g. T. M. Jones, 1991), little has been done to date (except e.g. Bundy et al., 2012) by way of developing typologies that evaluate issue salience.

My motivation for this approach comes from the desire to answer a question formed by my practitioner perspective as a former fund manager. Put simply, it is: how do managers of firms evaluate issues that appear to 'matter' to themselves as well as other stakeholders, in cases where a framework for consistent evaluation appears not to exist? At present, in these circumstances, the processes of strategic cognition within firms may deliver responses that lack consistency, clarity and predictability. The consequence of applying such responses may be deleterious to the firm's organisational (Albert & Whetten, 1985; Dutton & Dukerich, 1991) and strategic frames (Huff, 1982); in effect compromising the very processes that drive the evolution of strategic cognition.

Of course, the question itself carries the heavy weight of presumption. In their review of strategic cognition literature, Narayanan et al. (2010) discuss the managerial implications of cognitive inertia (Abrahamson & Fombrun, 1994; Hodgkinson, 1997; Reger & Palmer, 1996), suggesting that "top managers need to be proactive in challenging their own often hidden assumptions and beliefs" (Narayanan et al., 2010, p. 341) in order to secure competitive advantage. However, this suggests that cognitive inertia is purely a failing on the part of managers to respond proactively as circumstances change. I suggest that there are circumstances where even the most proactive of managers, who recognise the organisational and strategic significance of an issue, are unable to respond appropriately when they do not have a suitable evaluation framework.

EVALUATING ISSUE SALIENCE

This study proposes corporate water risk as an exemplar issue of salience to a wide range of a firm's stakeholders, but where the issue itself presents ambiguity in terms of both the firm's organisational identity – its core values and beliefs – and its strategic frames, which drive decision-making. A conceptual paper, it builds on empirical studies that explore corporate water risk disclosure as a function of resource dependence and institutional isomorphism (e.g. Money, 2014b); and investors' attitudes to corporate water risk with reference to stakeholder salience, myopia and proximity (Money, 2014c). These papers reference the extant body of academic and practitioner literature that considers the challenges of ascribing issue salience to corporate water risk.

While the taxonomy presented herein is rooted in the literature of salience and cognition, this study unabashedly aspires to managerial implications and enduring practical value for firms and their stakeholders. It proffers a heuristic in a field where few exist (Kaler, 2006), although its ability to shape management practice will ultimately be a function of its diffusion (Rogers, 1995).

The structure of this chapter is as follows. First the typology of stakeholder salience developed by Mitchell and his colleagues (1997) is briefly reviewed, and attributes – the basis for an adaptive typology for issue salience – are defined. Second, a strategic cognition approach to issue salience and firm responsiveness is summarised, highlighting those aspects that are relevant to this study. Third, a short case is made for corporate water risk as an exemplar issue that is salient, but where the managers nonetheless respond in a symbolic rather than substantive manner. Fourth, the salience of corporate water risk is evaluated with reference to the proposed typology. There follows a discussion of the implications of the theoretical model as a tool for practitioners, as well as in shaping future research.

5.2 Attribute definitions

The body of literature that is associated with Mitchell et al.'s (1997) typology is simultaneously reassuring and disconcerting. Reassurance comes from the fact that it has been widely examined by scholars who have made contributions that can be grouped thematically (see B. A. Neville et al., 2011): namely on stakeholder attributes (e.g. Driscoll & Starik, 2004; Eesley & Lenox, 2006); epistemological assumptions (e.g. B. Neville & Menguc, 2006; Pajunen, 2006) and the importance of context (Jawahar & McLaughlin, 2001; Parent & Deephouse, 2007; Pfarrer et al., 2008). The disconcerting aspect comes from the challenge implicit in making further advances, given the level of scrutiny that has hitherto been expended. However, some comfort is drawn from Neville et al.'s (2011) contention that, these contributions notwithstanding, further development of the typology itself has been limited.

Mitchell et al. (1997) propose a stakeholder classification based on the following attributes: 1) the stakeholder's power to influence the firm, 2) the legitimacy of the stakeholder's relationship with the firm, and 3) the urgency of the stakeholder's claim on the firm. The issues are socially constructed and may be a perceptual rather than objective reality (Agle et al., 1999). Their theory of stakeholder salience is defined as "the degree to which managers give priority to competing stakeholder claims" (Mitchell et al., 1997, p. 854). For a stakeholder to be 'definitively' salient to the firm, all three attributes of power, legitimacy and urgency must be present, or at least perceived by the firm's managers to be present. Where the perception is that just one attribute is present, salience will be low. Where two are perceived to be present, salience will be

EVALUATING ISSUE SALIENCE

moderate. Where it is all three, salience will be high. The framework identifies eight types of stakeholder, depending on the combination (or lack) of attributes they present. A key feature of the framework is that stakeholder attributes are variable rather than steady state; so someone may at one point in time be perceived to be powerful, but not at another, for example. It follows that stakeholder status is transitory in nature (Magness, 2008).

This thesis does not add to the already rich vein of literature that seeks to examine the validity or otherwise of these attributes (see e.g. B. A. Neville et al., 2011) or stakeholder types. Instead, it adapts the framework of relatedness to propose a new typology of issue salience.

The core argument which underpins my proposed typology is that an issue can only be evaluated by a firm's managers if they can apply judgements of: i) materiality, ii) specificity, and iii) urgency to this issue. The relevance of these attributes within the context of strategic cognition is discussed further in the next section, but I suggest here that an equivalence of sorts exists between these attributes of issue salience and Mitchell et al.'s attributes of stakeholder salience.

5.2.1 Materiality

Mitchell et al. conceptualise a Weberian definition of power as a potentially coercive relationship between social actors (Weber, 1947), and concur with Salancik and Pfeffer's description of power as the ability to bring about desired outcomes (Salancik & Pfeffer, 1974). I propose that if a stakeholder is powerful to the extent that it can "impose its will in the relationship" (Mitchell et al., 1997, p. 865), so an issue is material to the extent that it has the ability to force changes in a firm's organisational identity or strategic frames. Other conceptions of the power attribute (e.g. Driscoll & Starik, 2004;

EVALUATING ISSUE SALIENCE

B. Neville & Menguc, 2006; Pajunen, 2006) have used social network theory (cf. Wasserman & Galaskiewicz, 1994) to accord power based on a stakeholder's relative centrality within a network. Similarly the relative materiality of an issue might be understood in terms of its ability to affect the amount of attention that managers accord to other competing issues (Rowley, 1997). As to the academic literature on materiality itself, this is narrowly conceived, and largely confined to the domains of accountancy and audit. In a comprehensive review of the literature (Meisser Jr., Martinov-Bennie, & Eilifsen, 2011) some interesting perspectives emerge on the challenge of identifying what counts as material given the heterogeneity of views between auditors, preparers and users (e.g. Holstrum & Messier Jr., 1982), and the approaches firms take as a consequence (Martinov & Roebuck, 1998). However, the forty year old description of power as "tricky to define, but it is not that difficult to recognise" (Salancik & Pfeffer, 1974, p. 3) can equally be applied to materiality as an attribute of issue salience.

5.2.2 Specificity

Mitchell and his colleagues utilise Suchman's sociologically based definition of legitimacy as "a generalized perception or assumption that the actions of an entity are desirable, proper or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, p. 574). I propose that if stakeholder legitimacy is defined by its "evaluative, cognitive and socially constructed nature" (Mitchell et al., 1997, p. 866), then specificity is the extent to which an issue can be discretely evaluated by a firm's managers, within a strategic cognition framework. If an issue cannot be so evaluated, then its salience cannot be judged. Several scholars (e.g. Banerjee, 2001; Driscoll & Starik, 2004; Hybels, 1995; B. A. Neville et al., 2011; Phillips et al., 2003) have raised objections to Suchman's (1995) composite framing of legitimacy. Eesley and Lennox question "what exactly is being conferred legitimacy:

the ‘entity’ or the ‘action’” (Eesley & Lenox, 2006, p. 768). They suggest that legitimacy is being granted to the *specific issues* championed by the stakeholder, as well as the stakeholder itself. Whatever challenges this presents for Mitchell et al.’s (1997) framework, I propose that it is exactly this extensibility that makes possible the adaptive interpretation of their typology as proposed herein.

5.2.3 Urgency

Mitchell et al. (1997) define urgency as “the degree to which stakeholder claims call for immediate attention” (Mitchell et al., 1997, p. 867). They propose that urgency is a multidimensional attribute (T. M. Jones, 1991), and includes both time sensitivity (the degree to which managerial delay is unacceptable to the stakeholder) and criticality (the importance of the claim to the stakeholder). Moreover they argue that a precondition of salience is that both dimensions of this attribute must be present. In proposing urgency as the final attribute to my typology of issue salience, I follow a virtually identical path through the relevant literature. As Mitchell et al. point out, time sensitivity has been a focus of issues management (Wartick & Mahon, 1994) and crisis management scholarship for decades; where issues can become rapidly salient to a firm (Eyestone, 1978). Indeed a critique of Mitchell et al.’s (1997) inclusion of urgency as a dynamic attribute of stakeholder group salience comes from Eesley and Lenox, who propose that “it is the urgency of the request, rather than the urgency of the stakeholder group that matters” (Eesley & Lenox, 2006, p. 769). This finds some support in the psychology literature, where time pressure has been shown to make decision-makers more prone to take action (Dror, Basola, & Busemeyer, 1999). My proposal of urgency as an attribute is consistent with Eesley and Lenox’s (2006) view that there is a distinction between the stakeholder and the claim (or issue).

5.3 Strategic cognition

In their comprehensive review of the strategic cognition literature of the past two decades, Narayanan and colleagues ascribe causal importance to both structure and process of cognition in the explanation of strategy outcomes (Narayanan et al., 2010). Identified structures of cognition include organisational identity – features that distinguish the organisation from other organisations (Albert & Whetten, 1985); strategy frames (Huff, 2006); the knowledge structure that informs strategic decisions (Huff, 1982; Nisbett & Ross, 1980; Walsh, 1995); and organisational routines – information processing within an organisation to economise on cognition (Cyert & March, 1963; March & Simon, 1958). Identified processes of cognition include strategy formulation; strategy implementation; strategic change; and organisational learning. Outcomes identified by Narayanan et al. (2010) from the strategic cognition framework include process outcomes (e.g. decision attributes); strategic actions (e.g. resource allocation); and economic outcomes (e.g. stock market valuation).

In presenting their strategic cognition view of issue salience, Bundy et al. (2012) position organisational identity and strategy frames as “integral and interrelated components of the issue interpretation process” (Bundy et al., 2012, p. 353). They conceptualise an issue’s salience as being determined by its interrelationship with both *expressive logic* (a function of the organisational identity structure) and *instrumental logic* (a function of the strategy frames structure). Within their typology, relative salience depends on whether an issue is perceived to be consistent, conflicting or at cognitive dissonance with the logic of each structure.

EVALUATING ISSUE SALIENCE

Of the eight propositions within Bundy et al.'s (2012) paper, the first four can be crudely summarised as follows. Stakeholder issues that managers perceive to be consistent or conflicting with a firm's organisational identity and/or strategic frame will have high salience, while issues perceived to be unrelated to these structures will have low salience. Embedded within this understanding of issue salience, however, is an assumption of high perceptual awareness by a firm's managers. That is to say, they can make a clear and unambiguous judgement about their perception of an issue, both in terms of how it relates with their identity of the firm; and how it relates to the "knowledge structure that informs strategic decisions" (Narayanan et al., 2010, p. 309).

I propose that this assumption of high perceptual awareness, with only ternary options available (consistent; conflicting; unrelated) presents difficulties in terms of responsiveness. A firm's managers may not, in fact, be able to make such clear and unambiguous judgements. Consider for example the issue of corporate water use. There may be an expressive logic within a firm that relates to conserving scarce resources such as water. There may also be an instrumental logic that relates to maximising profitability. The cognitive dissonance in these positions as it affects issue salience is dealt with comfortably enough within Bundy et al.'s (2012) typology: water risk may have high salience to managers. But while this may shape their parameters of behaviour (B.E. Ashforth & Mael, 1996), perceiving that an issue is salient is different from responding to it. If the firm develops a more water efficient production process, the issue that managers may face is a responsive choice between using less water to make the same amount of product, and using the same amount of water to make more product. Both options are arguably consistent with the firm's organisational identity and strategic frames. Bundy et al.'s (2012) definition of responsiveness as the degree to which a firm is willing to provide a substantive response (B.E. Ashforth &

EVALUATING ISSUE SALIENCE

Mael, 1996; Blake E. Ashforth & Gibbs, 1990; P. David, Bloom, & Hillman, 2007) is helpful inasmuch as it provides weight to their propositions of equivalence between salience and responsiveness. However, their ternary option typology across two dimensions produces nine response types, but it does not particularly elucidate the shape of the responses themselves.

The central argument of this chapter is that without a framework of materiality, specificity and urgency, it is not possible to evaluate salient issues in a manner that is consistent with delivering a substantive response. In these circumstances, firm responses may be symbolic rather than substantive as firms attempt to manipulate external expectations in order to align them with firm goals (Oliver, 1991; Tolbert & Zucker, 1983; Tolbert, 1984; Zucker, 1983). However, I depart from Bundy et al. (2012) in proposing that symbolic action by managers is not a consequence of the issue having low salience – rather, it results from an undeveloped, inadequate or inconsistent typology, which precludes a substantive response. Thus, I propose the following:

Proposition 1: Stakeholder issues that have salience with managers may nonetheless elicit symbolic rather than substantive responses, if the framework for evaluating salient issues is unfit for purpose.

In proposing an alternative typological framework for responding to salient issues, I focus on the strategy frames element of strategic cognition structure – specifically, the filters that managers pay attention to and consider relevant for strategy formulation (Huff, 1982) and implementation. Narayanan et al. (2010) describe strategy implementation by managers as an ongoing cycle of sense-giving (D. A. Gioia &

EVALUATING ISSUE SALIENCE

Chittipeddi, 1991; D. Gioia et al., 1994), sense-making, and issue selling (Dutton et al., 2001). Jackson and Dutton (1988) describe sense-giving as a process of interpretation that organisational decision makers need to apply when encountering ambiguous issues (Daft & Weick, 1984; citing McCaskey, 1982). They assume that this process is schema-driven, and that “threat” and “opportunity” represent two schemata that are commonly used by decision makers in choosing how to respond (Jackson & Dutton, 1988, p. 371). I propose that the attributes of materiality, specificity and urgency are the schemata of my framework, and that the characteristics of these labels shape my typology of sense-giving and sense-making that can be applied by managers in responding to salient but ambiguous issues. Issue selling (Dutton & Ashford, 1993) in this context is the process of engagement between a firm’s top managers and its stakeholders, by which issues are framed as salience, and a rationale for the response is proffered (Ansoff, 1980).

The typology aspires to be more than a conceptual tool; but to be of practical value to a firm’s managers an association between responses and outcomes must be made. In this regard, the three types of outcome that Narayanan et al. (2010) attribute to the strategic cognition literature all resonate with the proposed framework. First, economic outcomes consider e.g. financial performance or stock market valuation, and are associated with the materiality attribute. Second, strategic action considers e.g. decisions of resource allocation, and are associated with the specificity attribute. Third, process outcomes consider e.g. the speed and timeliness of managers’ responses, and are associated with the urgency attribute. These relationships are explored further in subsequent sections of the paper.

5.4 Corporate Water Risk

‘Corporate water risk’ is an emergent concept in economic geography, and there is a lack of consensus on its definition. It is frequently described as the “physical, reputational, regulatory, and litigation risk” (Barton, 2010) that companies face in ensuring their licence to operate (Sarni, 2011), in an environment of increasing water insecurity; a function of resource scarcity, variability and volatility. Perceptions of water insecurity as a corporate risk issue appear to be increasing. A survey by the World Economic Forum ranked water supply crises as one of the business world’s top five risks in terms of probability, and the second most severe risk that the business world faces in terms of impact (Howell, 2013).

For firms that use it as a factor of production, water is unique: it is scarce, unevenly distributed, expensive to transport and has no substitute (Postel, 2000; Seckler et al., 1999). The demand and supply dynamics that affect the volumes of water consumed have, broadly speaking, exacerbated concerns of increased water insecurity in the future (Butler & Memon, 2006; Pittock & Lankford, 2010). Corporate water use is therefore characterised by resource dependence and organisational interdependence (Money, 2014b). Both local and multinational firms frequently operate within complex supply chains where intermediate goods have an extensive water footprint (Gerbens-Leenes & Hoekstra, 2008) and account for significant inter-country flows of ‘virtual water’ (Allen, 2003; Chapagain et al., 2006; Hoekstra & Chapagain, 2008). This creates a requirement for firms to manage their dependencies, both in terms of their organisational relationships, and in terms of environmental uncertainty. Firms compete for access to water, and may face stiff regulatory sanction if they fail to meet agreed terms of abstraction and discharge – in extremis, resulting in a suspension of

EVALUATING ISSUE SALIENCE

operations. This frames the salience of corporate water risk as an issue to a firm's top managers, and contextualises the importance of their responses to an extensive set of stakeholders including suppliers, employees, customers, shareholders, regulators and special interests.

Issues connected to increasing water insecurity may place considerable pressure on the cognitive structures and processes (Porac & Thomas, 2002) that enable sense-making and strategy formulation by a firm's top managers (Thomas et al., 1993). Their high salience notwithstanding, if the framework for evaluating these issues is unfit for purpose, managers may respond symbolically rather than substantively, modelling their actions on those they perceive to be more legitimate or successful (DiMaggio & Powell, 1983; Kostova et al., 2008; Rao & Sivakumar, 1999).

There is a small but expanding body of empirical data on firms' responses to issues of corporate water risk. For example, an analysis based on the disclosures by 184 of the world's largest 500 corporations by market capitalisation – collectively abstracting 11 billion megalitres of water per year – found that 70% of respondents reported exposure to “water related risks that could substantively affect their business”, a 17% increase from two years previously (Carbon Disclosure Project, 2013, p. 10). Yet 42% of these respondents do not have Board-level oversight of their water risk strategy. A firm's Board of Directors might be seen as sense-givers in formulating strategy, and this apparent disengagement may be a direct consequence of having cognitive frameworks in place that are unfit for the purpose of evaluating issue salience in the context of a substantive response.

A separate study of 58 firms in the global consumer staples sector compared historic improvements in water efficiency with targeted future improvements, and found that

EVALUATING ISSUE SALIENCE

the majority of firms had set aspirations that were much more modest than their historic achievements (Money, 2014b). This is generally at odds with their narrative disclosure on corporate water risk (Carbon Disclosure Project, 2013) that emphasises increased engagement, although the focus is more commonly placed on political action and other threat mitigation strategies that are a characteristic of resource dependence (Pfeffer & Salancik, 1978). Incongruities that smack of symbolic rather than substantive response are again consistent with the sense that managers are formulating strategy without having effective process frameworks in place.

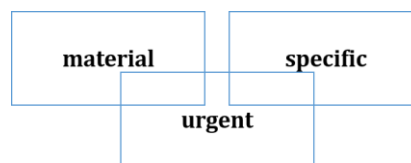
Finally, there is some empirical evidence that stakeholders regard firm responses to issues of corporate water risk as symbolic. In a study of fund management firms based in the UK, USA, Australia and South Africa, chief investment officers (CIOs) were interviewed about their perceptions of corporate water risk management amongst firms in their investment portfolios (Money, 2014c). The responses suggest that most investors accord scant attention to the water risk disclosure by these firms, and that it was very rarely a factor in the investment decision making process. CIOs did not feel that the issue of water risk lacked salience, but rather they believed that the response frameworks used by managers were insufficiently robust for a meaningful evaluation of the firm's strategy formulation and implementation.

In summary, corporate water risk is offered as an exemplar of an issue which is accorded salience by firms and their stakeholders, but where there are ambiguities associated with sense-giving and sense-making. Without a coherent and consistent framework for evaluating issue salience, responses by managers are likely to be more symbolic than substantive.

5.5 Framework for issue salience

My framework for issue salience appears in Figure 1. It unabashedly borrows from Mitchell et al.'s (1997) typology of stakeholder salience based on three attributes. However, unlike their Venn diagram, which implies a parity in the interrelationships between the attributes, I propose that materiality and specificity are salient only if they are associated with urgency. The attributes themselves might be usefully understood in the context of the outcomes framework associated with the strategic cognition literature.

Figure 12: A Framework for Issue Salience



Source: (Money, 2014d)

Material: this relates to economic outcomes within the strategic cognition literature, such as the potential impact of an issue on a firm's sales, profits, cost of capital, stock market valuation and so on. Unless the issue can be quantified against an economic outcome benchmark, it cannot be considered under the materiality attribute. The materiality of an issue is a function of its impact on an economic outcome benchmark and the probability of this impact. Whether an issue is material or not is a binary judgement made by the firm's managers.

Proposition 2: Stakeholder issues must be quantifiable against an economic outcome benchmark for the firm to be considered under the

EVALUATING ISSUE SALIENCE

materiality attribute. Judgments of materiality are binary, and made by the firm's managers.

Specific: this relates to strategic actions within the cognition literature, which Narayanan et al. (2010) exemplify as responding to competitor activity, allocating resources within the firm, timing action or delays in action, and so on. Unless the issue can be associated with a discrete and bounded strategic action (including a deliberate lack of action) it cannot be considered under the specificity attribute. Whether an issue is specific or not is a binary judgement made by the firm's managers.

Proposition 3: Stakeholder issues must be associated with a discrete and bounded strategic action by the firm to be considered under the specificity attribute. Judgments of specificity are binary, and made by a firm's managers.

Urgent: this relates to process outcomes within the strategic cognition literature, which Narayanan et al. (2010) suggest includes "the quality, speed and risk characteristics of a decision" (p. 311). Unless an issue requires "immediate action" (Mitchell et al., 1997, p. 867) and includes the elements of both time sensitivity and criticality, it cannot be considered under the urgency attribute. Whether an issue is urgent or not is a binary judgement made by the firm's managers.

Proposition 4: Stakeholder issues must be both time sensitive and critical to the firm's decision-making process to be considered under the urgency attribute. Judgments of urgency are binary, and made by a firm's managers.

In their typology of stakeholder salience, Mitchell et al. (1997) propose that where the perception is that just one attribute is present, salience will be low, increasing to

EVALUATING ISSUE SALIENCE

moderate and high if two or three attributes are perceived to be present, respectively. My framework similarly proffers a relationship between salience and the relative presence of attributes, but I argue that the salience of an issue to a firm cannot be divorced from the type of response by the firm's managers to that issue. I propose that, unless an issue is perceived to be urgent, the responsiveness of managers will at most be symbolic rather than substantive, irrespective of the presence (or otherwise) of the material and specific attributes.

Proposition 5a: Issue salience to a firm cannot be divorced from the responsiveness of the firm's managers to that issue.

Proposition 5b: Unless an issue is perceived to be urgent, managers' responsiveness will not be more than symbolic, irrespective of its materiality or specificity.

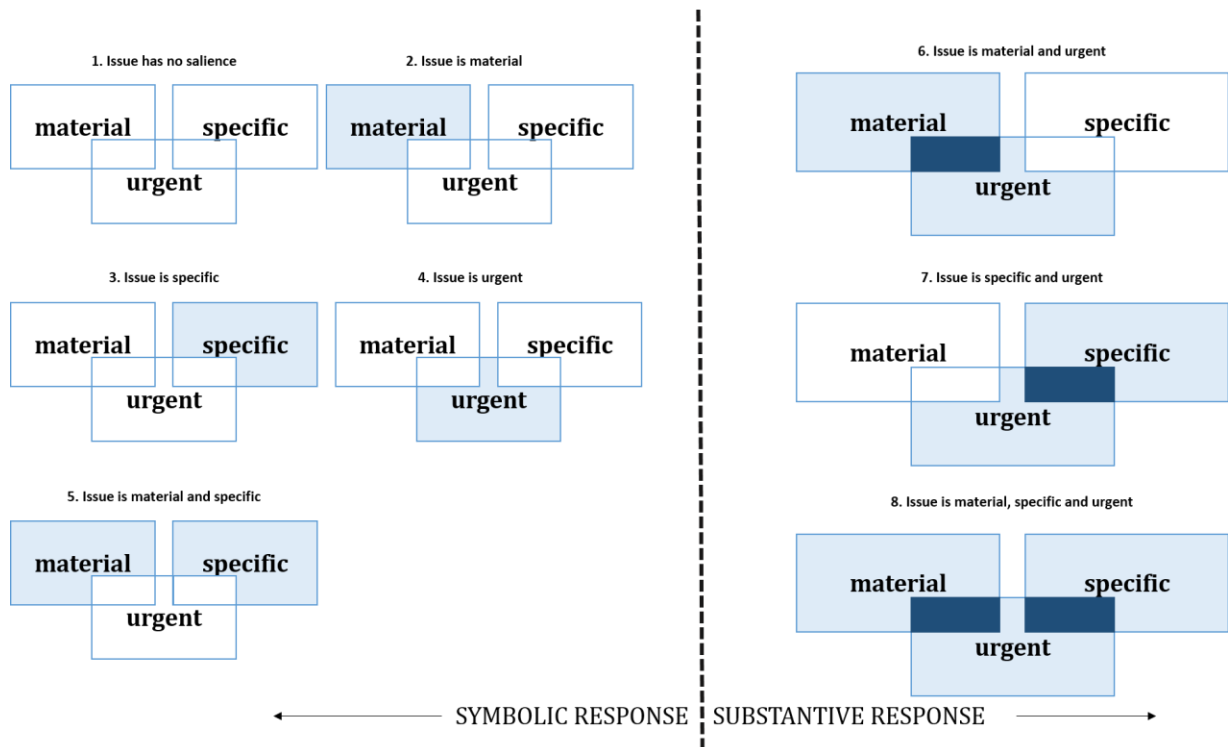
While I do not explore the distinction between symbolic and substantive responses in any detail in this paper, the typology of strategic responses to institutional processes that is offered by Oliver (1991, p. 152) is helpful in characterising possible symbolic response strategies in terms of compromise, avoidance, defiance and manipulation; within an institutional framework (DiMaggio & Powell, 1983; Oliver, 1997). Meanwhile, substantive responses can be characterised with reference to the strategy implementation component of the strategic cognition framework (Narayanan 2010, p. 310), i.e. sense-giving, sense-making and issue selling responses that lead to various outcomes.

There are eight permutations by which the attributes of materiality, specificity and urgency can be combined, and these are set out below. Requiring the presence of

EVALUATING ISSUE SALIENCE

urgency as an attribute for a response to be substantive rather than symbolic yields a subset of three combinations:

Figure 13: Issue Salience and Managerial Response



Source: (Money, 2014d)

Mitchell et al. (1997, p. 874) similarly identify eight stakeholder classes based on the presence of none, one, two or three attributes. With the lamentable exception of 'nonstakeholders' (possessing no attributes), these classes are pleasingly alliterative, where latent stakeholders (possessing one attribute) are 'dormant', 'discretionary' and 'demanding'; expectant stakeholders (possessing two attributes) are 'dominant', 'dependent' and 'dangerous'; while possession of all three attributes renders a stakeholder 'definitive'. While I lack the capability of provide a comparably assonant classification, I instead attempt to place the eight classes of issue salience within the context of corporate water risk.

5.5.1 Issue has no salience

Where a corporate water risk issue is perceived to be neither material, specific nor urgent, managers will likely respond in a manner consistent with the threshold heuristic (Simon, 1978), where the perceived salience of an issue is so low that it receives effectively zero attention by management. So for example a generic, unqualified proposition such as: “water is a scarce resource, so must be managed better by corporations” may have some traction with a firm’s stakeholders, but is unlikely to elicit anything but the most superficial symbolic response by that firm’s managers.

5.5.2 Issue is material

An example of a material issue that lacks specificity or urgency can be found in the WEF’s ninth edition of its global risks report (World Economic Forum, 2014). The report, based on a survey of 700 business leaders and policy makers, places ‘water crises’ as third out of the 10 global risks of highest concern in 2014. This is however the third consecutive year that water risk has earned a top five ranking, and while this does not exactly negate the time critical element of urgency, it arguably somewhat diminishes it. The report ranks 31 risks in terms of probability and impact; while this may have some utility to a firm’s managers as a relative measure of what is at stake in terms of economic impact, it offers little in terms of specifics.

5.5.3 Issue is specific

Launched in 2007, the UN Global Compact’s CEO Water Mandate “seeks to build an international movement of committed companies, both leaders and learners, interested in addressing the global water crisis” (Mandate, 2013). The initiative required endorsers to commit to six core elements (direct operations; supply chain; collective action; public policy; community engagement; transparency) via a letter signed by its Chief Executive Officer, or equivalent. While the substance of the

EVALUATING ISSUE SALIENCE

commitment within each of these elements lacks material accountability (beyond a generic requirement to produce a descriptive progress report annually), and there is no explicit urgency embedded within the endorsement, the process of responding is discrete and bounded.

5.5.4 Issue is urgent

In a document that sets out its expectations as an investor, Norges Bank Investment Management (NBIM) states that portfolio companies in the food, agriculture, pulp and paper, pharmaceuticals, mining, water supply and energy production industries are expected to manage risk from scarce water supplies. The detail of what this entails – beyond some general guidelines around water management strategy, sustainability and governance – is lacking, perhaps unsurprisingly given the scope of the requirement. However, NBIM is one of the world's largest sovereign wealth funds, with nearly US\$ 1 trillion of assets under management and investments in some 70 countries. It holds, on average, more than 1% of the world's listed stocks (more than 2% in Europe). As such, its engagement on water risk adds urgency to the issue for managers.

5.5.5 Issue is material and specific

Over the last half decade, corporate water risk has gained traction in the areas of management consultancy and advisory services. A widely cited report prepared by McKinsey set out the prospect of a 40% water deficit by 2030 under 'business as usual' (Addams, Boccaletti, Kerlin, & Stuchtey, 2009), while a series of annual questionnaires sent to 500 of the world's largest companies aims to benchmark the disclosure of water-related information; temporally, spatially and by industry (Carbon Disclosure Project, 2013). Other initiatives include a global water risk mapping tool by the World Resources Institute, and a modular disclosure tool by the Global Environmental

EVALUATING ISSUE SALIENCE

Management Initiative (GEMI). These approaches variously attempt to quantify value at risk and identify specific vulnerabilities within the management process. However, they lack the requirement of urgency: indeed the proposition of a 40% deficit by 2030 is probably self-defeating to the extent that it overstretches credulity.

5.5.6 Issue is material and urgent

The state of Texas produces about 50% of US cotton. Following a drought in 2011 resulting in over US\$ 5 billion in losses for farmers, Calvert Investments, a fund manager with over US\$ 12 billion in assets, filed a shareholder resolution with Hanesbrands Inc., a leading cotton apparel manufacturer, asking the company to clarify its strategy for mitigating water risk in its supply chain. Although the resolution lacked specificity – the company has limited ability to control water use in the agricultural production of cotton, for example – the resolution presented material risk to Hanesbrands' market valuation, and management's response was time sensitive. The company responded by updating its corporate goals disclosure; agreeing to investigate the water footprint of cotton; and exploring corporate water risk modelling tools. As a result of these substantive actions, Calvert withdrew its resolution in February 2012.

5.5.7 Issue is specific and urgent

In June 2013, Coca-Cola applied to India's Central Ground Water Authority for permission to begin running a new bottling line at its plant in Mehdiganj, a village near the city of Varanasi, in the state of Uttar Pradesh. Operations at the plant began in 1999, but the company has faced intensifying hostility from the local community and other stakeholders who believe that it is responsible for a sharp fall in groundwater levels over the past decade. The company has not yet been granted permission to bring the new line – which has the potential to produce 600 bottles per minute, doubling

EVALUATING ISSUE SALIENCE

the plant's existing output – on stream, meaning that it has been idle for the past eight months. The cost of the line is US\$ 24m, which is arguably not material in the context of the US\$ 5 billion that the company intends to invest in India over the next six years, but the issue is discrete, and requires urgent resolution if it is not to have a wider impact on the company's licence to operate in this fast-growing market.

5.5.8 Issue is material, specific and urgent

In the monsoon season of 2011, Thailand was affected by flooding that resulted in 815 deaths and over 20,000 km² of damaged farmland. According to the World Bank, the floods caused more than US\$ 30 billion of economic losses to the manufacturing sector, of which an estimated 90% was borne by private companies (World Bank, 2011). As a result of the floods, Western Digital – one of the largest computer hard drive manufacturers in the world, with 60% of production located in Thailand – was forced to completely suspend operations, creating severe supply chain problems for many customers and partners including Dell, then the world's third largest seller of computers by volume. The consequences for the firms affected included lower revenues and profits than previously forecast, and volatility in their share price as a result of attendant uncertainty. As a corporate water risk issue the Thailand floods met the various salience criteria proposed in this paper. For those firms affected, the economic impact was unambiguous, and required time critical changes in resource allocation if the firms were to maintain or restore their competitive advantage.

5.6 Summary

The typology I propose makes a somewhat arbitrary distinction between symbolic and substantive responses. Much as salience is itself a multidimensional construct (Agle et al., 1999; E. P. Crawford, Williams, & Berman, 2011; Mitchell et al., 1997), so the likely strength of managers' responses will be governed by the interplay of factors that are not explicitly captured by the framework. In common with Mitchell et al. (1997), I argue that there is a positive relationship between the numbers of attributes present and relative salience. However, I accord a primacy to the urgency attribute as a catalyst of manager response. If an issue is not perceived to be urgent, manager responses will be symbolic rather than substantive, the issue's materiality or specificity notwithstanding. Conversely, even if an issue is perceived solely to be urgent (i.e. just one attribute), the strength of manager response will be comparable to an issue perceived to be material and specific (i.e. two attributes) because of the primacy of the urgency attribute.

This provides for more texture than a binary distinction between symbolic and substantive responses, with a sub-classification for the relative strength of expected responses. The table below summarises the eight levels of salience and the expected response, with a corporate water risk example for each.

EVALUATING ISSUE SALIENCE

Figure 14: Issue Salience and Corporate Water Risk Examples

Salience Level	Expected Response	Example
No salience	Symbolic [Low]	Stakeholder requests that “companies manage their water use more carefully”
Material	Symbolic [Medium Low]	World Economic Forum ranking of ‘water supply crises’ as a top risk
Specific	Symbolic [Medium Low]	Endorsement of UN Global Compact’s CEO Water Mandate
Urgent	Symbolic [Medium]	Norges Bank Investment Management guidelines on water risk management
Material and Specific	Symbolic [Medium]	Compliance with CDP Water Disclosure; use of WRI Aqueduct; GEMI tools etc.
Material and Urgent	Substantive [Medium High]	Calvert Investment’s shareholder resolution filing with Hanesbrands Inc.
Specific and Urgent	Substantive [Medium High]	Coca-Cola’s application to turn on its new production line in Mehdiganj
Material, Specific and Urgent	Substantive [High]	Impact of flooding in Thailand on hard drive manufacturers, their customers and partners

Source: (Money, 2014d)

5.7 Practical application of the salience framework

It has been noted in recent scholarship that the construct of issue salience presents specific challenges for empirical testing (Bundy et al., 2012). In proposing this

EVALUATING ISSUE SALIENCE

conceptual model I include a methodology to qualitatively test the framework, which I hope might lead to further inductive development of the theory. The methodology attempts to address three practical challenges attendant in any response framework: scale, scope and signalling.

Scale: there is a rich seam within the literature of economic geography that explores how socio-spatial practices influence industrial organisation (e.g. Gertler, 2003), theories of the firm and the evolution of the multinational corporation (e.g. Kogut & Zander, 1993). Indeed, understanding knowledge flows at different levels of scale is the subject of robust scholarship (see e.g. Gupta & Govindarajan, 2000). My interest here is in identifying an issue salience response framework that can be applied universally at different levels of scale within a firm. That is, to propose an approach for evaluating corporate water risk (for example) at the local operations of a multinational corporation (MNC) subsidiary that is substantively the same as the approach applied within the board room of that MNC's headquarters.

Scope: three of the defining characteristics of Mitchell et al.'s (1997) typology of stakeholder salience are that each attribute is variable, not steady state; that attributes are a socially constructed, not objective, reality; and that consciousness and wilful exercise may or may not be present. Each of these characteristics are highly relevant to the issue salience framework presented herein, albeit in different ways. First, both typologies are consistent with their treatment of each attribute as variable. An issue that is material, specific or urgent at one point in time or space may not possess these attributes at another. Second, in terms of the social construction of attributes, it is plausible that an issue perceived by a manager to possess these attributes may be seen entirely differently by that same manager if she was at a different firm. However, it is assumed in this framework that that social constructions around strategy

EVALUATING ISSUE SALIENCE

implementation (i.e. sense-giving sense-making, issue selling) are cumulative and set at the firm level. So while the same manager may respond differently at another firm, it is assumed that a new manager joining a firm would perceive an issue the same way as her predecessor, in terms of the attributes. Third, the characteristic of latency in Mitchell et al.'s (1997) typology is not considered relevant here, as issues – unlike stakeholders – are assumed to be inert unless they are 'activated' by a firm's managers.

Signalling: related research has sought to contextualise salience in terms, for example, of stakeholder characteristics, or expressive versus instrumental logic. Helpful though these approaches are for inductive theory building, they lack the practicability required by managers to signal their response to external stakeholders. As Bundy et al. (2012) state, "we recognise that managers must identify, understand and assign priority to an issue before they can respond [...] and that responsiveness includes a broad collection of choices for action and engagement" (p. 372). My proposed typology, which is multivariate, context dependent and dynamic, runs the risk of increasing the range and complexity of outputs for managers to an extent where it is impossible to discern a clear signal of management response to a salient issue. In focusing on practicalities of application, it is hoped that this risk is ameliorated.

To incorporate the challenges of scale, scope and signalling within the testing methodology, I propose the following:

Proposition 6a: The methodology for managers to evaluate their response to issues of relative salience is agnostic to the intra-firm scale at which is applied

EVALUATING ISSUE SALIENCE

Proposition 6b: The methodology can be consistently applied to attributes that are variable over time and space, and where firm-level perceptions are socially constructed rather than objective

Proposition 6c: The methodology can be applied by managers as a signalling mechanism to stakeholders of the relative priority assigned to issues of perceived salience

The methodology combines the presence (or absence) of the three attributes of materiality, specificity and urgency to deliver a score of an issue's salience. Each attribute has a binary classification, that is, present (1) or absent (0). The primacy of the urgency attribute is embedded within the scoring method so that the salience score is the sum of an issue's materiality and specificity, multiplied by its urgency:

$$\text{salience}_{\text{issue}} = \text{urgent}_{\text{issue}} \times (\text{material}_{\text{issue}} + \text{specific}_{\text{issue}})$$

There are eight combinations in which these three attributes can be present or absent, with possible combined scores of 0, 1 and 2. These are presented below:

Figure 15: Issue Salience Scorecard

Issue	Material	Specific	Urgent	Total Score
No salience	0	0	0	0
Material	1	0	0	0
Specific	0	1	0	0
Urgent	0	0	1	0
Material and Specific	1	1	0	0
Material and Urgent	1	0	1	1
Specific and Urgent	0	1	1	1
Material, Specific and Urgent	1	1	1	2

5.8 Implications for management and research

In their paper, Bundy et al. (2012) set out the hope that their research would promote further work on the relationship between issue salience and responsiveness. The framework presented here responds to this, as well as to other broader calls (e.g. Rajagopalan & Spreitzer, 1997) for research exploring strategic change in relation to environmental conditions and management cognition.

By proposing issue salience as a distinct construct, driven by cognitive interpretation that helps us to understand how firms respond to stakeholder concerns (Bundy et al., 2012, p. 369), Jonathan Bundy and his colleagues provide a welcome and valuable underpinning to parts of my own conceptual framework. We are agreed that issue salience can be defined as the degree to which a stakeholder issue resonates with and is prioritised by management. We also share the view that issue salience can be characterised as a perceptual outcome of a strategic cognition process. However, I do not agree with their characterisation of managers as responding to more salient issues substantively, and less salient issues symbolically. My disagreement stems from a different interpretation of the multidimensional attributes of salience – in short, I believe it is entirely possible for managers to consider an issue highly salient across one or more attributes, and yet to nevertheless respond symbolically. My contention is that for managers to evaluate and respond to issue salience meaningfully, a practicable and integrated cognitive response methodology is a prerequisite. This is what I have set out to offer in this paper.

I also believe that the capacity for empirical testing must be an important consideration in developing any conceptual response framework. I demonstrate such a capacity

EVALUATING ISSUE SALIENCE

within this model by choosing the exemplar of corporate water risk, whereby I offer an issue which has rising salience amongst a wide spectrum of stakeholders, and for which both corporate disclosures and investor evaluations have hitherto been ambiguous and arguably unfit for purpose (see e.g. Money, 2014b, 2014c).

The salience-response scoring methodology meets three criteria of practicability. First, it is scalable. In principle, issue salience can be evaluated by managers at the factory floor right through to the executive boardroom using this scorecard. The relative salience of the issues themselves could be promoted or demoted at different scalar levels. For example, a problem of water availability at an MNC's bottling plant will almost certainly require a response from the local factory manager but will probably not require a response from the global chief executive. However, there may be occasions (such as Coca-Cola's Mehdiganj issue) where scalar responses are necessary. Second, the methodology is well scoped. The attributes that shape issue salience are variable, not steady state. A scorecard approach allows for this variability, for example over time and space. And the use of scores supports cognitive strategy implementation; for example by facilitating *sense-giving* by top management (who identify issues to evaluate), *sense-making* by senior management (who score the issues), and *issue selling* by middle managers (who implement firm responses). In accruing these scores and responses, the firm develops its organisational identity, which is "contested and negotiated through iterative interactions between managers and stakeholders" (S. G. Scott & Lane, 2000, p. 44). Third, the methodology provides clear signalling in terms of response. There are eight combinations by which the attributes can be present or absent; yielding three tiers of response based on the scorecard. I recognise that this approach opens itself to the criticism of being too reductive. However, I would suggest that it is the absence of clear signalling in

EVALUATING ISSUE SALIENCE

sustainability and CSR reporting (Cho, Roberts, & Patten, 2010; Fischer, 2004; Joseph, 2012; Neu, Warsame, & Pedwell, 1998) that has somewhat diminished stakeholder engagement with firms' responses, whereby the message has risked becoming lost in the medium. I believe that a framework with just three output scores may help managers to signal their responses on salient issues in a less ambiguous manner than if they are selecting from a wider range of permutations. Inasmuch as further nuance is required, the score can be qualified with supplementary content without detracting from the signalled response intent.

These arguments warrant further exploration of theoretical relationships that have been outside the scope of this paper, and I welcome research that corroborates or indeed challenges the validity of the framework as presented here. I am particularly interested in the following areas. First, an examination of the relationship between the attributes of materiality, specificity and urgency posited here, and the strategic cognition theme of strategy implementation (Dutton & Ashford, 1993); specifically, whether the attributes can be theoretically and empirically evaluated in terms of their contribution to sense giving, sense making and issue selling (e.g. D. Gioia et al., 1994). Second, an examination of the attributes with regard to the strategic cognition theme of outcomes. Specifically, whether the relationships posited here between the material attribute and economic outcomes; the specific attribute and strategic actions; and the urgent attribute and process outcomes, can be substantiated. There are a wealth of empirical studies within the strategic cognition literature that consider the linkages between antecedents, structure, process and outcomes (see Narayanan et al., 2010, pp. 321–327). I hope that this contribution can add to the body of empirical research in this field, as it lends itself to multi-method research of cognitive process (e.g. Grégoire, Barr, & Shepherd, 2010). Third, to consider whether the same attributes of

EVALUATING ISSUE SALIENCE

materiality, specificity and urgency can be applied by a firm's stakeholders, such as shareholders, regulators and others, in order to better understand the socially construed basis of these attributes in determining relative issue salience. This paper has proposed a framework of issue salience and response for a firm's managers. Developing a substantiated and comprehensive theory of salience that incorporates (if not integrates) both stakeholders and issues would represent a significant advance of the research in this field and important related areas, such as stakeholder activism; environmental social and governance management; and firm performance. Fourth, to establish whether the framework can be applied in practice. Case studies and other qualitative methods have been previously applied to cognitive process research (e.g. Clarke, Gioia, Ketchen, & Thomas, 2010), but my lofty ambitions for this methodology include having it embedded within firms as an operational tool. In making some broad and sweeping claims about the relevance, applicability and efficacy of the model for firms' strategic cognition process, I have generally followed a well-trodden path by authors of conceptual research. Inasmuch as I can step onto the altogether less certain ground of applied empirical testing and validation, I am eager to take this leap. The fact is that issues such as corporate water risk will likely loom ever larger in terms of salience for a firm's managers and their stakeholders, and the availability of mechanisms that effect substantive responses is essential, rather than merely desirable.

5.9 Conclusion

This chapter makes several propositions. They can be summarised as follows. First, stakeholder issues that have salience with managers may nonetheless elicit symbolic rather than substantive responses, if the framework for evaluating salient issues is unfit for purpose. Second, a framework that considers issue salience should incorporate the attributes of materiality, specificity and urgency. Third, these attributes should be benchmarked respectively against economic outcomes, strategic action and time criticality. The judgement made – in terms of managers' responses – for each attribute needs to be binary: an issue either qualifies, or does not qualify, against each attribute. However, the attributes are not equal, with urgency holding primacy over materiality and specificity. An issue that is not urgent is salient only to the extent that managers respond symbolically rather than substantively.

There are eight permutations by which the attributes can be combined, and these are described using the exemplar issue of corporate water risk. This paper takes an inductive research approach, and the methodology proposed needs to incorporate the challenges of scale, scope and signalling. It assumes that the methodology for managers to evaluate their response to issues of relative salience is agnostic to the intra-firm scale at which is applied, and that it can be consistently applied to attributes that are variable over time and space. Moreover, it is proposed that the methodology can be applied by managers as a signalling mechanism to stakeholders of the relative priority assigned to issues of perceived salience.

This chapter sets out, as its objective, to provide an answer to the question as to how managers of firms evaluate and respond to issues that matter, where the extant

EVALUATING ISSUE SALIENCE

frameworks for evaluation appear to be inadequate. It departs from salience research that precedes it by challenging the assumption that issues of high salience automatically result in substantive responses by a firm's managers. Rather, I propose that there may be issues that are highly salient to managers in terms of their materiality, specificity, and urgency – or combinations thereof – that nonetheless result in symbolic responses. In proposing a methodology where these three attributes can be evaluated jointly and severally, I advance the conceptual understanding of issue salience and firm response. The antecedents of this methodology exist within the stakeholder salience literature, and draw in particular on Mitchell et al.'s (1997) typology. I have also integrated my methodology within the literature of strategic cognition, proposing a relationship between my salience scorecard and the implementation of cognitive strategy. Indeed the three attributes themselves are, I propose, intrinsically associated with the three core outcomes recognised within the strategic cognition literature (e.g. Narayanan et al., 2010).

I believe that the paper provides several avenues for new conceptual and applied research. The nature of the attributes and their interrelationship may usefully be explored further with reference to the resource-based view. The extent to which value, relative scarcity, and the unavailability of substitutes (Barney, 1991) affects managers' cognitive responses in the context of a competitive environment has not been examined in this paper, but may have a conceptual resonance. Meanwhile, in proposing that the framework has extensibility over time and space, I invite critical examination of the bounds of the methodology in terms of scale and scope, across the many approaches by which this may be tested. This paper also proposes the primacy of the urgency attribute, and the salience methodology places heavy emphasis on time criticality. It is hoped that this area also provides opportunity for further investigation,

EVALUATING ISSUE SALIENCE

both in terms of whether the primacy of urgency is justified under empirical examination, and whether a more nuanced basis to combine the attributes offers a more robust and applicable methodology. Finally the paper has been presented with reference to the strategic cognition literature of firms and their managers. It would be interesting to explore the relevance of the approach to other stakeholder sets, such as shareholders.

In summary, what is proposed here is a methodology and scorecard that has been framed for applied interrogation in the real world (Robson, 1993). Its validity as an approach is ultimately contingent on providing practical improvements in how firms and their stakeholders understand, evaluate and respond to issues of salience. Given the importance of the matters at stake – corporate water risk is one of many – my hope is to have made a meaningful contribution to this agenda.

Chapter 6

CORPORATE WATER RETURN

6.1 Introduction

At the Rio +20 Earth Summit in June 2012, more than forty financial institutions signed up to a 'natural capital declaration', committing "to understanding the impacts and dependencies of financial institutions on natural capital, [...] which can translate into material risks and opportunities" (United Nations, 2012). A recent report claimed that unpriced natural capital cost the global economy over US\$ 7 trillion per annum, or some 13% of nominal GDP (Trucost Plc, 2013), with some US\$ 2 trillion accruing to water consumption. Natural capital accounting is one of several approaches being used by various actors to further the notion that current rates of corporate water use are unsustainable in the long term. The generic argument is that water use presents a large, potentially uncapped liability to firms and their shareholders as a consequence of physical, reputational, regulatory, and litigation risk (Barton, 2010) affecting a company's licence to operate (Sarni, 2011). Approaches used to give salience to the concept of corporate water risk include surveys such as those by the World Economic Forum, which has consistently ranked water supply crises as one of the business world's top five risks (Howell, 2013). A separate survey on corporate water use by the Carbon Disclosure Project, based on the disclosures by 184 of the world's largest 500 corporations, found that 70% of respondents reported exposure to "water related risks

CORPORATE WATER RETURN

that could substantively affect their business”, a 17% increase from two years previously (Carbon Disclosure Project, 2013, p. 10). In addition, heuristic devices have been developed by various third parties with the objective of helping companies model, manage and disclose their water risk (e.g. Global Reporting Initiative, 2011; WBCSD, 2013; World Resources Institute, 2010).

And yet, for all this, the mechanisms that exist for firms to identify, evaluate and mitigate the risks they face in ensuring sustainable access to water supplies at services remain at best embryonic. Corporate water use is characterised by resource dependence and organisational interdependence (Money, 2014b) and the disclosure by firms of the risks they face is generally narrow in scope and generic in content. This notwithstanding, there is an assumption amongst key stakeholders (such as a firm's shareholders) that sufficiently robust internal processes exist within firms to ensure these risks are managed effectively. These stakeholders often assume that the lack of disclosure by firms is more a function of managers' unwillingness to share what they perceive to be commercially sensitive information (Money, 2014c), assumptions that derive from a sense of 'tacit knowledge' (Gertler, 2003), which influences the relationship between shareholders and firms. This is often reinforced by proximity biases (Boschma, 2005; Coval & Moskowitz, 1999; Wojcik, 2009) which can combine with investor myopia (Clark, 2011), to result in shareholders making unsubstantiated and potentially dangerous assumptions about what firms are doing to manage water risk (Money, 2014c).

In short, it is almost certainly the case that: a) senior executives at many firms do not have substantive plans in place to manage future water-related risks, and b) many shareholders in these firms will unconsciously accept this situation as the status quo (Money, 2014b, 2014c). As a result, despite TEV frameworks, surveys, modelling

CORPORATE WATER RETURN

tools, reports and so forth that exhort companies to do more to manage their water risk, there may in practice be very little pressure on executive management to do so.

That said, it is clear that the issue of corporate water risk is salient to some shareholders. For example, Norges Bank Investment Management (NBIM), one of the world's largest sovereign wealth funds, sets out in writing what it expects from portfolio companies in terms of water management. And in 2011 Calvert Investments filed a shareholder resolution with Hanesbrands Inc., a leading cotton apparel manufacturer, effectively demanding that the company clarified its strategy for mitigating water risk in its supply chain – which it subsequently did. Equally, corporate water risk is undoubtedly highly salient to senior management at many firms. However, without an effective framework to evaluate water risk issues with their strategic cognition process, responses are symbolic rather than substantive (Money, 2014d), and risk being interpreted as merely a public relations exercise or 'bluewash'.

This chapter applies transaction cost theory to propose a framework based on hybrid governance structures that intermediates this gap between symbolism and substance. The growing requirement that firms and their stakeholders have for water-related infrastructure is used as an exemplar issue of salience. According to the management consultants McKinsey, the world's estimated need for water infrastructure investment between 2013 and 2030 is US\$ 11.7 trillion (Dobbs & Pohl, 2013), rising alongside GDP and population growth. Meanwhile, the OECD projects that the average annual world infrastructure expenditure on water between 2020 and 2030 will need to be US\$ 1,037 billion or 1.03% of world GDP, and more than the combined expenditure on road, rail, telecoms and electricity over the period (OECD, 2006). Financing this investment in the post-crisis environment presents particular difficulties, given the deterioration in many public sector balance sheets (O'Brien & Keith, 2009), increased

CORPORATE WATER RETURN

risk aversion by lenders and financial intermediaries, and the relatively small proportion of institutional asset allocation to infrastructure investment from within the private sector, although this is increasing (Clark, 2000b; Hagerman et al., 2007; Hebb, 2006a, 2007). Interesting new models for financing urban infrastructure based on profit-driven motivations rather than the creation of public goods are emerging within the literature (e.g. Hebb & Sharma, 2014) and this paper builds on work in this area to propose how and why profit-motivated firms might finance substantial investments in water-related infrastructure via structures that are a hybrid between market and hierarchy (i.e. firm), even where the firm may not be the primary beneficiary of these investments.

This chapter also proposes the idea of “corporate water return” as a corollary to corporate water risk. It will be argued, with reference to transaction cost theory, that firms may take actions that are outside the frame of business as usual, if the action is predicated on a competitive advantage that the firm enjoys. A prerequisite for the action to occur is that there are shared benefits both to the company and its external stakeholders which can be specifically attributed to the action. The paper offers a Five Factor Framework to describe this process, using the water infrastructure deficit challenge, outlined above, and the concept of corporate water return as illustrative examples.

The chapter is set out in three sections, as follows. In the first section a conceptual structure is set out, using transaction cost theory to frame what actions are typically conducted by the firm, and to help identify the circumstances in which transactions take place within or outside a firm’s governance structure. The construct of corporate water return is also developed in this section, along with a series of propositions. The second section sets out the Five Factor Framework, using the exemplar of water

infrastructure to position the model. The final section includes a discussion of the framework's applicability, its limitations, areas for future research, and conclusion.

SECTION I

6.2 Conceptual structure

Transaction cost theory emerged in the twentieth century in response to the question as to why firms even existed if market transactions were the most efficient basis to organise economic activity; and, given that firms did exist, on what basis did managers decide which activities to organise within firms, and which did they leave to the market (Crook, Combs, Ketchen, & Aguinis, 2012). In 1937 Ronald Coase published a paper on the nature of the firm which explained that market transactions involved certain costs, which in certain circumstances could be reduced by organising within firms (Coase, 1937). These ideas were further developed by Oliver Williamson, who formalised (Williamson, 1975, 1979, 1985) what has become transaction cost theory (TCT). He defined transaction costs as expenses that are distinct from the cost of production, and arise from identifying qualified exchange partners, negotiating contracts, creating dispute resolution mechanisms, monitoring performance, and adapting to changing conditions (Williamson, 1991). TCT proposes that transactions across workgroups can be organised into one of three structural alternatives: markets, hybrids, or hierarchies, which managers should select from in order to minimise transaction costs. The costs themselves arise due to imperfect information which restricts the identification of qualified exchange partners, price discovery, and the ability to anticipate all future contingencies (Simon, 1945). This creates the potential

CORPORATE WATER RETURN

for maladaptation (Williamson, 1999), where exchange partners may be unwilling (Klein, Crawford, & Alchian, 1978) or unable to adapt to changing circumstances.

In terms of the structural alternatives, market transactions are simple arms-length transactions between buyers of goods and services, and sellers. The price and quantity are market determined, and the transaction may be supported by a formal contract. Hybrid transactions involve two or more exchange partners, but typically involve long-term, greater-than-market commitments such as cooperation agreements, franchises, development partnerships and joint ventures (Kale & Sing, 2009; Siegel & Zervos, 2002). In hierarchies, transactions that could take place across many exchange partners instead take place within one firm.

TCT presents markets and hierarchies as polar structural alternatives, as defined in terms of ownership autonomy; incentive intensity; administrative controls; and adaptation (Williamson, 1985, 1991). Hierarchies allow firms to govern effectively by fiat, with managers having broad discretion to monitor and control intra-firm activity, and to resolve disputes without recourse to contractual renegotiation (Foss, 1996). But, while hierarchies accord high authority, they generally offer only low-powered incentives, because only a small portion of employee compensation is directly tied to performance (Williamson, 1991). This is in contrast to markets, which may lack authority but provide high-powered incentives for sellers to ensure buyer satisfaction; the latter can otherwise move their custom elsewhere (Zenger & Hesterly, 1997). However, market contracts do not anticipate all contingencies, and when it comes to adaptation the legal system may be necessary for arbitration. In between the two, hybrid structures are an intermediate form of governance that incorporate a mix of market and hierarchical governance systems (Makadok & Coff, 2009). They seek to minimise potential conflict by incorporating upfront commitments, such as capital

CORPORATE WATER RETURN

investment or long-term, binding contracts, to minimise potential conflict (Dyer, 1996). Hybrid structures also typically embed mutual monitoring schemes (Heide & John, 1990) as well as escalation mechanisms to manage conflict and disputes without recourse to the courts of law.

As a result of their characteristics, TCT implies that, for simple transactions, where prices autonomously adapt to prevailing conditions market structures would be preferred. However, increased complexity makes basic price adaptation no longer efficient, and to maximise shared value, exchange partners need to coordinate activity. TCT predicts that because managers are willing to trade off the incentive power and autonomous adaptation of markets for enhanced authority and coordination, they will respond to increasing complexity and exchange hazard by moving from market to hybrid and eventually hierarchy structures (Williamson, 1991).

Williamson also identified three transactional attributes that raise complexity and exchange hazard. These are asset specificity, uncertainty and frequency (Williamson, 1985). First, as assets become more use-specific (e.g. precision machinery), they become more costly to re-deploy or resell without loss, compared to nonspecific assets (e.g. laptop computers). Second, uncertainty is a function of unpredictability in future demand; technological change; and exchange parties' behaviour. Third, frequency refers to how often a transaction takes place. According to Williamson, the greater the asset specificity, uncertainty and frequency associated with a transaction, the higher the exchange hazard; and the more likely it will take place under a hierarchical structure rather than a hybrid or market structure. He predicted that, when activity is organised in ways that match transactions with their appropriate structural alternative, the firm would enjoy higher performance (Williamson, 1991).

CORPORATE WATER RETURN

Concurrent with the development of TCT, scholarship has emerged that challenges the conceptual boundaries of structural alternatives and transactional attributes. For example, economic geographers have proposed that a sunk cost framework for spatially differentiated corporate strategy might offer a more empirically bounded and better defined research agenda than transaction costs, given the difficulty of demarcating the latter from other kinds of costs (Clark & Wrigley, 1995, 1997b; Clark, 1994). Separately, resource based theory – which emphasises how firms may gain competitive advantage by husbanding resources that are valuable, scarce, and hard to substitute (Barney, 1991) – predicts that firms may integrate ‘strategic assets’ (Amit & Schoemaker, 1993) within the hierarchy, even where exchange hazards associated with TCT asset specificity do not exist (Argyres, 1996; Conner & Prahalad, 1996; Leiblein, 2003; Madhok, 2002). Instead, the asset’s value within the hierarchy may come from routines (Combs & Ketchen, 1999), social relationships (Kogut & Zander, 1996) and managerial process (Sirmon, Hitt, & Ireland, 2007).

TCT and the resource based theory view assets differently. Under TCT high asset *specificity* results in market failure, so managers move toward hierarchical structures to reduce exchange hazards. Under resource based theory, managers bundle *strategic* assets within a hierarchy in order to create and unlock value. However, specific assets and strategic assets are not equivalents. While a specific asset is valuable because it is specialised to a transaction, this is just one criterion of the three that define strategic assets in the resource based view (Barney, 1991; Chi, 1994). The other two are that it must be relatively rare, and difficult to substitute. As Crook et al. (2012) note, there has been little empirical examination of whether strategic assets, as understood from the resource based view, have a greater impact on hierarchical integration than assets which are merely specific, i.e. neither rare nor difficult to

substitute. Based on a meta-analytical study they find a positive and significant relationship between asset-specific investments that are also strategic, and the degree of integration (Crook et al., 2012, p. 69). This apparent relationship is of particular interest in the context of a firm's use of water resources and services, and will be revisited shortly.

A more direct challenge to TCT comes from real options theory (Bowman & Hurry, 1993). It challenges the relationship that TCT assumes between the transactional attribute of uncertainty and structural alternatives. Specifically, real options theory proposes that, instead of pushing managers to greater integration and hierarchy, they respond to uncertainty by desiring greater flexibility (McDonald & Siegel, 1986). This can be to the extent that managers rationally choose a structure that is suboptimal, for example by deferring irreversible decisions on investments until uncertainty is reduced, even if these investments would deliver a positive net present value (Folta & O'Brien, 2004). For managers, sunk costs imply commitment-intensive choices (Ghemawat, 1991) and may present significant barriers to entry (Baumol & Willig, 1981; Caves & Porter, 1977; Clark & Wrigley, 1995). In short, greater uncertainty may lead managers to prefer market structures over hierarchy, which is at odds with the outcomes predicted by TCT. Testing for the relationship between volume uncertainty and preference by managers for hybrid structures over hierarchies, a positive and significant correlation has been identified (Crook et al., 2012, p. 70). However, in the presence of behavioural uncertainty, where the tasks being performed are complex, opaque, and difficult to evaluate, managers prefer increased integration (Crook et al., 2012, pp. 70–1). This points to a nuanced relationship between uncertainty and structure which is also of particular interest in this paper.

CORPORATE WATER RETURN

In summary, TCT posits that a relationship exists between the structural alternatives of markets, hybrids and hierarchies that managers choose from in response to the transactional attributes of asset specificity, uncertainty and frequency (Williamson, 1985). It provides a theoretical justification for why all three structures exist, and offers an explicative framework for changes in the level of integration in response to perceived exchange hazard and adaptation risk. However, in the past half century, the predictive boundaries of TCT have been variously challenged. For example, it has been proposed that transaction costs are insufficiently demarcated for empirical analysis when compared to sunk costs (Clark & Wrigley, 1995). It has also been suggested that asset specificity, the “big locomotive” of TCT (Williamson, 1985, p. 56) is less useful in predicting integration than the resource based view, which considers assets to be strategic if they are valuable, rare and not easily substituted. Finally, real options theory suggests that in an environment of increased volume uncertainty, managers may prefer more market based structures in order to preserve flexibility: although if the increased uncertainty is behavioural, there is empirical evidence that managers prefer more integrated structures (Crook et al., 2012).

This paper explores some of the implications of TCT, within the applied context of corporate water risk. It is proposed that corporate water risk is an exemplar of the nuanced transaction hazard that managers face, when deciding between the structural alternatives of market, hybrid and hierarchy. Transactions that involve water resources (such as abstraction and storage) or services (such as treatment and disposal) incorporate assessments of asset specificity, uncertainty and frequency. However, a more complete understanding of the transaction hazard is rendered if assets are also considered from a resource based view, i.e. being value-enhancing, limited in supply, and difficult to substitute (Barney, 1991). Moreover, unpacking the TCT attribute of

CORPORATE WATER RETURN

uncertainty to its components of volume, technology and behaviour (Williamson, 1985) also affords interesting insights from a real options theory perspective, as it points to a conflict where managers seek greater integration in response to behavioural uncertainty, but more freedom in response to volume uncertainty. Given that these sub-attributes may be positively correlated (e.g. more uncertainty about the volume of water demanded might make suppliers more opaque about their pricing or provisioning strategies), this implies that the uncertainty effect is not monotonic (e.g. Folta & O'Brien, 2004), and that intra-attribute 'wars of primacy' may take place as managers wrestle to determine the appropriate structural alternative for the transaction.

To illustrate these various nuances and conflicts within an applied context; and to consider how they might be resolved, the concept of corporate water return is introduced as a corollary to corporate water risk.

6.3 Corporate Water Return

While real options theory suggests that managers opt to defer making attractive but irreversible investment decisions in the face of uncertainty (Folta & O'Brien, 2004), they may also, in certain circumstances, take a 'growth option', and make early investments under uncertain conditions (Amram & Kulatilaka, 1998), if there are early mover advantages in doing so (Kulatilaka & Perotti, 1998). Indeed, greater uncertainty may actually add value to the growth option, encouraging investment that delivers new firm capabilities (Kogut & Kulatilaka, 2001), technological advantages, brand recognition, or other comparative advantages over later movers (Lieberman &

CORPORATE WATER RETURN

Montgomery, 1988). Indeed, this is consistent with the integrative structural preference predicted by TCT.

However, even when seeking first mover advantages, managers are more likely to exercise their growth options if they are able to minimise the size of their irreversible investments, or sunk costs (Clark & Wrigley, 1997a; Folta & O'Brien, 2004). One way that managers might do this is by using more flexible arrangements such as market contracts and hybrids, even where these structures imply a higher transaction cost than a hierarchy (Kogut, 1991; Schilling & Steensma, 2002), provided the value of being a first mover exceeds the transaction cost. In this configuration, real options theory challenges the predictions of TCT. Instead of hierarchies, it is hybrid structures that allow managers to make limited commitments and to reduce the risks associated with volume and technological uncertainty.

Consider the provision of water supply and services for a multinational firm, which seeks to expand in an infrastructure-scarce but rapidly growing part of the world. This could, for example, be in sub-Saharan Africa, where real GDP more than doubled between 1995 and 2010 (International Monetary Fund, 2013). However, the cost of addressing the continent's infrastructure deficit is US\$ 75 billion per annum, or 12% of Africa's GDP, of which there is currently a funding gap of US\$ 35 billion per year (World Bank, 2014). With GDP growth of 6% in sub-Saharan Africa forecast for 2014 compared to the world output of just 3.6% (International Monetary Fund, 2013), the IMF anticipates that the region will account for more of the global economy than at any time in the last thirty years.

This provides the basis for at least a *prima facie* case that there are early mover advantages to be gained by firms exercising a 'growth option' and investing in water

CORPORATE WATER RETURN

infrastructure, despite behavioural uncertainty and *because of* the uncertainties associated with rapidly increasing volume demand related to e.g. socioeconomic development.

Proposition 1: Corporate Water Return can be understood in terms of the value of a 'growth option' that affords early mover advantages to managers that invest in water infrastructure under conditions of uncertainty

In essence this is the counterpoint to the corporate water risk concept, which, *inter alia*, emphasises the lack of adequate infrastructure, uncertainties related to populist politics, inadequate information flows and weak regulatory frameworks, and the variability and unpredictability of demand due to demographics, urbanisation, and climate variability (Hope & Rouse, 2013). As a result, firms opt to defer investing in water infrastructure, *despite* early mover advantages, and because of behavioural uncertainties related to e.g. political and regulatory risk.

Proposition 2: Corporate Water Risk can be understood in terms of the value of a 'deferred option' that affords flexibility and protects managers from investing in water infrastructure under conditions of uncertainty

According to a report prepared by a leading consultancy firm, global spending on basic infrastructure currently amounts to US\$ 2.7 trillion per annum, compared to an optimal \$3.7 trillion per annum that is required to close the output gap of lost economic activity (World Economic Forum, 2013). Inasmuch as a portion of this investment gap is a 'deferred option', where managers of firms decide not to make infrastructure investments despite their delivering a positive net value, it is deductively proposed that

CORPORATE WATER RETURN

this situation exists because the risk of behavioural uncertainty outweighs the early mover advantage of volume uncertainty.

Proposition 3: Where the net difference between Corporate Water Return and Corporate Water Risk is a negative value, managers will not integrate the transaction within the firm, but instead seek structural alternatives

As has been discussed, the structural alternatives according to TCT are markets and hybrids. In terms of markets, the literature in relation to the market provision of water supply and services has emphasised the importance of water pricing that delivers sustainable cost recovery, within a transparent governance structure that provides for the poor (Rouse, 2013). To the limited extent that managers of firms comment externally about the appropriateness of market structures for water supply and services, they emphasise the importance of ‘stewardship’ (e.g. Cofino, 2013) which broadly equates to advocacy of incentive based models of activity, with minimal distortions from e.g. pricing subsidies, that are consistent with TCT.

Proposition 4: Where managers seek market structures to manage Corporate Water Return and Corporate Water Risk, they will advocate arms-length ‘stewardship’ models based on incentives, consistent with transactions cost theory

Indeed in a ‘pure’ market structure, it is likely that most of the costs accruing to water use correspond directly to the level of consumption, rather than as discrete transaction costs. However, there are few pure market structures for the intermediation of water supply and services. In part, this is likely a function of the unique social, cultural and economic attributes associated with water use, including human rights to water that

CORPORATE WATER RETURN

have been developed within the literature (e.g. McCaffrey, 1992) and ratified under international law (United Nations General Assembly, 2010). Moreover, water pricing rarely includes any amortisation of the original capital expenditure costs, often because this was covered by the public purse. Water rates typically include allocations for repair and maintenance, but exclude a provision for replacement.

Proposition 5: For transactions where Corporate Water Return and Corporate Water Risk are salient but cannot be fully integrated, managers will always prefer to participate in hybrid structures over market structures

Proposition 5 treats water as a strategic asset, as understood by the resource based view. It introduces the idea of issue salience within the strategic cognition process; where managers evaluate return and risk in terms of their relative materiality, specificity and urgency (Money, 2014d). No assumption is made here as to the level of integration between the polar structures of market and hierarchy. However, it posits that, where full integration is not appropriate, the preference by managers for a hybrid structure over a market structure is unconditional.

The following section offers an empirical framework to test these propositions.

SECTION II

6.4 Five Factor Framework (5FF)

What follows is a theory-building framework that has been deliberately structured to facilitate both *ex ante* and *ex post* empirical analyses of actions taken by managers. It is important therefore to present the framework with appropriate context, and an illustrative (albeit entirely concocted) scenario is used for this purpose.

ACME Plc. is a multi-national firm within the food and beverage sector. Its portfolio includes packaged foods such as cereals and confectionary, and powdered and liquid beverages. The firm is listed on the London Stock Exchange. Its annual revenues are roughly US\$ 20 billion, as is its market capitalisation, and it is a member of the FTSE 100 index. Its share ownership is geographically diverse, but in common with its peers it is concentrated amongst institutional holders rather than retail investors. The firm also uses debt to finance its activities, and is rated “A2” (upper-medium grade, low credit risk) – also similar to its peers. ACME currently has distribution networks and retail presence in over 100 countries, and a manufacturing presence in about 30 countries. At present, about 40% of sales are derived from Europe, 30% from the Americas, 20% from Australasia, and 10% from the Middle East and Africa (MEA).

ACME’s managers anticipate annual sales growth of 4% over the next decade, which compounded would increase group revenues to \$30 billion. However, they also believe that by the end of that period, MEA will account for 20% of sales, while Europe’s share will fall to 30%. These dynamics reflect the expected growth rates in demand within the respective regions, and implies compound sales growth of over 10% per annum in

CORPORATE WATER RETURN

MEA, compared with less than 2% in Europe. The firm's managers recognise that very few of their manufacturing plants are based in MEA, and the facilities in place are insufficient to accommodate an increase in sales from US\$ 2 billion per annum to US\$ 6 billion per annum over the next decade.

Given the importance of MEA growth to the firm's overall performance (it would account for 40% of the group's total increase in sales value), ACME's managers make it a strategic priority to increase the firm's manufacturing capacity in the region. As part of this programme, a new finishing factory for several of the firm's key lines is commissioned at a site on the outskirts of Lusaka, Zambia. The decision is shaped by the site's proximity to road, rail and air transport networks, space available to expand, and Zambia's relatively stable political regime, strong civic institutions, and a legal system based on English common law. ACME's managers decide to build sufficient capacity into the plant to meet customer demand, not just in Zambia, but in several adjacent markets.

The factory is modern and efficient but nonetheless relatively water intensive, given the nature of ACME's product portfolio. A rolling twelve month agreement has been concluded with the municipal water utility, ensuring the firm has sufficient supply at an agreed price. However, it is clear that in the longer term the municipal utility will struggle to cope with the increasing demand for water from its rapidly growing, urbanising customer base without significant investment in infrastructure. This investment is currently not available to the utility. Zambia's infrastructure funding gap is estimated at US\$ 500m per annum, 40% of which is in the water and wastewater sector (Foster & Dominguez, 2011).

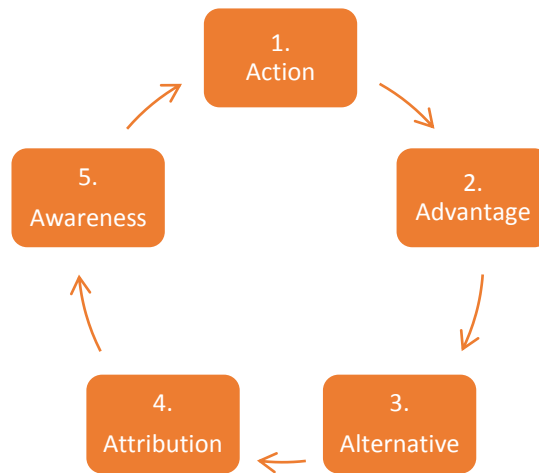
CORPORATE WATER RETURN

The implications are clear. Rising demand and relatively inelastic supply is likely to result in maladaptation (Williamson, 1999) as the utility finds itself unable to meet ACME's requirements. This creates transaction costs for ACME, as behavioural uncertainty rises. Apart from the utility itself, various actors can contribute to this uncertainty, including regulators, politicians, formal civic groups, activist local residents, and so on. This narrative around 'licence to operate' – including economic and reputational risk – is widely rehearsed in the extant corporate water risk literature (e.g. Barton, 2010; Sarni, 2011) and will not be reprised here. The point of interest is corporate water return. Irrespective of the increased transaction costs associated with behavioural uncertainty, ACME carries latent benefits in the growth options that it can exercise to exploit its early mover advantage.

The question is whether a relational structure exists in which these latent benefits are greater than the transaction costs, so that ACME would exercise its growth option. In this example, if the firm could operate within a structure where it was sure that it would not face constraints on water supply and services as it expanded, this structure would have a value to the firm. The question would then be what the value was, and if it exceeded the cost of the structure.

A Five Factor Framework (5FF) under which such a structure can be identified and evaluated is set out below:

Figure 16: A Five Factor Framework (5FF)



Source: (Money, 2014a)

6.4.1 5FF Factor 1: Action

The first condition of the 5FF is that the firm is considering an action (such as an investment in water supply and services) that has lower transaction costs when it occurs *outside* the hierarchy. If the desired outcome is possible by action taken within the integrated firm structure at a lower transaction cost than any alternative structure, then logically the action would be taken within the firm. In the parlance often used by managers of firms, this action would be 'business as usual'. For the action to take place outside the hierarchy, the transaction cost associated with an alternative structure has to be lower than the cost associated with an integrated transaction. In the parlance of managers, this is an action that is 'beyond the fence line'. In ACME's case, it is assumed that the transaction costs to the firm of securing a dedicated, irrevocable right to sufficient water at the Lusaka site are too high for that action to take place. These costs may be purely economic, but may also relate to the firm's licence to operate.

6.4.2 5FF Factor 2: Advantage

The second condition of the 5FF is that, in taking an action, the firm lowers the transaction costs associated with the activity, due to a comparative advantage that the firm brings to the transaction. That is, the firm's involvement results in lower transaction costs for the activity than are otherwise prevailing. For example, assume that the utility that supplies ACME wishes to increase its capacity to store and distribute water within its customer catchment area. The investment required for such a capital intensive activity is significant, and the utility considers borrowing the money by issuing bonds. The current sovereign credit rating for Zambia is "B1" (Moody's, 2014) and the Zambian utility is likely to be rated below this – assume one grade lower, i.e. "B2". Recall that ACME is rated "A2", which is 9 notches higher than the utility. In a bond placing in April 2014, Zambia raised 10-year funding at a yield of 8.625% (Moore & Wigglesworth, 2014). For the utility to borrow e.g. US\$ 250m over 10 years, lenders would likely require a premium interest rate of say 10% per annum. For ACME to borrow the same amount over the same period, lenders might require annual interest of just 3%. This differential offers scope for a meaningful reduction in transaction costs, due to ACME's comparative advantage over the utility.

6.4.3 5FF Factor 3: Alternative

The third condition of the 5FF is that there is, in practice, an alternative structure to the status quo, under which the firm (e.g. ACME) engages in the transaction (e.g. underwriting a US\$ 250m investment in water infrastructure) with another actor (e.g. the utility) on a Pareto improved basis (e.g. lower financing costs benefiting the utility as well the utility's customers, including ACME). This structure may have some or all of the characteristics expected of hybrids in TCT, such as equity investment (e.g. a

CORPORATE WATER RETURN

joint venture between ACME and the utility), long term binding contracts (e.g. regarding supply and payment terms), routines for mutual monitoring (e.g. ACME monitors the utility's progress in cost recovery; the utility monitors the volume of ACME's water use; the regulator monitors the utility's abstraction and ACME's discharge), and prearranged procedures for third party mediation or arbitration in the event of a dispute, without immediate recourse to a court of law. The alternative structure as a consequence of the transaction may involve many more actors than the buyer and seller of the service, and might include other water consumers, regulators, government agencies, taxpayers, civic society groups, NGOs etc.

6.4.4 5FF Factor 4: Attribution

The fourth condition of the 5FF is that, beyond a Pareto improvement, the benefits accruing to the lower transaction cost are attributable to the respective beneficiaries. It is moreover a necessary condition that the beneficiaries include at least one other actor than the firm (or concert party); although the firm itself does not have to be a beneficiary. The attributed benefits need not be financial, nor must they be quantified. However, the benefits must be defined, discrete and direct. The necessity of attribution is a function of hybrid structures. In a hierarchy structure, controls exist to manage and resolve disputes, and managers exercise broad discretion to direct behaviour. Meanwhile, in a market structure, powerful incentives exist to ensure that buyers and sellers are satisfied. However, a hybrid structure lacks the authority of control by fiat, while long-term contractual arrangements erode the power of incentives. As a result, the efficacy of monitoring and managing relationships between transacting parties and other actors becomes critical. Attribution is key to this: again, in the parlance, 'you cannot manage what you cannot measure'.

6.4.5 5FF Factor 5: Awareness

The final condition of the 5FF is that the beneficiaries of the action, beyond the transacting parties themselves, are aware that they are better off as a consequence of the transaction taking place. In the case of ACME, beneficiaries would include the institutional investors who hold shares in the firm and participate in its profits. The transaction helps to increase the flow of earnings and dividends that result from ACME's additional sales to the MEA region. It is important the investors are aware of the benefits, as they are the principals who ultimately authorise managers, acting as their agents, to take such actions. In the case of the utility, the beneficiaries may be proximate domestic water consumers, who have improved access to water supply and services at a price that is affordable, thanks to the lower cost of infrastructure funding. It is important that beneficiaries are aware because their support may be necessary in granting a 'licence to associate'; creating innovative hybrid structures that deliver Pareto improvements that may not have been realised under market or hierarchical regimes. The 'licence to associate' in terms of delivering corporate water return is the counterpoint to the 'licence to operate' on which the corporate water risk literature is focused.

SECTION III

6.5 Discussion

The 5FF posits a framework to understand and evaluate intermediating actions taken by managers to lower transaction costs and deliver desired outcomes. Although it is conceptual in structure, the framework facilitates *ex ante* and *ex post* empirical evaluation of these actions, from different perspectives. While the 5FF sets out minimum criteria that must be met for each condition, it is also possible to conceive a relatively high (or low) contextual applicability of the framework, where conditions are more (or less) comfortably met.

To take each condition in turn by way of brief example. First, where the differential in transaction costs for a firm is substantial if the action is internalised (high applicability), the firm is more likely to look at alternative structures than where the differential is modest (low applicability). Second, where the comparative advantages that the firm brings to the action are greater and/or more numerous, the rationale for the transaction increases (high applicability). Third, where alternative structures to hierarchy and market already exist and are well established, e.g. prevalence of co-operative agreements, joint ventures, monitoring agencies etc. the applicability of the framework is higher. Fourth, where the benefits accruing from the transaction are bigger, more widely spread, and more clearly apparent to the respective parties, the framework gains stability and reinforcement. Finally, where the ultimate beneficiaries can make the clearest link between their benefit and the original action, the lower the resistance may be to deployment, and the higher the corresponding applicability. This paper does not attempt to qualify the relative importance of each of the five conditions set to the

CORPORATE WATER RETURN

overall applicability of the 5FF. This would be a useful area of future research, particularly with reference to empirical analysis and statistical significance testing. And by embedding a Pareto improvement within the conditions, the paper also does not allow for anyone to become worse off as a consequence of the action. This may conceivably be an unrealistic criterion in an applied context, and again would be an interesting area for empirical analysis.

The 5FF is a cyclical, self-reinforcing framework. *Ceteris paribus*, the benefit of an action that reduces a firm's transaction costs and raises its profitability is that its value should increase and its creditworthiness should improve. This in turn contributes to a higher credit rating. For example, if ACME is upgraded to "A1" the interest rate it is required to pay on future borrowing should fall, compared to its current "A2" rating. In effect this increases the firm's comparative advantage, potentially making more hybrid transactions attractive as the marginal cost falls. These additional actions further improve creditworthiness and lowered borrowing costs, creating a virtuous circle of Pareto improved value creation. Meanwhile the investment in infrastructure – which would otherwise not have taken place – delivers multiplier benefits through job creation, creating tax receipts and income that can be used to reinforce the mechanisms necessary for monitoring and managing hybrid governance structures. This helps to ensure they are fit for purpose, disputes are resolved more swiftly, and the benefits accruing from the process are delivered more completely. It should also be noted that the jobs created through this process deliver growth in disposable income and an impetus to consumer spending, some of which should support further demand for ACME's products. Separate to this, the improvement created in water supply and services infrastructure has benefits in terms of productivity (e.g. fewer days lost to illness) and welfare (e.g. improved health outcomes). Investments should also

CORPORATE WATER RETURN

create opportunities in terms of skills training and education, productivity benefits that are not the exclusive domain of water.

This paper has used corporate water risk and return as a bounded exemplar for the 5FF. Given water's unique economic, social and cultural attributes, this raises the legitimate question as to whether the framework has broader validity or relevance beyond water. Two related questions are whether the 5FF is only relevant to transactions in fast-growing regions with insufficient infrastructure, as characterised by parts of the developing world; and whether the 5FF applies only to capital investments, rather than a broader range of firm activity. In principle, there is nothing within the 5FF that restricts its applicability along these dimensions. Lowering transaction costs, utilising comparative advantage, and operating within hybrid structures are all generic factor processes, and the 5FF has been conceived with the objective of extensibility across objectives, activities and geography. Ultimately, the practical value or otherwise of the proposed approach must be confirmed via empirical analysis, and it is hoped that future research will complement this conceptual approach by probing its applicability.

The idea that an action by a firm can precipitate a benefit (or value) on a mutual (or shared) basis that would otherwise not exist is not, of course, a new or original concept. Instrumental stakeholder theory (T. Donaldson & Preston, 1995) has variously explored value creation for shareholders through stakeholders (R Edward Freeman, Wicks, & Parmar, 2004). The literature on how firms can create shared value highlights "three distinct ways to do this: by reconceiving products and markets, redefining productivity in the value chain, and building supportive industry clusters at the company's locations" (Porter & Kramer, 2011, p. 65). Inasmuch as the 5FF incorporates these dimensions, it is complementary to, rather than a substitute for, the

CORPORATE WATER RETURN

outputs of Porter and Kramer's shared value solutions. However, while the creation of shared value is a necessary component of the 5FF's process, it is not the motivation for the action. If transaction costs for a firm are lower if the transaction takes place within a firm's structure, rather than in a market or hybrid structure, then the 5FF predicts that the transaction will be internalised, even if an alternative structure creates shared value. As such, it is at odds with the definition that "the purpose of a corporation must be redefined as creating shared value, not just profit per se" (Porter & Kramer, 2011, p. 63). The 5FF makes no normative statement about what the purpose of a corporation must be in relation to society, and is on the agnostic, rather than evangelical edge of this spectrum. Instead it seeks to build theory on the motivations and conditions under which managers may engage with hybrid structures which, *inter alia*, have societal implications.

In conceptualising corporate water return and risk through the lens of TCT and real options theory, the 5FF attempts to proxy some of the applied dynamics under which managers make decisions (G. Donaldson & Lorsch, 1983; Hayes & Garvin, 1982). Much as the literature on corporate water use has hitherto focused on the risk side of the equation, so too has most of the empirical research on real options theory focused on the option to defer, rather than to grow (Folta & O'Brien, 2004). Given that both options increase in value with increased uncertainty, the disproportionate interest in options to defer (and corporate water risk) over options to grow (and corporate water return) suggest that more attention to the latter is justified. While there is nothing substantive within the academic literature on corporate water return, it is curious that even in practitioner reports – where commercial incentives, if nothing else, exist for a wider framing of the issue – the conceptualisation of opportunity as the counterpoint to risk is very narrow, and restricted principally to the economic benefits for firms of

CORPORATE WATER RETURN

greater efficiency. It is hoped that the 5FF will catalyse new and innovative approaches to conceptualising and realising the value of options to grow, which are likely to increase in an environment of rising uncertainty.

Certainly, the stakes are high enough. It has been estimated that the 'output gap' between rising infrastructure needs and insufficient provision is at least US\$ 1 trillion per year (World Economic Forum, 2013). Public-Private Partnerships (PPPs) which can tap the private sector's financial resources and skills in delivering infrastructure are frequently described as the obvious and optimal solution to closing the gap. However, insufficient preparation, low quality feasibility studies, a poor balance between risk allocation and regulation, and an inadequately accommodating environment are cited as reasons why PPPs have not delivered against their potential. The 5FF does not obviate these hurdles, but provides a different perspective by which they can be conceptualised and addressed. Preparation requires an experienced team, good governance and adequate funding. Feasibility studies require sophisticated modelling, supplemented with accurate data. Balancing risk allocation and regulation requires clear signalling and adaptive responses. A conducive environment requires a solid legal framework and societal communication. The 5FF is based on a hybrid governance structure where the requisite elements to catalyse these investments exist. If the key stakeholders in the process, such as the transacting parties, governance and monitoring agents, and the ultimate beneficiaries (e.g. shareholders and citizens), can be aligned in the pursuit of an objective, there is reason to be optimistic that the output gap can be closed. The onus lies firstly with firms to reconceptualise risk in terms of options to defer and options to grow. It lies secondly with utilities and others to take a longer term view of their infrastructure requirements. And it lies thirdly with governments to develop the environment needed

CORPORATE WATER RETURN

where complex hybrid structures can thrive. But this is not simply a wish list. The responsibility of firms – as profit-seeking entities, accountable to their owners – ranks *primus inter pares*. The current status quo may reflect problems of agency, but the momentum for change builds as the reality of insufficient infrastructure in a growing, developing, urbanising and resource scarce world, comes home to roost.

This is not mere whimsy. In March 2014, the consumer goods firm Unilever announced the issuance of the first ever green sustainability bond (Unilever Plc., 2014) in the sterling market. The amount raised was £250 million, at a fixed interest rate of 2%. In a statement accompanying the issuance, the firm's Chief Financial Officer said that the "intention is to support [their] vision for sustainable growth, while investing in the Unilever credit" (Unilever Plc., 2014). The firm also described a 'Green Sustainability Bond framework' that would provide "clarity and transparency around the use of proceeds with a yearly reporting structure to reconcile use of funds. The criteria for investments include operational reductions of water used of 50% for new factories, and 30% for retrofitted factories. The firm also set out a pipeline of projects in which the bond's proceeds would be invested, including factories in South Africa, China, Turkey and the USA. Even from a superficial analysis, there are various aspects of the firm's decision that are consistent with the propositions in this paper, and predictable from the 5FF. Unilever is prosecuting its 'Sustainable Living Plan' which targets a doubling of the size of the business, while reducing the overall environmental footprint. It can be speculated that this target creates transaction costs that the firm would seek to reduce via hybrid structures. Given the company's "A1" credit rating, it enjoys a comparative advantage over many sovereign borrowers. The 'Green Sustainability Bond framework' provides a basis for attributing the benefits, while the yearly reporting structure should keep stakeholders aware of developments.

CORPORATE WATER RETURN

According to the research provider Dealogic, the market for green bonds increased by 500% in 2013 over the prior year (Bolger, 2014), mainly issued by supranational organisations such as the World Bank and EIB. However, corporate activity is rapidly increasing and, in the first three months of 2014, issuance was two-thirds of the total issued for 2013 as a whole (Edwards, 2014). The market has also been developed through the publication of voluntary guidelines by a consortium of leading banks, which categorise potential eligible projects, including water. Such publications contribute to lowering transaction costs by improving the flow of information, and encourage the development of structural alternatives. In absolute terms, the capital committed to green bonds in 2013 was US\$ 11bn, a relatively small number in the context of the estimated infrastructure investment gap (Bolger, 2014). However, if the recent trend rate is extrapolated, green bond issuance could exceed US\$ 50 billion in 2014. The 5FF predicts that such investments create a positive feedback loop, and it is certainly conceivable that capital allocations to infrastructure via PPP arrangements or other hybrid structures achieve critical mass within the decade. This would be an immensely exciting outcome, given the economic and societal benefits that would accrue from, for example, major improvements in access to improved water and sanitation services in lesser developed nations.

6.6 Conclusion

This chapter makes five propositions. It introduces the concept of corporate water return, in the context of a 'growth option' that affords early mover advantages to firms. It presents the concept as a counterpoint to corporate water risk; where managers

CORPORATE WATER RETURN

defer action in order to protect themselves in conditions of uncertainty. It proposes that corporate water risk and return pull decision-making in opposite directions, although both increase in value under conditions of uncertainty. It suggests that where managers seek to manage risk and return through market structures, they tend to advocate arms-length 'stewardship' models, where transactions are intermediated by incentives. However, pure market structures are fairly rare unless the contiguous transaction costs are a low proportion of total costs. The paper's final proposition is that for transactions where water return and water risk are salient but cannot be fully integrated into the firm's hierarchy, managers will always prefer to participate in hybrid structures over market structures. This is a departure from transaction cost theory, and the 5FF derives from this proposition.

The 5FF predicts that a positive feedback loop exists when a firm exercises its growth option by taking action outside the hierarchical structure. However, adherence to certain conditions is necessary. These conditions are, first, that the firm must benefit from lower transaction costs as a result of taking the action outside the firm structure rather than within the hierarchy. Second, that in taking an action the firm brings a comparative advantage that lowers transaction costs. Third, that a structural alternative to the polar positions of hierarchy and market exists. Fourth, that the benefits accruing from lower transaction costs are attributable to the respective beneficiaries. Fifth, that the beneficiaries of the action, beyond the transacting parties themselves, are aware that they are better off as a consequence of the transaction taking place. A fictional company was used to illustrate the applicability of these conditions. The 5FF's applicability could be considered relatively 'high' or 'low', depending on the extent to which each condition was fulfilled.

CORPORATE WATER RETURN

One of the defining characteristics of the 5FF is its self-reinforcing nature, and an example was provided in terms of a firm's borrowing costs as a source of comparative advantage. The relevance and applicability of the 5FF beyond water, infrastructure and investment was briefly discussed; and it was argued that lowering transaction costs, utilising comparative advantage, and operating within hybrid structures were all generic factor processes and that the 5FF had been conceived with the objective of extensibility across objectives, activities and geography. The key issue is the necessity of developing an empirical base, given that the 5FF is essentially a theory-building framework.

The literature adjacent to the 5FF includes theories of natural capital, which, while not meaningfully explored in this paper, include the concept of returns on investment. The literature on stakeholder theory, and, in particular, work on shared value, undoubtedly shares some common elements with the 5FF. However, a key distinction is that the 5FF makes no normative statement about the purpose of firms. The shared benefits that accrue from lowered transaction costs are a consequence of the action, rather than cause of it. Indeed TCT, which is today substantively the same theory that was proposed by Ronald Coase some 80 years ago, remains a highly satisfactory conceptual lens to view the 5FF through when integrated with real options theory, and the resource based view.

While the 5FF is conceptual, the practical significance of the issues at stake is undoubtedly high. Even allowing for forecast error, the annual US\$ 1 trillion 'value gap' between the demand for new infrastructure and its supply represents a dramatic market failure. The consequence is lower economic activity and sub-optimal welfare. Closing the gap would lift more people out of poverty more quickly, and PPP hybrid structures that engage firms with their counterparties to deliver this infrastructure

CORPORATE WATER RETURN

would be valuable and desired. This underpins the exhortations made in this paper for further research in developing an empirical base; testing the sensitivities of the factor conditions; and widening the frame of reference beyond water, infrastructure and investment.

Finally, it is important to emphasise that while this is a theory-building paper various real-world developments in recent months offer strong support for the predictive implications of the 5FF, and the propositions that underpin it. The market for 'green bonds' – closely analogous to the action proposed in the example herein – has increased five-fold in the past year, and demand is accelerating sharply as the conditions required to embed hybrid structures are strengthened. This already reflects new investment in the order of tens of billions of dollars per annum. These may be the dawning days of a new era in post-crisis sustainable environmental financing, during which theories such as the 5FF can play a small but important role in securing a better future for the generation to come.

CONCLUSION

Chapter 7

CONCLUSION

This thesis concludes with a summary of the problem that has been addressed, and of the solution that has been proposed. This chapter also highlights the contribution that the thesis makes to the literature, and discusses the gap it fills in the practical application of the concepts under study. Finally, the conclusion summarises the limitations of this research, and proposes some avenues for future development.

7.1 The problem this thesis addresses

The thesis is critical of the received wisdom and presumptions of best practice that are pervasive in corporate disclosure in general, and non-financial corporate disclosure in particular: specifically within what is classified as corporate social responsibility (CSR) or sustainability disclosure. Two branches of CSR literature can be identified. The first concentrates on classifications and drivers (Brammer & Pavelin, 2005; Campbell, 2007; Cramer, Jonker, & van der Heijden, 2004; Garriga & Melé, 2004; Whitehouse, 2006), while the second focuses on the outcomes and performances of CSR for the engaging firms (Pava & Krausz, 1997; John Peloza & Papania, 2008; Porter & Kramer, 2006; Waddock & Smith, 2000). While the literature variously identifies CSR as a moving and contested target (Bansal, 2005; Conley & Williams, 2005; Sadler & Lloyd, 2009; van Marrewijk, 2003), the path-dependent nature of CSR and the susceptibility

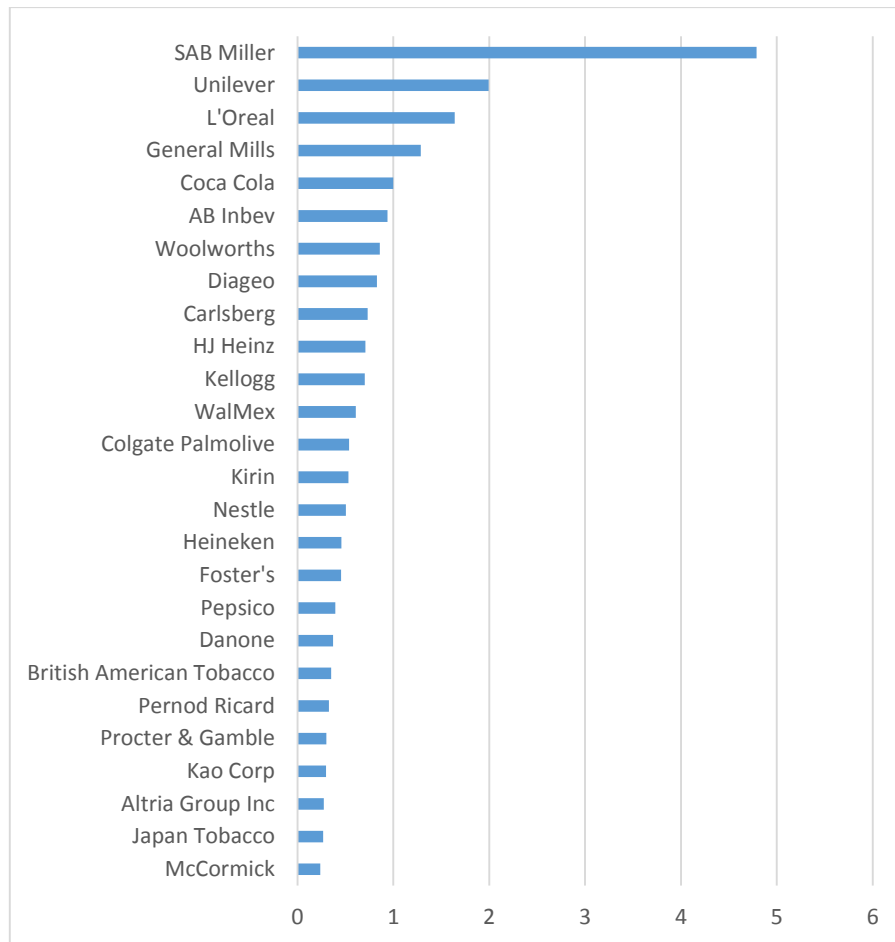
CONCLUSION

of best practice to be hijacked by lock-in (Martin & Sunley, 2006; Martin, 2009) is rarely a focus of empirical analysis. In exploring the disclosure practices of a set of firms that are identified as exemplars of best practice in corporate water disclosure, both by self-selection and by their inclusion in the CDP water disclosure report (CDP, 2011), this thesis offers a critical empirical examination of what best practice actually means, and how it is derived.

In Chapter 3, using water efficiency targets as a proxy for best practice, the average annualised change in the disclosed amount of water used per unit of product for the previous five years was applied as a measure of historic efficiency. Of the qualifying companies, 31 (94% of the sample) reported a reduction in the volume of water used per unit of production. The average change in water/unit for the sample was -5.9%. As a measure of target efficiency, the compound annual growth rate necessary for that company to achieve its disclosed efficiency target over the timeframe was applied. Of the qualifying companies, the average improvement in targeted water/unit for the sample was -3.6%. That is, a targeted improvement in water efficiency that is 230 basis points *lower* on average than the actual historic improvement in efficiency. Dividing target efficiency by historic efficiency produces a ratio, or Aspiration Multiple (ASMUL). An ASMUL >1 indicates that a firm aspires to deliver water efficiencies in the future at a greater rate than it has in the past; while an ASMUL <1 indicates the opposite.

CONCLUSION

Figure 7: Water Efficiency Aspiration Multiples (ASMULs)



Source: (Money, 2014b)

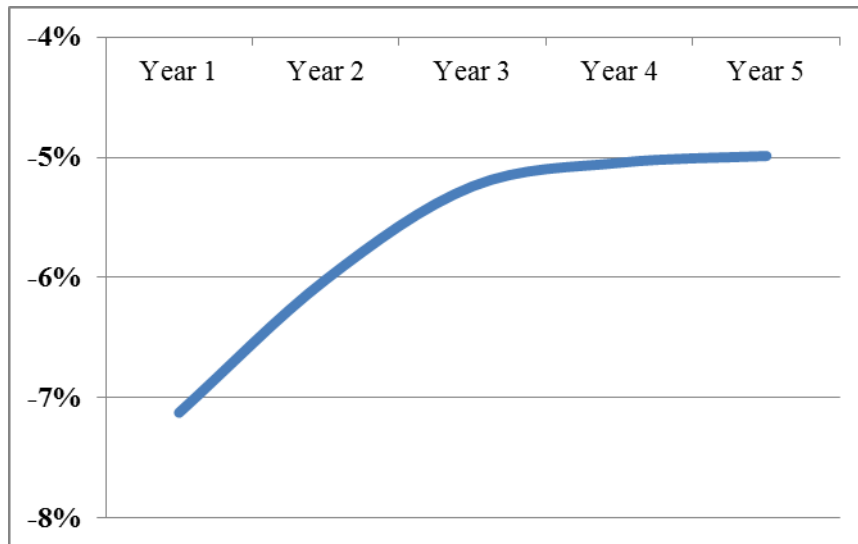
Of the 26 firms in the adjusted sample, just 15% have an ASMUL greater than 1, while the median ASMUL is 0.54x. The data shows that most of these exemplars of so-called best practice are targeting a materially lower rate of improvement in their efficiency of water use in the future, compared to what they have achieved historically.

Chapter 3 also suggested why these findings are not particularly surprising, even if they are not consistent with the narrative disclosure in these firms' CSR reports, which generally emphasise an ever greater focus on efficiency and water use targets. From

CONCLUSION

the data, the average CAGR of historic efficiency improvements over 1, 2, 3, 4 and 5 years for the sample was calculated and plotted.

Figure 9: CAGR improvements in historic water efficiency



Source: (Money, 2014b)

It shows that, on average, the highest efficiency improvement is achieved in the first year, decreasing in each of the subsequent years. This is consistent with the theory of diminishing returns on efficiency investment (Romer, 1986), as well as the argument made more extensively in Chapter 3 that ASMULs will inevitably fall over time.

The results are not only unsurprising from an empirical analysis perspective, they are also consistent with the predictions from the conceptual literature. First, companies seek to mitigate the threat of their resource dependence (Pfeffer & Salancik, 1978). It is logical to invest in reducing dependence on water until the point where the marginal benefit of reduced dependence is equal to the marginal cost of that investment. As the marginal benefit falls and the marginal cost rises, the ASMUL will decline. Second, companies may be interdependent on their supply chain. Exposing their level of water

CONCLUSION

risk – for example via CSR disclosure – without having the control necessary to reduce that risk could make this vulnerability even more visible. So disclosure is curtailed, even though it may give rise to agency problems. Narrative CSR disclosure, which may be unquantified and unqualified, allows companies to emphasise aspects of their threat mitigation strategy selectively, and, as the threats have expanded, so too has their narrative disclosure. Such an approach is sustainable only if it is considered legitimate within an institutional framework. Operating in an environment of complexity, ambiguity and uncertainty has encouraged companies to take their cues from their peers, and mimetic process has created a received wisdom of what is best practice in corporate water risk disclosure (DiMaggio & Powell, 1983).

Sources that might traditionally be expected to challenge this received wisdom, such as shareholders and other stakeholders, have instead responded to normative behavioural pressures that have, crudely speaking, cherished form over substance. Chapter 4 describes two heuristics that help explain this response. First, the availability heuristic refers to the tendency for decision makers to respond more strongly to risks when instances of those risks are more available to them from memory or imagination (Tversky & Kahneman, 1973). Second, the threshold heuristic (Simon, 1978) is an implicit rule whereby managers allocate their attention – a scarce resource – on the basis that when the probability of an event reaches some critically low level, it is treated as if the probability is in fact zero. Chapter 4 combines these heuristics with scholarship on discount functions and inter-temporal trade-offs (Ainslie & Haslam, 1992a; Clark, 2011) to propose that an asymmetric ‘Predictability Discount Curve’ exists: where an investor’s behaviour today in response to a probabilistic event that will affect shareholder value becomes more unpredictable the further into the past (or future) a comparable event occurred (or was expected to occur). This provides an

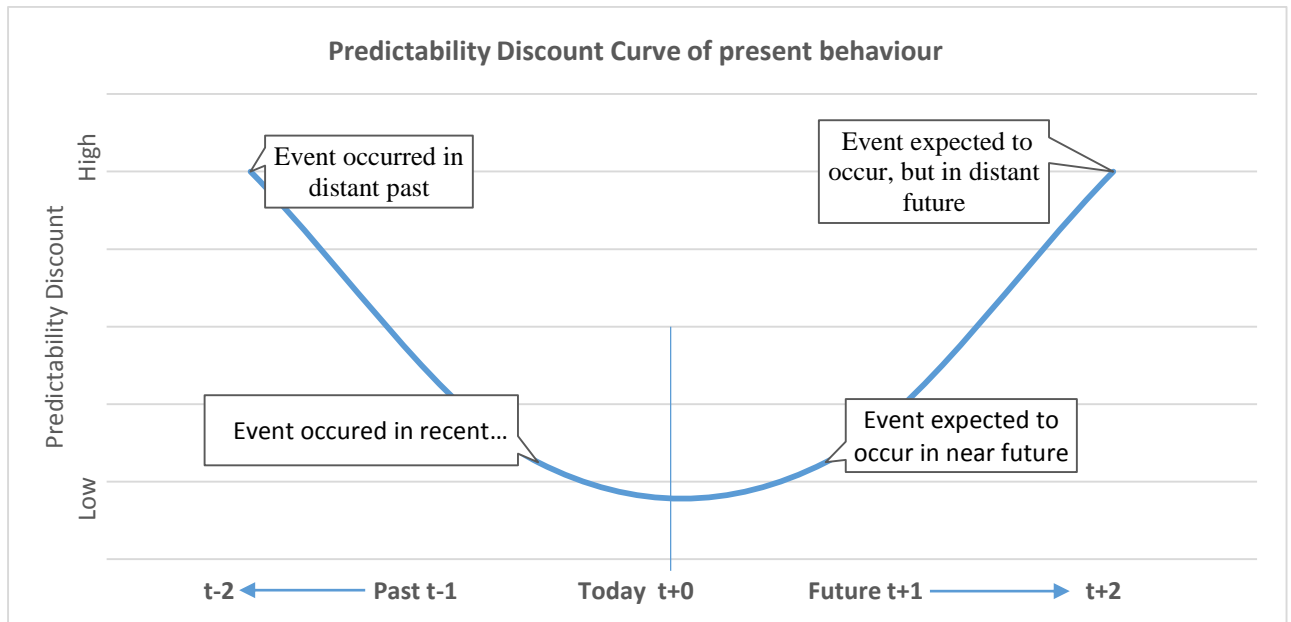
CONCLUSION

explanation as to why the agency problem associated with water risk disclosure that is unfit for purpose remains endemic, despite companies adhering to what passes for best practice; and investor acceptance of this adherence.

The Predictability Discount Curve that is proposed in Chapter 4 incorporates four hypotheses. First, that where a risk event has occurred in the recent past investor behaviour is relatively predictable: even though the behaviour itself is afflicted by the ‘gambler’s fallacy’ of underestimating the probability of a repetition (Cortner et al., 1990; Winter & Fried, 2000). Second, that where a risk event is anticipated to occur within the near future investor behaviour is also relatively predictable: although rare events may be overweighted when prior probabilities are explicitly specified, due to salience and availability heuristic (Cutler & Zeckhauser, 2004). Third, that where a risk event occurred the distant past investors apply the threshold heuristic and allocate no attention to its antecedents. Investor behaviour in anticipation of this event is not predictable, as the literature on experience-based choice attests (see e.g. Rakow & Newell, 2010). Fourth, where a new risk event is expected to occur, but not in the near future, investors apply a form of the threshold heuristic and behaviour is again unpredictable. Although small probability events are often underweighted (Hertwig & Erev, 2009), salience may be influenced by multidimensional perspectives of proximity, such as cognitive, organisational, social, institutional and geographical proximity (Boschma, 2005). Critically, no temporal dimension defines an explicit time period; these vary depending on the salience of specific issues.

CONCLUSION

Figure 10: Temporal Myopia and Probabilistic Events



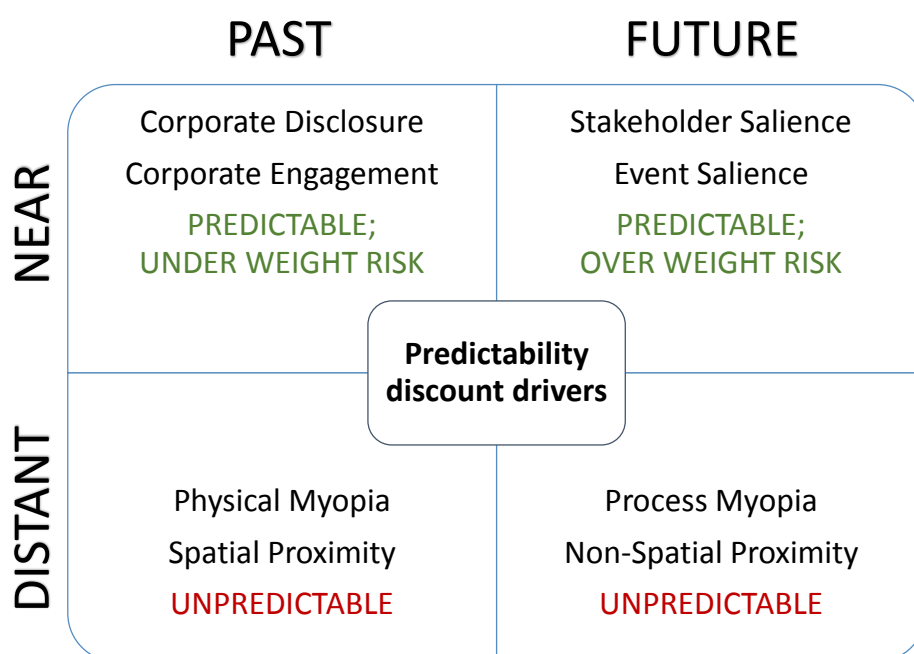
Source: (Money, 2014c)

Chapter 4 goes on to test the conceptual validity of this Predictability Discount Curve empirically, based on telephone interviews with a sample professional investors, on the subject of corporate water risk. The sample was screened to include only those fund management firms that were signatories to *both* the UN Principles for Responsible Investment (UNPRI), and the Carbon Disclosure Project's Water Disclosure (CDPW) report. As such, they could be considered 'exemplar' investors from the perspective of engagement with corporate water risk. Firms based in four countries (Australia, South Africa, the UK and the USA) were chosen, and of the 60 investment managers identified, 20 responded and 12 gave telephone interviews. 75% of the interviewees were Chief Investment Officers (CIOs), with more than 10 years' experience in their current or similar role. The interview covered six topics: perceptions

CONCLUSION

towards corporate water risk disclosure; engagement with their portfolio companies; internal processes and decision making; the relevance of proximity; a self-assessment of their salience as stakeholders; and future priorities. All respondents were invited to comment on any other aspects of the topic that they wished to. Based on their responses, the Predictability Discount Curve was re-framed within four temporal dimensions of the distant past; the near past; the near future; and the distant future.

Figure 11: Predictability of Investor Behaviour



Source: (Money, 2014c)

The responses implied that the key risks (and opportunities) that investors associated with corporate water use were generally in the distant past and distant future. In these

CONCLUSION

two temporal dimensions, investors paid little heed to corporate disclosure of water risk. Disclosure was significant only in terms of the near past.

The problem can be summarised thus. Companies face resource dependence, which exposes them to uncertainty and interdependence. They rationally seek to reduce the risks associated by this exposure. Their disclosure strategy for water use is shaped by this motivation of risk reduction, but as consequence of this strategy, the disclosure itself becomes unfit for purpose, as described the empirical analysis of target efficiency rates. The status quo has become embedded because the approach has acquired institutional legitimacy, and achieved the path-dependent status of best practice, reinforced through mimetic behaviour by aspirant firms. The agency problem that this creates is unchecked, in part because of the legitimacy acquired by the process. But it also reflects a Predictability Discount that applies to investor behaviour in response to events that occur (or are expected to occur) in the distant past (or distant future). Corporate water risk disclosure acquires a salience only for reporting on events that have taken place in the near past, which is not necessarily an appropriate temporal dimension for evaluating future risk. So, in short: corporate water risk is unfit for purpose, and investors tolerate the status quo.

This is not to say that firms or investors do not care about the issue. Indeed the contrary is true. Inasmuch as it represents a series of material business risks (Barton, 2010) that can affect a company's licence to operate (Sarni, 2011), it matters a great deal both to managers at firms – whose livelihoods are invariably associated with the firm's prospects – as well as professional investors exercising fiduciary duties of ownership. If, *in extremis*, a company's licence to operate is revoked, it will fail, and shareholder value will be destroyed. The question is whether the problem of the

CONCLUSION

current cycle of path dependence and lock-in can be broken through the introduction of a new paradigm, and what the necessary conditions are for this to be effected.

This is not a question of philosophical debate, but rather a challenge of urgency and importance. Water has unique attributes in terms of a company's operating performance: as a factor of production it is scarce, unevenly distributed, expensive to transport and has no substitute (Postel, 2000; Seckler et al., 1999). The demand for water is rising worldwide and projections are for continued growth (Butler & Memon, 2006) due to population expansion and migration, changes in lifestyle and the consequences of climate change (Butler & Memon, 2006; Pittock & Lankford, 2010) exacerbating concerns of future water insecurity. According to the management consultants McKinsey, the world's estimated need for water infrastructure investment between 2013 and 2030 is US\$ 11.7 trillion (Dobbs & Pohl, 2013), rising alongside GDP and population growth. Meanwhile, the OECD projects that the average annual world infrastructure expenditure on water between 2020 and 2030 will need to be US\$ 1,037 billion or 1.03% of world GDP, and more than the combined expenditure on road, rail, telecoms and electricity, over the period (OECD, 2006). Financing this investment in the post-crisis environment presents particular difficulties, given the deterioration in many public sector balance sheets (O'Brien & Keith, 2009), increased risk aversion by lenders and financial intermediaries, and the relatively small proportion of institutional asset allocation to infrastructure investment from within the private sector, although this is increasing (Clark, 2000b; Hagerman et al., 2007; Hebb, 2006a, 2007).

In summary, given what is at stake, the level of demand for solutions to this problem is inexorably increasing from desirable to desperate. It is in making a contribution to the solution that the motivation for this thesis ultimately lies.

7.2 The solution this thesis proposes

The problem identified above begs the question as to how managers of firms evaluate issues that appear to ‘matter’ to themselves as well as other stakeholders, in cases where a framework for consistent evaluation appears not to exist. This is not just a case of cognitive inertia that simply requires proactivity on the part of top managers (Narayanan et al., 2010). Instead, this thesis proposes a solution that addresses the circumstances where even the most proactive of managers, who recognise the organisational and strategic significance of an issue, are unable to respond appropriately when they do not have a suitable evaluation framework. The constraints in question are applicable at various scales. For example, within a multinational firm, how does the manager of a subsidiary company provide the management of the parent with salient information that can be compared with other subsidiaries operating in heterogeneous environments? How can the managers of the parent firm evaluate relative salience in a format that facilitates internal resource allocation? How can an external comparative analysis be made between firms, geographies, management and so on, using an extensible basis of evaluation? The common challenge implicit in these examples is that stakeholder issues that have salience with managers may nonetheless elicit symbolic rather than substantive responses, if the framework for evaluating salient issues is unfit for purpose.

Chapter 5 proposes a typological framework for identifying, evaluating and responding to salient issues. Drawing on the literature of both salience and strategic cognition, it uses the attributes of materiality, specificity and urgency as the schemata of the

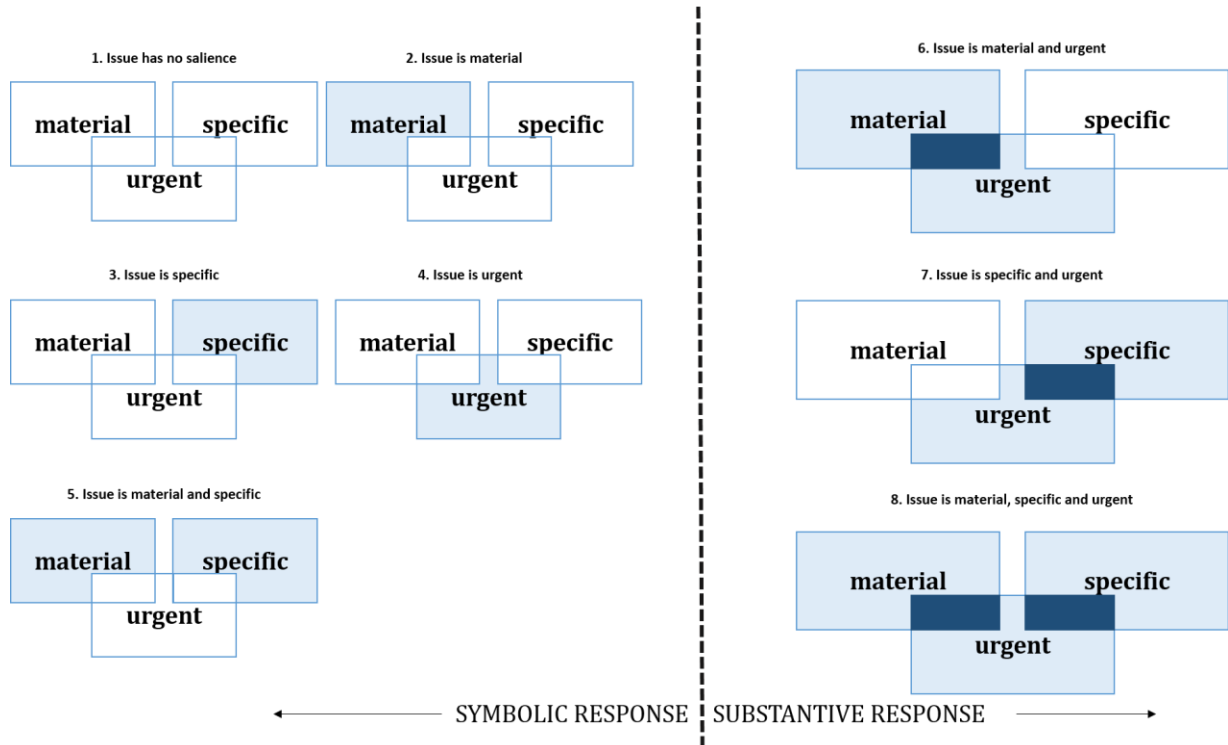
CONCLUSION

framework in order to shape strategy formulation and implementation; and deliver economic, strategic and process outcomes. The materiality attribute relates to economic outcomes such as the potential impact of an issue on a firm's sales, profits, cost of capital, and stock market valuation. The specificity attribute relates to strategic actions, such as responding to competitor activity, allocating of resources within the firm, and timing action or delays in action. The urgency attribute relates to process outcomes such as the quality, speed and risk characteristics of a decision. Unless an issue requires "immediate action" (Mitchell et al., 1997, p. 867), and includes the elements of both time sensitivity and criticality, it cannot be considered urgent. In their typology of stakeholder salience, Mitchell et al. (1997) propose that where the perception is that just one attribute is present, salience will be low, increasing to moderate and high if two or three attributes are perceived to be present, respectively. This framework similarly proffers a relationship between salience and the relative presence of attributes, but proposes that unless an issue is perceived to be urgent, the responsiveness of managers will at most be symbolic rather than substantive (Oliver, 1991), irrespective of the presence (or otherwise) of the material and specific attributes.

There are eight permutations by which these attributes can be combined: requiring the presence of urgency as an attribute for a response to be substantive rather than symbolic yields a subset of three combinations:

CONCLUSION

Figure 13: Issue Salience and Managerial Response



Source: (Money, 2014d)

The typology proposed in Chapter 5 aspires to be more than a conceptual tool, and to be of practical value to a firm's managers and others. To this end a salience scoring methodology is proposed that combines the presence (or absence) of the three attributes. Each attribute has a binary classification, that is, present (1) or absent (0). The primacy of the urgency attribute is embedded within the scoring method so that the salience score is the sum of an issue's materiality and specificity; multiplied by its urgency:

$$\text{salience}_{\text{issue}} = \text{urgent}_{\text{issue}} \times (\text{material}_{\text{issue}} + \text{specific}_{\text{issue}})$$

CONCLUSION

There are eight combinations in which these three attributes can be present or absent, with possible combined scores of 0, 1 and 2.

Figure 15: Issue Saliency Scorecard

Issue	Material	Specific	Urgent	Total Score
No saliency	0	0	0	0
Material	1	0	0	0
Specific	0	1	0	0
Urgent	0	0	1	0
Material and Specific	1	1	0	0
Material and Urgent	1	0	1	1
Specific and Urgent	0	1	1	1
Material, Specific and Urgent	1	1	1	2

Source: (Money, 2014d)

With just three possible scores, the methodology could be critiqued for lacking nuance, but it reflects a deliberate attempt to infuse conviction into a cognitive process that has been hitherto associated with ambiguity. The methodology strives to incorporate the challenges of scale, scope and signalling. First, it is agnostic to the intra-firm scale at which is applied, and would be applicable to both subsidiary and parent companies of a multinational firm, for example. Second, it can be consistently applied to attributes that are variable over time and space, and where firm-level perceptions are socially constructed rather than objective. That is, the methodology is accommodative of differences in corporate cultures that are described in institutional theory. Third, the

CONCLUSION

methodology can be applied by managers as a signalling mechanism to stakeholders of the relative priority assigned to issues of perceived salience. This is important inasmuch as the methodology is more valuable if it is accessible to, and meaningful for, external stakeholders such as shareholders.

The typological attributes and methodology proposed in Chapter 5 provide an answer to the question as to how managers of firms evaluate and respond to issues that matter, where the extant frameworks for evaluation appear to be inadequate. It departs from salience research that precedes it, by challenging the assumption that issues of high salience automatically result in substantive responses by a firm's managers. It proposes that there may be issues that are highly salient to managers in terms of their materiality, specificity, and urgency – or combinations thereof – that nonetheless result in symbolic responses. In proposing a methodology where these three attributes can be evaluated jointly and severally, it presents a practical solution to the conceptual challenges associated with issue salience and firm response. The antecedents of this methodology exist within the stakeholder salience literature, and draw in particular on Mitchell et al.'s (1997) typology. It is also integrated within the literature of strategic cognition, proposing a relationship between the salience scorecard and the implementation of cognitive strategy. Indeed the three attributes themselves are intrinsically associated with the three core outcomes recognised within the strategic cognition literature.

After offering a methodological solution to evaluating issue salience at the firm level, the thesis focuses on the next step. Understanding a problem – uncertainty and interdependence – by evaluating salience is a necessary intermediate stage to resolving it, but it is not in itself the solution. In Chapter 6, the growing requirement that firms and their stakeholders have for water-related infrastructure is presented as

CONCLUSION

an exemplar issue of salience. The world's need for water infrastructure investment over the next decade is variously estimated at between US\$ 10 trillion and US\$ 15 trillion (Dobbs & Pohl, 2013; OECD, 2006). Financing this investment in the post-crisis environment presents particular difficulties, given the deterioration in many public sector balance sheets and increased risk aversion by lenders and financial intermediaries. Interesting new models for financing urban infrastructure based on profit-driven motivations rather than the creation of public goods are emerging within the literature (e.g. Hebb & Sharma, 2014), and the chapter builds on work in this area to propose how and why profit-motivated firms might finance substantial investments in water-related infrastructure. It draws on transaction cost theory to posit why firms might engage with governance structures that are a hybrid between market and firm.

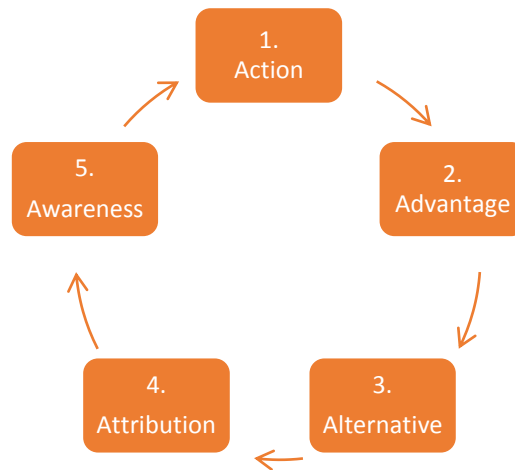
Chapter 6 also draws on real options theory to develop the concept of corporate water return. The literature proposes that, while managers opt to defer making attractive but irreversible investment decisions in the face of uncertainty (Folta & O'Brien, 2004), they may also, in certain circumstances, take a 'growth option', and make early investments under uncertain conditions (Amram & Kulatilaka, 1998), if there are early mover advantages in doing so (Kulatilaka & Perotti, 1998). Indeed, greater uncertainty may actually add value to the growth option, encouraging investment that delivers new firm capabilities (Kogut & Kulatilaka, 2001), technological advantages, brand recognition, or other comparative advantages over later movers (Lieberman & Montgomery, 1988). The chapter summarises the distinction between corporate water risk and corporate water return thus. Corporate water risk can be understood in terms of the value of a 'deferred option' that affords flexibility and protects managers from investing in water infrastructure under conditions of uncertainty. Meanwhile, corporate water return can be understood in terms of the value of a 'growth option' that affords

CONCLUSION

early mover advantages to managers that invest in water infrastructure under conditions of uncertainty.

Drawing together these strands, the chapter proposes a Five Factor Framework (5FF) which combines firms' motivations to reduce transaction costs and avoidable uncertainty, whilst benefiting from strategic opportunities to invest for future growth.

Figure 16: A Five Factor Framework (5FF)



Source: (Money, 2014a)

The first condition of the 5FF is that the firm is considering an action (such as an investment in water supply and services) that has lower transaction costs when it occurs *outside* the hierarchy. The second condition is that, in taking an action, the firm lowers the transaction costs associated with the activity, due to a comparative advantage that the firm brings to the transaction. The third condition is that there is, in practice, an alternative structure to the status quo, under which the firm engages in a transaction with another actor on a Pareto improved basis. The fourth condition is that,

CONCLUSION

beyond a Pareto improvement, the benefits accruing to the lower transaction cost are attributable to the respective beneficiaries. The final condition of the 5FF is that the beneficiaries of the action, beyond the transacting parties themselves, are aware that they are better off as a consequence of the transaction taking place.

The 5FF is a cyclical, self-reinforcing framework. The benefit of an action that reduces a firm's transaction costs and raises its profitability are that its value should increase and its creditworthiness should improve. This in turn should contribute *inter alia* to a higher credit rating. In effect this increases the firm's comparative advantage, potentially making more hybrid transactions attractive as the marginal cost falls. These additional actions further improve creditworthiness and lowered borrowing costs, creating a virtuous circle of Pareto improved value creation. Meanwhile the investment in infrastructure – which would otherwise not have taken place – delivers multiplier benefits through job creation, creating tax receipts and income that can be used to reinforce the mechanisms necessary for monitoring and managing hybrid governance structures. This helps to ensure they are fit for purpose, disputes are resolved more swiftly, and the benefits accruing from the process are delivered more completely.

Empirical evidence consistent with the predictions of the 5FF is becoming available. According to Dealogic, the market for green bonds increased by 500% in 2013 over the prior year (Bolger, 2014). These are the sort of financial instruments that firms could use to invest in water infrastructure. Corporate activity is rapidly increasing in this area and in the first three months of 2014 issuance was two-thirds of the total issued for 2013 as a whole (Edwards, 2014). In absolute terms, the capital committed to green bonds in 2013 was US\$ 11bn, a relatively small number in the context of the estimated infrastructure investment gap (Bolger, 2014). However, if the recent trend rate is extrapolated, green bond issuance could exceed US\$ 50 billion in 2014. The

CONCLUSION

5FF predicts that such investments create a positive feedback loop, and it is certainly conceivable that capital allocations to infrastructure via PPP arrangements or other hybrid structures achieve critical mass within the decade.

In summary, the solution that this thesis proposes can be summarised thus. For corporate disclosure of water use to be meaningful, a framework to evaluate issue salience is necessary. This is what is proposed in Chapter 5. The associated attributes are chosen for their capacity to elicit substantive rather than symbolic responses. This contributes to a better understanding of the challenges faced at firm (micro) level; which in turn provides a contextual understanding of the macro challenges, such as the paucity of water related infrastructure. As factors such as demographic change, urbanisation, climate variability and financing constraints compound to render the problems progressively more pressing, so too does the urgency for action increase. A solution in the form of a catalyst for action is posed in Chapter 6, which develops the concept of corporate water return in recognition of the opportunity (as well as risk) that is embedded in uncertainty. Deployment of this solution in terms of a cyclical, reinforcing framework for action is effected through the 5FF. Empirical evidence that suggest recent activity that is consistent with the predictions of the 5FF – such as the growth of corporate green bond financing – is emerging.

7.3 Contribution to theory

The thesis makes two distinct contributions to the academic literature. First, it provides new empiric validation of some of the most well established concepts used in

CONCLUSION

academic research. Second, it builds on existing and emerging concepts to proffer new, predictive theory that is capable of being tested empirically in future scholarship.

While at one level it may appear that empirical validation of well-established theory is at best a peripheral contribution to the literature, there are unique aspects of the contribution – specifically to resource dependence theory (RDT) and institutional theory – that augment its value. In terms of RDT, the analysis of corporate water risk disclosure and efficiency targets in Chapter 3 offers three summary insights. First, that firms operate in an environment of uncertainty and interdependence in terms of their water use, and this is particularly evident with companies in the consumer staples sector who typically operate with complex and geographically extensive relationships within their supply chains. Second, that for firms operating in this sector, their CSR disclosure embeds as a strategic priority the reduction of uncertainty and interdependence. The chapter posits that this priority ranks more highly than other objectives associated with the CSR literature, such as transparency or accountability. Third, that firms use other actions associated with RDT, such as mergers and acquisitions, inter-organisational relationships and political mechanisms to reduce interdependence from their water use exposure. These actions are not generally part of the disclosure framework for corporate water risk management.

These findings are interesting because there is a paucity of literature that explores corporate water risk disclosure in an academically rigorous context, i.e. why do firms act as they do, what is the context of these actions, and what are the implications of these actions. These issues are significant because of the bearing they have on many branches of related scholarship, including organisational theory, strategic cognition and the CSR literature. To date this thesis includes the only empirical study of this disclosure.

CONCLUSION

In terms of institutional theory, the analysis in Chapters 3 and 4 also offers three summary insights. First, perceptions of best practice are driven by path dependence and institutional lock-in, and this is perpetuated by mimetic process, as firms seek to acquire legitimacy for the ways in which they behave. Second, institutionalism and mimetic process reinforce the objectives of reducing uncertainty and interdependence, because as firms are seen to be following best practice the legitimacy they acquires serves to blunt any objective and rational examination of their vulnerability – which, if the financial crisis of 2008 is any guide, could be systemically damaging in the long term. Third, mimetic process exacerbates the agency problem, as owners follow similar path dependence as managers, with myopia and multiple dimensions of proximity lock-in contributing to an entrenched status quo. The result is that disclosure by agents that is unfit for purpose is tolerated by principals from whom more might be expected in terms of their fiduciary duty. The empirical study of CIO perceptions to corporate water risk that makes up Chapter 4 is also the only analysis to date of this important subject.

RDT and institutional theory have been highlighted as two of the trio of integrated theories that form the conceptual narrative of this thesis. Of the third, stakeholder theory, the contribution this thesis makes is not in its conceptual testing, but instead in using stakeholder salience as the basis of building a new, empirically testable typology of issue salience. Combined with the strategic cognition literature, Chapter 5 offers the first cohesive attempt at providing a basis to evaluate issue salience based on the attributes of materiality, specificity and urgency, and a methodology to determine whether these issues would receive a symbolic or substantive response. It is conceived as a riposte to the general direction in which best practice water risk disclosure appears to be heading. However, it is recognised in various points

CONCLUSION

throughout this thesis that managers and owners are also often unhappy with the status quo. There is a demand for a better way. One conclusion from Chapter 5 might be that this better way need not come from an expensively commissioned management consultancy report, but instead from re-visiting some of the somewhat venerable academic theory that has nonetheless never been more relevant to the challenges at hand than it is today.

In Chapter 6, the well-established TCT also formed the basis of some inductive theory building. While operating under hybrid governance structures is consistent with actions predicted by RDT, the combination with real options theory provides a perspective of uncertainty that is not generally part of the RDT literature. By building on the concepts developed in earlier chapters, it was possible in Chapter 6 to present the new and unique concept of corporate water return to form the basis of an explicative and predictive framework. This framework – the 5FF – goes further than popular related ideas such as the shared value framework in predicting what actions companies might take, the circumstances in which they might take them, and the consequences of them taking it. Along with the typology of issue salience, and the concept of corporate water return, the 5FF is one of three new contributions to theory which are capable of being tested empirically in future scholarship.

Finally, on the basis that a thesis should be more than the sum of its parts, it is proposed that, taken collectively, the empirical validation of existing concepts in this thesis, along with the development of new, predictive theory, together represents a substantial and unique contribution to the literature, and a solid foundation for future academic scholarship in these areas.

CONCLUSION

7.4 Contribution to practice

In positioning this thesis within the context of practitioner literature, it is important to acknowledge that a number of initiatives already exist. Some such as the CDP, GRI and Norges Bank Investment Management have been referenced elsewhere in this thesis. Others include the System of Environmental-Economic Accounting for Water; Water Footprinting; the 2030 Water Resources Group framework; the World Business Council water tool; and the WRI, GE and GS Water Risk index.

The System of Environmental-Economic Accounting for Water links hydrological data to the System of National Accounts that are used to derive macroeconomic statistics such as GDP (Vardon, Martinez-Lagunes, Gan, & Nagy, 2010). Part of a family of United Nations statistical standards, it covers all of the stocks and flows of water through a series of accounting identities (Lange & Hassan, 2006) that allow consistent comparisons between areas and over time (United Nations 2009). However, as Mungatana and Hassan point out, the limitations of SNA in representing environmental stocks and flows into the economic system renders this an incomplete approach (Mungatana & Hassan, 2010) and not readily adaptable in the evaluation of corporate water risk except at a generic, macro scale.

Water Footprinting is an indicator of the direct and indirect freshwater consumption by a producer or consumer (Chapagain et al., 2006), and is a quantitative evolution of Tony Allen's notion of 'virtual water' (Allan, 1998). The concept of business water footprinting has achieved some traction, notably with SABMiller as a tool to "better understand the quantity, efficiency and geographical context of water used" (SABMiller & WWF, 2009). In terms of a risk evaluation tool, the methodology is quantitative,

CONCLUSION

enabling relative assessments to be made, and, conceptually at least, the model can accommodate various levels of complexity in terms of the supply chain and factor inputs. However, the approach faces criticism that it does not account for the differential opportunity costs of water, and while its “determination is relatively standardised, there is no single format to present data and its potential application has not been completely discovered” (Andreu, Solera, Paredes, Perez, & Momblanch, 2010).

The 2030 Water Resources Group report offers case studies from China, India, South Africa and Brazil, which will collectively account for 42% of the world’s projected water demand by 2030 (2030 Water Resources Group, 2010). The report is predicated on the argument that, if left to ‘business as usual’, growth in demand for water supply and services will exceed available supply to the extent that a 40% output gap will emerge by 2030. The report quantifies the cost of closing this gap in the case study countries at ‘just’ \$19 billion per annum, or if scaled to global demand, at \$50-60 billion, provided a) supply is increased, b) productivity is improved, and c) demand is reduced, all based on a series of solutions proposed in the report. The approach makes use of a ‘water marginal-cost curve’ that compares on a like-for-like basis the efficacy of different efficiency and productivity measures with the corresponding impact on supply. The conceptual simplicity of the approach is appealing, although it does not address the issues of corporate water use as explored in this thesis.

The World Business Council for Sustainable Development (WBCSD) introduced a Global Water Tool that enables a company to analyse water use at its production sites against “validated water and sanitation data on a country and watershed basis” (Gerbens-Leenes & Hoekstra, 2008). The tool also helps companies understand their water needs in relation to local conditions, such as water availability (current and

CONCLUSION

projected), water scarcity, access to safe drinking water sources and sanitation, as well as population and industrial growth. The tool also generates outputs which companies can then incorporate into GRI indicators. According to WBCSD's website, more than 300 companies have used the tool since its launch in 2007, although information regarding how the tool was used and to what ends is not available. As a mechanism to incorporate a relative assessment of the resource challenges implicit in corporate water risk, there is much to commend in this approach. However, it does not address the questions of issue salience or closing the infrastructure deficit.

Finally, the World Resources Institute, in partnership with General Electric and Goldman Sachs, released a prototype Water Risk Atlas based on the Yellow River basin in China, that creates maps which illustrate the variations in water risk from place to place. Called "Aqueduct", the prototype contains a database of over 70,000 geographic data points – incorporating hydrological data, socioeconomic and regulatory drivers from publically available sources – to measure water risk in terms of increasing scarcity; reducing quality; and poor governance (World Resources Institute, 2010). It claims to add value to companies as a tool to inform strategic decisions; to investors as a basis for understanding water risk within their portfolios; and to governments to inform spatial planning and infrastructure investment.

There is undoubtedly some overlap between this thesis and each of the approaches outlined above and elsewhere, most obviously in terms of the audiences that the research seeks to inform and influence. Where this thesis makes its unique contribution to the area of practitioner research is in its integration. The problem is presented empirically, supported by well-established conceptual frameworks. The solution builds on these foundations to present a cohesive, coherent and deployable set of tools that are optimised for testing in the field.

CONCLUSION

The concept of corporate water return – embedding the growth option of uncertainty – is the single most significant fresh contribution to the field. Its value as a concept is contingent on its relevance in application, and this represents an exciting area for interdisciplinary collaboration between academia, enterprise and other organisations. The solution presented in this thesis is scalable, transparent to vested interest, and re-purposable. The typological methodology and the 5FF should be relevant to firms, investors, governmental organisations, regulators and other stakeholders.

Beyond the peer-reviewed journal publication of two substantive chapters, some applied exposure of the arguments in this thesis has already been undertaken. In April 2012, the empirical data from Chapter 3 was presented in a session at the Water Security, Risk and Society Conference at the University of Oxford. The event convened “many of the world’s leading thinkers from science, policy and enterprise” (Oxford, 2012) and offered a platform for over 200 academics, policy makers and business leaders to engage with the issues.

In May 2013 the empirical data from Chapters 3 and 4 were presented in a panel discussion at the Water Risk and Finance conference in London, hosted by Environmental Finance magazine. Fellow panellists included the head of the Carbon Disclosure Project’s Water Programme, the senior advisor for responsible investment at PGGM investment, and head of water sustainability at the Swedish apparel company, H&M. The audience of about 200 included representatives from enterprise, finance, government and academia.

In November 2013, the outputs from all of the substantive chapters were presented at a day-long water conference for senior employees at the multinational firm Nestlé. I was one of 6 external speakers invited by the firm’s global head of sustainability to

CONCLUSION

present ideas on how Nestlé could change its approach to engaging on water issues. Other speakers included the Head of the UK Environment Agency and representatives of NGOs such as the World Wildlife Fund. At the end of the event I was invited by the Head of Nestlé UK to return and present the final outputs and recommendations to the firm's executive management, on completion of my degree.

7.5. Limitations of this research

Each of the substantive chapters faces its own sets of limitations. The empirical analysis of Chapter 3 is restricted to the 58 firms in the consumer staples sector identified by the Carbon Disclosure Project (CDP) in their second annual Water Disclosure report (CDP, 2011). This restriction was self-imposed, and the inclusion of more sectors would increase the representativeness of the sample. For the analysis of historic and target water efficiency, the number of companies with qualifying data were 33 and 31 respectively. Variability in the levels of disclosure by companies is another limitation, although the consumer staples sector has the best overall record of water-related disclosure according to the Disclosure report (CDP, 2011).

A small sample size was a limitation of the empirical data in Chapter 4. This is a function of various self-imposed restrictions. First, the sample was screened to include only those fund management firms that were signatories to both the UN Principles for Responsible Investment (UNPRI), and the Carbon Disclosure Project's Water Disclosure (CDPW) report. Second, only qualifying firms based in Australia, South Africa, the UK and the USA were approached. This filter was applied to make the administration of telephone interviews more manageable in terms of common

CONCLUSION

language, volume of respondents and timeframes. The choice of countries was also deliberate to facilitate comparisons. Based on these screening criteria, a total of 60 investment managers were identified, of which 12 were based in Australia, six in South Africa, 24 in the UK and 18 in the USA. Third, CIOs were explicitly targeted for interview. Some 75% of the respondents were CIOs with more than 10 years' experience in their current or a similar role. By targeting CIOs rather than, for example, Socially Responsible Investment (SRI) personnel, the paper seeks to extend beyond the territories typically occupied by academic studies in this area. However, in targeting the most senior investors the response rate was inevitably lower than it might otherwise have been. Despite these limitations, responses were received from 20 of the 60 firms targeted, and 12 interviews completed. Each interview lasted an average of 19 minutes, so while the sample size is small the extent of individual engagement was meaningful.

As Chapters 5 and 6 are conceptual in orientation, the limitations relate to the challenge of introducing ideas without it being possible within the constraints of a thesis to explore and refine them. An example would be the methodology used in the salience scorecard in Chapter 5 – in practical terms, it may benefit from reconfiguration, but this is an unknown at this stage. Similarly, in Chapter 6 corporate water return and the 5FF are emergent concepts, and they have not been validated by any meaningful quorum of managers, investors or other stakeholder group.

In summary, however, none of the limitations identified are endemic to the research, and all could be negated through more focused individual studies in the future. This thesis set out to achieve two aims. First, to set out a framework by which the disclosure of corporate water risk can be meaningfully evaluated by investors and other stakeholders. Second, to propose how the water infrastructure investment gap could

CONCLUSION

be narrowed by the disclosure and application of the corporate water return concept. In order to achieve both these aims, the research has had to trade off depth for breadth. This was an accepted and – in my view – an acceptable compromise, taken from the outset of this project.

7.6 Avenues for future research

In part because of the limitations described above, but mainly because of the inductive, theory building nature of this research, there are various avenues for future research that can be identified.

The research in Chapter 3 would benefit from a wider sector orientation, but also a wider geographical footprint. In the sample used, 57% of the firms had their headquarters in the UK or USA. There are interesting questions to be asked about whether the format of disclosure follows a particularly Anglo Saxon model shaped by investor engagement (Clark & Hebb, 2005), and what differences might appear in the data if it included more companies from continental Europe, Japan, or various emerging market countries, for example. The sample also has a heavy bias towards large companies, with a median market capitalisation of US\$ 42 billion. Research that explored disclosure amongst smaller companies, and the reasons underpinning any differences, would be fruitful areas of further work too.

Meanwhile, in Chapter 4, there are opportunities to expand the sample in almost every way: more respondents from more countries, covering more job functions would be an interesting study. Do CIO perceptions vary perceptibly from their fund managers'? Are CIOs as a group more similar than they are different, when compared to other job

CONCLUSION

designations within their respective firms? What attenuating factors need to be considered when interrogating investor perceptions? Grounded theory helps with the framing of issues, and there is certainly a rich seam to prospect.

In terms of the conceptual chapters, there are many opportunities to challenge, critique, refine and test the arguments proposed. It is certainly my ardent hope that this research garners sufficient scholarly interest for such activity to take place. Also of interest would be challenges to the validity of the framework applied to the various chapters – and indeed to the thesis as a whole – in attempting to describe and address the problems and solutions associated with corporate water risk. I recognise there may be many different ways to answer the same question, and given what is at stake I welcome all such attempts that contribute to a better understanding of the challenges faced and possible ways forward.

Finally, while my first priority is to meet the standards of academic rigour expected for the examination of a doctoral degree, my enduring hope is that the arguments presented in this thesis will ultimately benefit from exposure to a wider audience, including corporate practitioners, investors, governmental organisations and others. For there is much to be done, and it is in shared endeavour that the brightest prospects for success lie.

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APPENDIX 1

APPENDIX 1

APPENDIX 1

Appendix 1A: Qualified ASMUL data

Company	Country	CDP	Abst.	Historic	Target	ASMUL	MktCap
Altria	USA	AQ	3,566	-11.64%	-3.19%	0.27	61,595
AB Inbev	Belgium	AQ	157,800	-7.05%	-6.63%	0.94	106,327
Archer Daniels Midland	USA	NR	0	0.00%	-1.61%	0.00	20,947
British American Tobacco	United Kingdom	AQ	4,481	-8.04%	-2.84%	0.35	98,555
Carrefour	France	NP	21,900	-9.36%	0.00%	0.00	16,317
Coca Cola	USA	AQ	309,000	-2.75%	-2.75%	1.00	156,043
Colgate Palmolive	USA	AQ	5,400	-7.89%	-4.25%	0.54	45,094
Danone	France	AQ	34,850	-9.29%	-3.47%	0.37	43,755
Diageo	United Kingdom	AQ	23,137	-5.26%	-4.36%	0.83	59,516
General Mills	USA	AQ	10,900	-1.90%	-2.45%	1.29	24,574
Heineken	Netherlands	AQ	83,000	-3.59%	-1.64%	0.46	30,555
Imperial Tobacco	United Kingdom	AQ	1,602	-1.24%	0.00%	0.00	39,955
Japan Tobacco	Japan	NR	6,346	-9.42%	-2.52%	0.27	54,284
Kellogg	USA	AQ	12,530	-3.14%	-2.21%	0.70	18,970
Kimberley Clark	USA	AQ	129,700	0.64%	-3.80%	nm	28,300
Kraft	USA	DP	0	0.00%	-3.20%	0.00	67,437
L'Oreal	France	AQ	2,956	-4.08%	-6.70%	1.64	68,967
Nestle	Switzerland	AQ	144,000	-6.31%	-3.20%	0.51	204,337
Pepsico	USA	AQ	106,000	-6.21%	-2.45%	0.39	99,417
Pernod Ricard	France	AQ	6,155	-6.36%	-2.09%	0.33	27,427
Philip Morris Intl.	USA	AQ	4,350	-2.52%	-4.36%	1.73	143,053
Procter & Gamble	USA	AQ	79,999	-14.52%	-4.36%	0.30	184,159
Reckitt Benkiser	United Kingdom	AQ	5,300	-6.21%	0.00%	0.00	39,642
Reynolds American	USA	AQ	2,019	-22.94%	0.00%	0.00	24,106
SAB Miller	United Kingdom	AQ	73,100	-0.84%	-4.03%	4.79	64,909
Unilever	Netherlands	AQ	56,610	-5.95%	-11.85%	1.99	100,461
WalMex	Mexico	NP	5,083	-8.90%	-5.43%	0.61	55,969
Foster's	Australia	DP	23,155	-5.69%	-2.60%	0.46	0
Woolworths	Australia	AQ	2,970	-2.41%	-2.07%	0.86	33,014
Carlsberg	Denmark	NP	38,325	-4.01%	-2.94%	0.73	12,149
Kao Corp	Japan	AQ	11,617	-7.84%	-2.35%	0.30	13,415
Kirin	Japan	AQ	89,300	-3.26%	-1.74%	0.53	11,569
McCormick	USA	AQ	900	-7.25%	-1.74%	0.24	6,678
Molson Coors	USA	AQ	23,973	0.12%	-3.88%	nm	7,966
HJ Heinz	USA	NA	29,790	-3.11%	-2.21%	0.71	17,115

APPENDIX 1

Appendix 1B: Historic and Target Data

Company Name	Country	CDP Status	Abstraction '000 m3	Intensity 1Y	Intensity 2Y	Intensity 3Y	Intensity 4Y	Intensity 5Y	Intensity Average	CAGR to target	Aspiration Multiple	Market Cap \$m	d Δ% Rev 5Y	d Δ% GPM 5Y
Altria	USA	AQ	3,566	-15.15%	-8.13%				-11.64%	-3.19%	0.27	61,595	-14.31%	16.58%
AB Inbev	Belgium	AQ	157,800	-6.56%	-7.54%	-7.05%			-7.05%	-6.63%	0.94	106,327	20.13%	-1.59%
Archer Daniels Midland	USA	NR								-1.61%		20,947	17.13%	-34.23%
British American Tobacco	United Kingdom	AQ	4,481	-7.17%	-13.08%	-5.36%	-5.71%	-8.89%	-8.04%	-2.84%	0.35	98,555	9.54%	
Carrefour	France	NP	21,900	-15.00%	-7.80%	-5.27%			-9.36%			16,317	4.10%	-7.15%
Coca Cola	USA	AQ	309,000	-2.96%	-2.63%	-2.92%	-2.60%	-2.66%	-2.75%	-2.75%	1.00	156,043	14.08%	-1.04%
Colgate Palmolive	USA	AQ	5,400	-11.92%	-7.93%	-6.86%	-6.58%	-6.14%	-7.89%	-4.25%	0.54	45,094	6.46%	8.62%
Costco Wholesale Corp	USA	DP										36,899	8.13%	2.35%
CVS Caremark	USA	DP	7,346									58,229	19.57%	-21.10%
Danone	France	AQ	34,850	-10.00%	-7.80%	-9.14%	-10.21%		-9.29%	-3.47%	0.37	43,755	9.87%	8.62%
Diageo	United Kingdom	AQ	23,137	-11.25%	-0.63%	-4.81%	-4.34%		-5.26%	-4.36%	0.83	59,516	6.48%	-0.21%
General Mills	USA	AQ	10,900	-4.35%	-2.20%	-0.73%	-2.25%	0.00%	-1.90%	-2.45%	1.29	24,574	4.90%	12.45%
Heineken	Netherlands	AQ	83,000	-4.92%	-3.15%	-2.68%	-3.30%	-3.90%	-3.59%	-1.64%	0.46	30,555	7.68%	
Imperial Tobacco	United Kingdom	AQ	1,602	-5.74%	1.17%	-0.70%	-0.20%	-0.74%	-1.24%			39,955	36.87%	
Japan Tobacco	Japan	NR	6,346	-13.46%	-7.84%	-6.97%			-9.42%	-2.52%	0.27	54,284	9.27%	-20.39%
Kellogg	USA	AQ	12,530	-3.90%	-3.54%	-1.79%	-2.79%	-3.68%	-3.14%	-2.21%	0.70	18,970	3.89%	-4.90%
Kimberly Clark	USA	AQ	129,700	2.04%	1.57%	0.90%	-0.46%	-0.86%	0.64%	-3.80%	nm	28,300	4.48%	0.26%
Kraft	USA	DP								-3.20%		67,437	9.61%	1.16%
L'Oreal	France	AQ	2,956	-3.18%	-4.89%	-4.54%	-3.61%	-4.18%	-4.08%	-6.70%	1.64	68,967	5.20%	0.99%
Nestle	Switzerland	AQ	144,000	-7.32%	-6.75%	-6.34%	-5.60%	-5.52%	-6.31%	-3.20%	0.51	204,337	-3.18%	-15.78%
Pepsico	USA	AQ	106,000	-6.97%	-6.71%	-6.21%	-4.96%		-6.21%	-2.45%	0.39	99,417	13.61%	-4.27%
Pernod Ricard	France	AQ	6,155	-9.91%	-3.96%	-6.17%	-6.15%	-5.63%	-6.36%	-2.09%	0.33	27,427	4.73%	2.26%
Philip Morris Intl.	USA	AQ	4,350					-2.52%	-2.52%	-4.36%	1.73	143,053	8.38%	8.01%
Procter & Gamble	USA	AQ	79,999	-24.29%	-16.33%	-11.82%	-10.46%	-9.71%	-14.52%	-4.36%	0.30	184,159	3.89%	-1.61%
Reckitt Benkiser	United Kingdom	AQ	5,300	-3.30%	-8.40%	-8.53%	-6.28%	-4.52%	-6.21%			39,642	14.02%	10.41%
Reynolds American	USA	AQ	2,019	-17.84%	-27.98%	-25.12%	-23.30%	-20.44%	-22.94%			24,106	0.07%	15.94%
SAB Miller	United Kingdom	AQ	73,100	0.00%	0.00%	-0.73%	-1.67%	-1.80%	-0.84%	-4.03%	4.79	64,909	4.12%	
Seven & I	Japan	AQ	16,414									24,429	5.68%	-6.75%
Sysco	USA	NR										17,064	3.80%	-3.44%
Tesco	United Kingdom	DP										40,401	9.08%	8.21%
Unilever	Netherlands	AQ	56,610	-6.53%	-6.92%	-5.51%	-5.48%	-5.31%	-5.95%	-11.85%	1.99	100,461	3.23%	-2.45%
WalMart	Mexico	NP	5,083		-8.90%				-8.90%	-5.43%	0.61	55,969	13.95%	5.02%
Walgreens	USA	NR										29,488	8.77%	0.77%
Wal-Mart	USA	DP										200,105	5.09%	5.89%
Wilmar	Singapore	NR	14,750									25,870	44.83%	-11.93%
Coca Cola Amatil	Australia	NP										9,697	5.68%	6.31%
Foster's	Australia	DP	23,155	-14.83%	-2.87%	-1.99%	-3.05%		-5.69%	-2.60%	0.46		-14.42%	-32.15%
Goodman Fielder	Australia	DP	2,644	0.00%	0.00%	0.00%	0.00%					1,084	10.92%	-7.87%
Petcash	Australia	AQ	13,995									3,470	8.52%	-3.24%
Woolworths	Australia	AQ	2,970	-1.34%	-2.65%	-3.16%	-2.50%		-2.41%	-2.07%	0.86	33,014	7.49%	4.08%
AVI	South Africa	DP										1,920	7.29%	12.52%
Distell Group	South Africa	DP	2,090									2,153	12.91%	-4.80%
Illovo Sugar	South Africa	DP	999									1,586	8.19%	-6.67%
Pick n Pay	South Africa	DP	1,380									2,726	8.17%	1.95%
Pioneer Foods	South Africa	DNP										1,643	11.76%	-5.43%
Shoprite Holdings	South Africa	DP										9,795	16.62%	0.09%
Steinhoff Intl.	South Africa	DP										5,953	7.37%	23.24%
SPAR	South Africa	DP										2,642	17.94%	-0.86%
Tiger Brands	South Africa	NP										6,346	4.35%	-4.19%
Tonga Hulet	South Africa	AQ	26,803									1,421	6.93%	
Woolworths Holdings	South Africa	AQ	896									4,821	12.48%	1.54%
Beiersdorf	Germany	AQ	885									15,990	1.93%	3.32%
Carlsberg	Denmark	NP	38,325	-2.27%	-3.47%	-5.61%	-4.24%	-4.47%	-4.01%	-2.94%	0.73	12,149	9.12%	2.70%
Kao Corp	Japan	AQ	11,617		-14.56%		-4.84%	-4.13%	-7.84%	-2.35%	0.30	13,415	4.09%	3.57%
Kirin	Japan	AQ	89,300	-3.26%					-3.26%	-1.74%	0.53	11,569	4.46%	-1.75%
McCormick	USA	AQ	900				-7.25%		-7.25%	-1.74%	0.24	6,678	6.36%	6.24%
Molson Coors	USA	AQ	23,973	0.24%	0.00%				0.12%	-3.88%	nm	7,966	-9.67%	10.93%
HJ Heinz	USA	NA	29,790	-2.55%	-2.58%	-2.37%	-3.35%	-4.68%	-3.11%	-2.21%	0.71	17,115	4.37%	3.16%
			Mean	-7.12%	-6.02%	-5.24%	-5.05%	-4.99%	-6.01%	-3.51%	0.86			
			Median	-6.14%	-4.89%	-5.27%	-4.29%	-4.33%	-5.95%	-2.94%	0.54			

APPENDIX 1

Appendix 1C: Company data templates



APPENDIX 1

Name:	Altria	Website:	http://www.altria.com/en/cms/Responsibility/environmental-management/programs/water-biodiversity/default.aspx	Date Updated:	24/11/2011	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Base numbers incl. vineyards not comparable over time periods.	Set 5 year targets in 2008 against 08 baseline. 15% reduction in absolute water usage from company facilities and operations. Achieved in 2009. Includes acquisitions	2010 'Environmental Management System' implemented	Not quantified	Targets only apply to facilities, not to water used in vineyards	Not quantified	Target already achieved so low base for improvement, except if major production volume growth
Water Platitude?	0						
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction	-3.19%	-15.15%	-8.13%				
Intensity							

APPENDIX 1

Name:	AB Inbev	Website:	http://www.ab-inbev.com/go/social_responsibility/global_citizenship_report/download_center.cfm	Date Updated:	25/11/2011	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	10 years' data but can only reconcile last 4. From 2009, report included current year. 2006/7/9 reports all rebase historic	Set target to achieve 3.5 hl/hl production by 2012, based on 2009 base	a global water risk assessment this year, which identified higher-risk operations.	none	VPO management programme best on benchmarking and communicating across sites	UNEP engagement; 567 environmental and volunteer projects in 21 countries	Even cos with long trail do not make it easy to reconcile efficiency as bases change
Water Platitude?		High-quality water is fundamental to our business.	We are acutely aware that efficient water use is essential to the continued, sustainable growth of our business around the world	and an important part of water conservation globally			
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		-5.99%	-7.56%	-6.05%			
Intensity	-6.63%	-6.56%	-7.54%	-7.05%			

APPENDIX 1

Name:	Archer Daniels Midland	Website:	http://www.adm.com/en-US/responsibility/2011CR/Pages/downloads.aspx	Date Updated:	29/11/2010	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	No data currently disclosed. Have been talking about current measurement exercise since 2009 SR	Committed to achieving, by 2020, a 15% reduction in water use and waste from 2010 levels on a per unit basis	In June 2010 company collected data from plants representing 99% of total water use. Once verified it will be used as basis for future targets	No suggestion of quantification. Will measure abstraction by source and discharge by quality/ destination	No information. Target has been set before disclosure of consumption!	Using WBCSD tools and GRI standards for abstraction. Have established standardised data entry systems for plants	Target implies CAGR improvement of just 1.6%, well below delivery shown by other companies. Not clear whether this factors m&A
Water Platitude?		http://www.adm.com/en-US/responsibility/2011CR/Pages/water0.aspx					
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction							
Intensity	-1.61%						

APPENDIX 1

Name:	British American Tobacco	Website:	http://www.bat.com/group/sites/UK__3MNFEN.nsf/wwPagesWebLive/DO6RZGHL?opendocument&SKN=1	Date Updated:	30/11/2011	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Full reconciliation apparent in data although no allowances made for M&A, except Indonensia in 2009-10	2012 Target of 4.2 m3/mill cig. Baseline 2007. Set new 5 year targets by end 2011. Target in 2006 was 1.5% reduction for year	Will carry out a water footprint analysis by end 2011. Stakeholder dialogue sessions. G3 indicators introduced in 2006	None	Not specified	Not suggested	'Good' disclosure in terms of completeness but lack of reconciliation requirement suggests no M&A impact in 8 years! e.g. It bought Tekel in Turkey for \$1.7bn in 2008
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		-3.79%	-11.19%	-6.25%	-3.98%	-4.70%	
Intensity	-2.84%	-7.17%	-13.08%	-5.36%	-5.71%	-8.89%	

APPENDIX 1

Name:	Carrefour	Website:	http://www.carrefour.com/cdc/responsible-commerce/sustainability-report/	Date Updated:	30/11/11	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	2010 data relates to 79% of consolidated sales; 2009 relates to 79% also. The numbers don't reconcile	Water consumed per square meter of hypermarket sales. Water use in hypermarkets and supermarkets (95% of total) has been measured since 2003.	Sustainable Development self-assessment tool (intro 2006) for Group suppliers includes a water criterion and provides fact sheets with recommendations to help suppliers reduce their environmental impact.	For the water KPI, the published quantity of water corresponds to the quantity of water purchased. In fact, water collected by some stores through drilling may not be counted when there is no charge for its withdrawal.	Information given to suppliers that encourages drip irrigation or more effective drainage/recycling. Efficiency disclosure by region and site of store. Data by intensity including store type and region.	Hypermarkets in eg. Nevers and Chambourcy use rain harvesting to clean floors and operate bathrooms. Sustainable Development tools is in 15 languages and available to 5000 suppliers. Developed with ADEME and WWF. Will be deployed at Group level from 2011	Good data by intensity for type of store and region. Development tool covers 49 criteria in 4 areas (econ, enviro, social, management) and includes 20 information sheets
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		2.07%	7.73%	3.02%	4.93%	2.56%	
Intensity		-15.00%	-7.80%	-5.27%			

APPENDIX 1

Name:	Coca Cola	Website:	http://www.thecoca-colacompany.com/citizenship/reporting.html	Date Updated:	9/12/2011	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	2004-6 numbers recalculated in 2010 "based on changes to the organisation". Detail unavailable	20% reduction in intensity by 2012 based on 2004 ratios. Implies 2.75% annual improvement. Current rate is 2.7%. Means 2.85% needed for next 2 years	Water footprinting including PET bottles and sugar. Measurement of recycling and stewardship (UNDP, WWF etc.)	None	No explicit assessment	Education and awareness	Accessible disclosure but even best in class do not reconcile historic numbers or provide any aspect of materiality in the analysis
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		-2.80%	0.70%	1.61%	2.28%	1.56%	
Intensity	-2.75%	-2.96%	-2.63%	-2.92%	-2.60%	-2.66%	

APPENDIX 1

Name:	Colgate Palmolive	Website:	#REF!	Date Updated:	12/12/2011	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	No reconciliation! Claims 36% reduction in water usage per tonne of production 2002-10 but is actually 44% based on reported data!	Reduce water consumed per ton of product by 40% from 2005 to 2015	Risk assessment based on WBCSD and GEMI tools.	No data	Confusion between total volume and intensity in targets. Hard figures for volume are not available on website	No forward looking objectives appear to have been set. Future goal is to "reduce water use and increase efficiency wherever possible".	Target appears set in actual volume, i.e.6 million m3. Scope for it to rise from here
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction	-3.83%	-7.14%	-5.13%	-5.01%	-5.85%	-5.06%	
Intensity	-4.25%	-11.92%	-7.93%	-6.86%	-6.58%	-6.14%	

APPENDIX 1

Name:	Costco Wholesale Corp	Website:	http://phx.corporate-ir.net/phoenix.zhtml?c=83830&p=irol-govhighlights	Date Updated:	12/12/2011	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report							Mission statement refers to reducing consumption of water, energy and fuel - but no data at all.
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction							
Intensity							

APPENDIX 1

Name:	CVS Caremark	Website:	http://info.cvscaremark.com/our-company/corporate-responsibility	Date Updated:	12/12/2011	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?			Reduced sprinkler usage in 2010, resulting in 26% saving on c.800 m3	None disclosed		Began measuring in 2010; seeking to establish baseline. In future will communicate through CDP W	
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction							
Intensity							

APPENDIX 1

Name:	Danone	Website:	http://www.danone.com/en/media-center/telechargement.html	Date Updated:	13/12/11	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Numbers restated in 2007 for 2005-6. No reconciliation provided.	Reduce water (l/kg) by 30% from 2000 to 2010, to 1.56. A 41% reduction achieved.	DanPrint tool measures water consumption. In 2010 adopted a water footprint tool workink with Quantis	Not disclosed	No assessment. Sharp reduction in water consumption as % of withdrawals over time, but is it total withdrawals that matter??	New target is to "renew long term plan fro water reduction" from 2011-20. Quantitative targets to appear in 2011 report	Exceeded 10 year target 2 years early. Waiting to see if another reach target is set. CDP filing suggests 60% to 2020 based on 2000 baseline. Still only 4.47% p.a., well below current run rate
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		8.50%	10.24%	2.88%	1.88%	2.40%	
Intensity	-3.47%	-10.00%	-7.80%	-9.14%	-10.21%		

APPENDIX 1

Name:	Diageo	Website:	http://www.diageo.com/en-row/csr/environment/Pages/default.aspx	Date Updated:	13/12/11	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Water use defined as all water consumed, including in product, rather than just water used in the factory (i.e. excl. product)	2015 targets off 2007 baseline. Improve water efficiency by 30%. Reduce water wasted at water-stressed sites by 50%. Reduce wastewater BOD by 60%.		None disclosed	Water stressed sites identified by name but water consumption at these sites is not disclosed. e.g. 2015 target improvement is 50%, so far only 9% improvement of which 6% came last year and is mostly down to improvement at one site and better data capture	Measurement approach is amongst the clearest in identifying where there is risk (i.e. water stressed sites) and the difficulties incumbent in getting improvements.	Africa is 14% of net sales but 84% of organic growth. Half of production based in water stressed sites. Need to accelerate improvement if to meet targets
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		-7.75%	-1.59%	-3.98%	-3.54%		
Intensity	-4.36%	-11.25%	-0.63%	-4.81%	-4.34%		

APPENDIX 1

Name:	General Mills	Website:	http://www.generalmills.com/~media/Files/CSR/2011_cs_r_final.ashx	Date Updated:	15/12/11	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?	Limited, anecdotal info provided. No actual numbers - have to read off graph.	5% improvement targeted 2006 - 10; actual improvement of 9%. Revised target of 20% reduction by 2015		None	Not considered	Revising to introduce more stringent targets suggests recongition more could be done. But no sense of looking by geography or source.	
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		-6.09%	-0.44%	-0.29%	-1.33%		
Intensity	-2.45%	-4.35%	-2.20%	-0.73%	-2.25%		

APPENDIX 1

Name:	Heineken	Website:	http://www.sustainabilityreport.heineken.com	Date Updated:	15/12/11	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Derived calculation of intensity is different number than reported calculation! Reported number for 2008 in 2009 report is 89.8 Mm3 but this is revised down to 71.6 in 2010 report. Bloomberg shows old data	A 25% reduction on 2008 levels is targeted.	Water footprint studies conducted. Shows that 90% of water used in crop cultivation. Membership of CEO WM and BIER.	None given	Programme where operating companies have a local Source Water Protection plan.	No consideration of site specific usage; Diageo type comparables not available. Bad reconciliation is key problem.	Sharp spike in water consumption in 2010 but the targets out to 2020 look very comfortable. Using a long date makes the CAGR more manageable.
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		8.59%	6.62%	1.39%	-0.18%	3.85%	
Intensity	-1.64%	-4.92%	-3.15%	-2.68%	-3.30%	-3.90%	

APPENDIX 1

Name:	Imperial Tobacco	Website:	http://www.imperial-tobacco.com/files/corporate_responsibility/gri_performance_indicator_report.pdf		Date Updated:	16/12/11	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other	
Latest Report	Historic data does not reconcile. e.g. in 2005 intensity reported as 3.966 but number changes to 3.83 in 2010 report	None. Set locally.			Reduction targets set for 6 sites in 5 countries. Not disclosed where or what the target is.		Although no targets set and off a relatively low number, abstraction has increased significantly while efficiency has not, suggesting there aren't any further easy wins	
Water Platitude?								
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year		
Abstraction		-2.34%	2.57%	21.94%	15.30%	11.23%		
Intensity		-5.74%	1.17%	-0.70%	-0.20%	-0.74%		

APPENDIX 1

Name:	Japan Tobacco	Website:	http://www.jt.com/csr/report/index.html	Date Updated:	16/12/11	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Basis of measurement changed in FY09 to include all domestic subsidiaries	12% reduction on 2012 compared to 2007	Environmental Management System; ISO 14001	Disclosed through Environmental Accounting of investment in efficiencies and conservation gains.	Not explicit		
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction	-2.52%	-16.39%	8.17%	2.20%	-0.06%	-0.77%	
Intensity	-2.52%	-13.46%	-7.84%	-6.97%			

APPENDIX 1

Name:	Kellogg	Website:	http://www.kelloggcorporateresponsibility.com/environment/8.html	Date Updated:	19/12/11	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Note says that due to "improved data analysis", historic numbers 2005-9 have been slightly revised and restated.	To reduce water intensity by 15-20% by 2015, using 2005 baseline	Water footprint assessments in 2009. In June 2010 used WBCSD water tool. Assessed watershed stress, incoming flow, incoming quality, water cost, regulatory pressures, facility management.	None provided	No quantitative or discursive analysis	Not discussed	Range target of 15-20% reduction is provided. We use most ambitious reduction to maximise 'benefit' to company of work it still has to do.
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		1.50%	0.12%	1.53%	0.16%	-0.20%	
Intensity	-2.21%	-3.90%	-3.54%	-1.79%	-2.79%	-3.68%	

APPENDIX 1

Name:	Kimberley Clark	Website:	http://www.kimberly-clark.com/sustainability/reporting.aspx	Date Updated:	20/12/11	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?	Reported total abstraction but high proportion recycled. This is not set out in detail. 2005 data off a different base	Original target to 2010 has been missed; new target of 25% reduction by 2015 using 2005 targets	Intensity target abandoned in 2010 report as seems to be unachievable. Focus is on absolute reduction	Ad hoc examples included of how lower water use has saved money (\$0.75m pa in California)	Sustainability Report 2010 says expects water shortages to continue and increase in severity	Efficiency benchmarks apply to tissue plants, as "that is where conservation opportunities exist". Not all other water is monitored.	Focus on reducing total water use rather than intensity, reflects diminishing returns on efficiency.
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction	-2.84%	3.27%	1.34%	0.59%	-2.01%	-2.03%	
Intensity	-3.80%	2.04%	1.57%	0.90%	-0.46%	-0.86%	

APPENDIX 1

Name:	Kraft	Website:	http://www.kraftfoodscorporation.com/investor/index.aspx	Date Updated:	21/12/11	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report		Reduce water use 15 percent by 2015 based on 2010 baseline	We're working with global experts to estimate the amount of water used in our factories, as well as the "water footprint" of the ingredients and packaging materials we purchase and the water used in our factories		We've reduced water consumption in our manufacturing facilities by 30 percent since 2005.		No meaningful disclosure
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	-3.20%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	L'Oreal	Website:	http://www.sustainabledevelopment.loreal.com/downloads/	Date Updated:	21/12/2011	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?		To cut water consumption by 50% between 2005 and 2015.	developed a new method called OptiCIP, which enables us to take into account site specifics such as equipment and type of product, then apply the most efficient cleaning processes in our factories			44% of water consumption in industrial sites is used for cleaning equipment. A different challenge therefore - reducing water consumption of cleaners will make big difference.	Ambitious targets which company is behind track to meet. However text suggests confidence. As measured against finished product, if these become less water process intensive, ratio will improve
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		-0.53%	-1.14%	-3.23%	-3.06%	-1.68%	
Intensity	-6.70%	-3.18%	-4.89%	-4.54%	-3.61%	-4.18%	

APPENDIX 1

Name:	Nestle	Website:	http://www.nestle.com/CSV/Performance/Pages/Performance.aspx	Date Updated:	22/12/11	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Water Resources Review focuses on quality, quantity, compliance, site protection, stakeholder engagement. Heavy score also set by WRG and what that will achieve in driving govt decisions.	No direct data provided for 2007 reconciliation. Used production tonnage of 41.26 based on CO2 emissions data in 2007 CSV report	Goal to reduce water consumption by 10-15% over next 5 years off 2009 base	Support with data gathering of supply/demand balance in water scarce catchments 2030 Group. Objective is proof of concept so governments adopt approach. Apply life cycle approach to water use	Cites reduction in consumption a function of improved efficiency AND changing mix.Contextualises Nestle water use in terms of global stock - pointless	Water risk report published but presentations relate to exogenous scarcity risk, rather than contingent risk	Priority has changed from lowering overall consumption to targeting water scarce areas. Water efficiency can be improved by targeting products with higher value added component.	If companies move to higher value added component this can make their water efficiency numbers look better without actually driving any underlying improvement in efficiency! It also makes no statement on the volume of water being abstracted.
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		-2.52%	-0.60%	-2.56%	-2.60%	-1.95%	
Intensity	-3.20%	-7.32%	-6.75%	-6.34%	-5.60%	-5.52%	

APPENDIX 1

Name:	Pepsico	Website:	http://www.pepsico.com/Purpose/Environmental-Sustainability/Water.html	Date Updated:	27/01/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Have applied 1/3 food and 2/3 beverage to reductions for each year based on disclosure in water report. used an index of 100 for 2006	Improve water-use efficiency by 20 percent per unit of production by 2015 versus a 2006 baseline applies to global manufacturing operations as they existed in 2006, excluding major acquisitions in 2009 and 2010	Supports WBCSD tool; has mapped 99% of facilities to tool. Estimates 45% are in water stressed areas. Working with Nature Conservancy to identify innovations	Benefits of water savings in terms of financial impact are articulated. Interesting trade off between disclosure of financial benefits (PEP) and amount being invested (NESN). 'ReCon' tool saves \$2.7m since 2009; Pep has spent \$15m on safe water initiatives since 2005	Disclosure of scarcity risks in Stewardship report. Basis of measures behind "positive water balance"; recognition that term is undefined	Heavy focus on cost savings opportunity from conservation. technological improvements eg making UK chip-making facilities water self sufficient by 2018, direct seeding in India	Makes much of its commitment to human right to water. Delivers through efficient operations. positive water balance, and clean water to 3m people in dev cos
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		0.94%	0.86%	0.00%	13.49%		
Intensity	-2.45%	-6.97%	-6.71%	-6.21%	-4.96%		

APPENDIX 1

Name:	Pernod Ricard	Website:	http://www.pernod-ricard.com/en/pages/173/pernod/Corporate-responsibility.html	Date Updated:	27/01/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Has already achieved 2012 target in 2010	Latest data discloses to 2007, no rec needed	In 2008, Pernod Ricard set a goal of reducing its level of water consumption per unit produced by 10% before 2012.	Participation in BIER for best practice, and in local associations. Partners with Alliance for Water Stewardship, CDP, WBCSD, WRI, Water Footprint Network, Sustainable Agriculture Initiative, WWF	not quantified	Where abstraction is in scarce resource area, a specific plan devised to minimise use. Estimates that 90% of consumption is in non-scarce areas	not expressed.	note participation in a large number of associations, despite being a relatively small consumer
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		-10.18%	-2.48%	-5.68%	-4.58%	-5.10%	
Intensity	-2.09%	-9.91%	-3.96%	-6.17%	-6.15%	-5.63%	

APPENDIX 1

Name:	Philip Morris Intl.	Website:	http://www.pmi.com/eng/about_us/how_we_operate/pages/environmental_initiatives.aspx	Date Updated:	31/01/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?	No reports online so CDP data used	Reduce water use per million cigarettes manufactured in PMI Manufacturing Facilities by 20% in 2015 versus 2010 base year. From 2005 to 2010, we reduced the volume of water used per million cigarettes by 12% throughout all our factories	WBCSD Water Tool. We are launching a Global Monitoring & Targeting program in 2011. Investigating water footprint embedded in supply chain starting 2011				
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	-4.36%	-100.00%	-100.00%	-100.00%	-100.00%	-2.52%	

APPENDIX 1

Name:	Procter & Gamble	Website:	http://www.pg.com/en_US/downloads/sustainability/reports/PG_2011_Sustainability_Report.pdf	Date Updated:	31/1/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?	Data easy to reconcile	Deliver an additional 20% reduction (2007-2012), per unit production, in water consumption	WWF and P&G recently announced a Global Partnership aimed at encouraging sustainable production and consumption.	None disclosed	States commitments to quality, availability, affordability, information and legal compliance		
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		-1.76%	-2.40%	-4.89%	-2.97%	-2.61%	
Intensity	-4.36%	-24.29%	-16.33%	-11.82%	-10.46%	-9.71%	

APPENDIX 1

Name:	Reckitt Benkiser	Website:	http://www.rb.com/Our-responsibility/Environment	Date Updated:	31/1/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report		None at present. In development for 2012	WBCSD Water Tool				
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		4.00%	-2.13%	-1.93%	-0.26%	2.22%	
Intensity	-100.00%	-3.30%	-8.40%	-8.53%	-6.28%	-4.52%	

APPENDIX 1

Name:	Reynolds American	Website:	http://www.reynoldsamerican.com/gri.cfm	Date Updated:	31/01/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Data has been revised in 2009 report so abstraction/intensity is not reconcilable	Target to be established in 2011	FAO/ Aquastat				
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		-17.27%	-18.82%	-20.91%	-18.24%	-17.38%	
Intensity	-100.00%	-17.84%	-27.98%	-25.12%	-23.30%	-20.44%	

APPENDIX 1

Name:	SAB Miller	Website:	http://www.sabmiller.com/index.asp?pageid=110	Date Updated:	7/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?	Graphical data available for years before 2007, but no hard numbers	Reduce water per hectolitre of beer by 25% between 2008 and 2015	CEO Water Mandate, WBCSD tool, Source Vulnerability Assessments, Water Footprints	Not specified	Company has not improved its efficiency in line with its targets. At risk of "missing". Likely to focus on other measures in communication with market	Example of co. where there are probably more effective measures as is running efficiently and now intensity is more a function of growth	Business performing well in thirsty parts of the world. Efficiency benefits already there. Hard to improve.
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		4.07%	-0.79%	-1.78%	-1.03%		
Intensity	-4.03%	0.00%	0.00%	-0.73%	-1.67%	-1.80%	

APPENDIX 1

Name:	Seven & I	Website:	http://www.7andi.com/en/csr/pdf/2011/2011_11.pdf	Date Updated:	7/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Water use only	No targets	UNEP Vital Water Graphics		Identifies operations in China as source of some risk, but describes as not significant		Responded to CDP Water; abstraction disclosure from there.
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Sysco	Website:	http://www.sysco.com/investor/sustainability-reports.html	Date Updated:	7/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report						Plan to contribute to CDPW survey from 2013	In the 2010 growing and processing season, our suppliers reported that 41 million tons of processing water was recycled for use in irrigation.
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Tesco	Website:	http://www.tescopl.com/media/60113/tesco_cr_report_2011_final.pdf	Date Updated:	7/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?							Member of FTSE4Good and top ranked retailer in CDP report. But no targets or apparent intention to disclose on water. Makes a good company to follow up with
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Unilever	Website:	http://www.sustainable-living.unilever.com/the-plan/water/	Date Updated:	7/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Latest data used for historic reconciliation. No data provided on whether intensity improves through mix, efficiency, M&A etc.	Total factory abstraction at/ below 2008 levels by 2020. Represents reduction of 78% per tonne of production. New factories to abstract less than 50%/ unit of current ones. Halve the water associated with consumer use of products	Water Footprint Network, WBCSD, SEDEX supplier questionnaires. Quantis consortium, Ecoinvent database on flows	Reflects the fact that new factories are much more efficient. So if you are based in a market that is growing, your ratios may be able to come down, but your use is going up...	Targets do not set control of absolute consumption, but efficiency of consumer consumption. 50% of use by consumers, 50% in raw materials. Very little in operational side. So punch targets there don't mean much.	Focus is on wider distribution of 1) laundry [50m households by 2020] and 2) shampoo products [400m consumers by 2020] that use less water. Unilever Sustainable Living Plan	Targets set on a 'per consumer use' bases, for 7 water-scarce countries* representing 50% of population
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		-4.77%	-6.13%	-6.45%	-6.82%	-5.50%	
Intensity	-11.85%	-6.53%	-6.92%	-5.51%	-5.48%	-5.31%	

APPENDIX 1

Name:	WalMex	Website:	http://www.walmex.mx/assets/files/Responsabilidad-Social/Eng/Environment.pdf	Date Updated:	7/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report							
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	-5.43%	#DIV/0!	-8.90%	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Walgreens	Website:	http://www.walgreens.com/topic/sr/sr_environmental_sustainability_home.jsp	Date Updated:	7/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report							No usable data
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Wal-Mart	Website:	http://walmartstores.com/sites/ResponsibilityReport/2011/default.aspx	Date Updated:	7/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?							Data referenced to WalMex but no disclosure or intent on water. Focus instead on renewable energy; waste; 'sustainable' products
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Wilmar	Website:	http://www.wilmar-international.com/sustainability/stewardship_water.htm	Date Updated:	7/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report							Insufficient data for analysis
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Coca Cola Amatil	Website:	http://cca2011crr.reportonline.com.au/water-stewardship	Date Updated:	7/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?		Has set targets since 2005.	Company talks about 'decoupling' since 2009 between volume of beverage produced and volume of water used.				only discloses annual targets;
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	-3.18%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Foster's	Website:	http://www.fostersgroup.com/sustainability/links.aspx	Date Updated:	13/02/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	website refers abstraction of 2,315,524 FL for 2011. Have used Bloomberg conversion						Company taken over by SAB in November 2011 so reporting is not relevant
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	-2.60%	-14.83%	-2.87%	-1.99%	-3.05%	#DIV/0!	

APPENDIX 1

Name:	Goodman Fielder	Website:	http://www.goodmanfielder.com.au/sites/default/files/PDFs/Environment/GFL2493_2011SustainabilityReport_ASX_NZX_vF.pdf	Date Updated:	13/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report							No targets set
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Metcash	Website:	http://www.metcash.com/files/dmfile/AnnualReport2011pg22-27CorporateSocialResponsibility.pdf	Date Updated:	13/02/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report							Targets a 20% absolute reduction from 2008/9 but end dates unclear on CDP response. 2014/15 - 20? No information provided to make reconciliation possible
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Woolworths	Website:	http://media.corporate-ir.net/media_files/IR/OL/14/144044/Woolworths_Limited_Corporate_Responsibility_Report_2011.pdf	Date Updated:	13/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?		Reduce water use by at least 200m l/year by 2010, from 2007					Different type of target, an absolute reduction in volume. Based on reductions in municipal water use
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	-2.07%	-1.34%	-2.65%	-3.16%	-2.50%	#DIV/0!	

APPENDIX 1

Name:	AVI	Website:	http://avi.investoreports.com/avi_ar_2011/sustainability/	Date Updated:	13/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report		Announced intention to identify areas of environmental impact for measurement, management and reporting at a future point					
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Distell Group	Website:	http://distell.investoreports.com/distell_sdr_2011/environment/water-usage-to-sustain-supply/	Date Updated:	14/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report		Distell has developed a water use reduction target for 2018. The measuring and reporting of water use against this reduction target will be finalised in the new financial year.					6 year target from 2012 is being proposed.
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Illovo Sugar	Website:	http://www.illovo.co.za/Libraries/Governance_Sustainability/ENVIRONMENTAL_IMPACT.sflb.ashx	Date Updated:	14/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report			As a means to manage and monitor water use, Illovo has sought specialist services to provide guidance with respect to improving the group's water footprint accounting, and to standardise methods used to estimate water abstraction, which is currently estimated based on pump abstraction velocities and water mass balance calculations.	Illovo's greatest water use is for cane irrigation in its agricultural operations outside of South Africa. Operations in Malawi, Mozambique, Swaziland and Zambia are under full irrigation whilst those in Tanzania are under partial irrigation.	Furthermore, water abstraction for irrigation is likely to increase in future years as Illovo expands its irrigation capacity to improve and increase cane supply and formalises water supply agreements to assist in supplying water to small-scale outgrower developments	open loop recycling, pivot irrigation, brine recovery	No disclosure on agricultural water use, just the amount in operations, which company itself says is not that significant. Important as these are a potential supplier to multinationals
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Pick n Pay	Website:	http://www.picknpay-ir.co.za/financials/annual_reports/2011/downloads/12_sustainability_overview.pdf	Date Updated:	14/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?	Water disclosure dropped from 2011 reporting! Was there in 2010. (2009 numbers updated reflecting "improved estimates")				Trading expenses increased by 7.2%, largely driven by increases in electricity, water, rates and our continued investment in strategic initiatives.		Water rates highlighted as a cost factor in CEO statement but not referred to anywhere in terms of sustainability. Good anecdotal point about what is reported and what is relevant. http://www.picknpay-ir.co.za/financials/annual_reports/2011/report_ceo.htm
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Pioneer Foods	Website:	http://www.pioneerfoods.co.za/governance/sandh.asp	Date Updated:	14/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?			One of the pioneering initiatives that the Group is investing in, is the development of an Integrated Management System. Its aim is to integrate management systems and business processes, focusing on three core disciplines – i.e. environmental management, food safety and people safety.			Water management will receive focused attention, as access to this vitally important but scarce natural resource is attracting growing concern in South Africa.	Water receives just a vague comment, but no sense of urgency. Company is a leading producer of staple foods, and has a JV with Heinz, who has detailed water disclosure.
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Shoprite Holdings	Website:	http://www.shopriteholdings.co.za/files/1019812640/Corporate-Responsibility/2010_Sustainability_Bio-physical.pdf	Date Updated:	14/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report				"other expenses" increased by 12.8% in FY10. Electricity and water is highlighted. Connection with PnP. Expenses increasing faster than turnover			FY10 report refers to: The implementation of a project to measure, monitor and report on water consumption at the Group's supermarkets.
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Steinhoff Intl.	Website:	http://www.steinhoffinternational.com/downloads/cr_reports/Steinhoff%20CR_Report_2010.pdf	Date Updated:	14/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?		Where viable, we will minimise our use of water and energy	Case study offered on how rain water and water from wash bays is cleaned and recycled.				
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	SPAR	Website:	http://www.spar.co.za/Uploads/dea8cc16-9904-47c7-a08f-372368348220/2011_Anuual_Report_TWO.pdf	Date Updated:	14/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report		The group will be taking part in the water disclosure project next year.					No disclosure
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Tiger Brands	Website:	http://www.tigerbrands.co.za/Investor/SocialResponsibility/SustainabilityReport/Content.htm	Date Updated:	14/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report		Greater disclosure of water use efficiency (in kl per unit of production) is planned for future reporting cycles	In the year under review, we have progressed our environmental management strategy, implemented 20 key metrics which fall under the themes of water, energy, waste and packaging and established a group-wide data base on the key metrics				
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Tongaat Hullet	Website:	http://www.tongaat.co.za/gr/sustain.asp#b	Date Updated:	14/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report		Quality of discharges, set at local level (from CPDW)	FAO/AQUASTAT Internal company knowledge Regional government assessments or databases		Most of the sugar cane cultivated in South Africa is dependent on natural rainfall while operations in Mozambique, Swaziland and Zimbabwe, practise large-scale irrigation via purpose-built canal systems with water extracted from rivers.	75 565 904 m3 being purified at various mills and sold to local Municipalities as potable water.	"due to the fact that the sugar cane plant comprises approximately 70% water, sugar mills are net producers of water." This is because the water embedded in the cane is not included in the process or calculation
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Woolworths Holdings	Website:	http://www.woolworthsholdings.co.za/downloads/2011_integrated_report.pdf	Date Updated:	14/2/2012	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	Data from CDPW report	"On track to substantially achieve 2007 objectives for 2012." Reduce water usage in stores by 50% by 2015 (2011 data).					Targets are set to apply to head office and distribution centres, but NOT to stores which account for 706 of the 896 '000 m3 of water used!
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 1

Name:	Beiersdorf	Website:	http://www.sustainability.beiersdorf.com/Environmental-Protection/Water.aspx?l=2	Date Updated:	15/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?		None		None. Focus is on minimising contamination of water into public sources	No targets set for consumption; but plants are not in generally water scarce areas		No update on website beyond 1999.
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		7.40%	-1.90%	2.85%	1.14%	2.12%	
Intensity	-100.00%	-7.00%	-13.40%	-9.55%	-5.13%	-100.00%	

APPENDIX 1

Name:	Carlsberg	Website:	http://www.carlsberggroup.com/csr/ourfocusareas/Environment/progress%20in%202010/Pages/Water.aspx	Date Updated:	15/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?		Reduce water consumption by 9% to 3.2hl/hl by 2013 from 2010 base			Creating a risk matrix and cataloguing potential initiatives	New technologies for re-use of water inside and outside our breweries explored	
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		2.27%	1.69%	28.56%	18.43%	12.68%	
Intensity	-2.94%	-2.27%	-3.47%	-5.61%	-4.24%	-4.47%	

APPENDIX 1

Name:	Kao Corp	Website:	http://www.kao.com/jp/en/corp_csr/eco_activities_02_05.html	Date Updated:	15/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report	2009 report used for 2005 abstractions data; rest in 2010 report. Gaps represent unavailable data - presumably being reviewed by co.	Target is 30% reduction in water consumption during product use, in Japan, by 2020, based on 2005 baseline. Set in 2010.		Environmental accounting measures used		Target is a move away from production based metric historically used. But appears flawed.	Similar approach to Unilever. However no basis of how calculation is done. They have set 15 years to get to a 30% reduction, but within 2nd year they had achieved a 27% reduction! Have now said they will review past results based on a 'tabulation processing system' introduced in 2010
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		4.46%	3.21%	0.70%	-0.89%	-2.06%	
Intensity	-2.35%	-100.00%	-14.56%	-100.00%	-4.84%	-4.13%	

APPENDIX 1

Name:	Kirin	Website:	http://www.kirinholdings.co.jp/english/csr/env/water.html		Date Updated:	16/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other	
Latest Report		CDP target to reduce absolute water usage to 10% below 2009 level by 2015 in Oceania, which accounts for 10% of total water abstraction. Other target is for 7.5% improvement in Kirin brewery Japan for next year.				Although data is limited the challenge of reducing absolute water use is a bigger one. The company has used quite a long time frame which makes the annualised reductions less dramatic, but in terms of the overall growth of the business implies significant improvements in efficiency. This is a key DELTA. A long term target for efficiency is helpful to company, but a long term target for reduction has a lot more uncertainty built in	Company discloses improvements at Kirin Brewery but not overall as a group. Presents achievements but does not set targets.	
Water Platitude?								
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year		
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
Intensity	-1.74%	-3.26%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		

APPENDIX 1

Name:	McCormick	Website:	http://www.mccormickcorporation.com/Sustainability.aspx	Date Updated:	16/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report Water Platitude?	Impossible as no public data available. Reliant on CDPW responses	10% reduction per equivalent unit of production with a baseline year of 2009 to be achieved by the end of 2015.				Unusual for company to have filings in publically available CDPW repository but for this information not to be available to investors via its own website	Public website provides ZERO information about water management, even in sustainability section. Responses inferred from CDPW
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	-1.74%	-100.00%	-100.00%	-100.00%	-7.25%	-100.00%	

APPENDIX 1

Name:	Molson Coors	Website:	http://www.molsoncoors.com/en/Responsibility/What%20Matters%20To%20Us/Environmental%20Stewardship/Water.aspx	Date Updated:	16/2/12	CPD Status:	see table
Commentary	Reconciliation	Target	Tools	Financial Impact	Risk	Opportunity	Other
Latest Report		Molson Coors has set the global target to reduce water use by 15%, per unit of production, by the end of 2012 (baseline year 2008)	WBCSD Water Tool, watershed assessments		Risk that efficiency measures derailed for brewers who have old market footprint	Despite covering the topic extensively and having a lot of engagement on pledges etc., actual progress has been limited. Lower water use has combined with lower production.	Stated that post 2012, next step will be to establish 2020 targets
Water Platitude?							
CAGR	Target Year	1 Year	2 Year	3 Year	4 Year	5 Year	
Abstraction		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Intensity	-3.88%	0.24%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	

APPENDIX 2

APPENDIX 2

Appendix 2A: Letter of Introduction

Gordon L. Clark FBA DSc

Halford MacLinder Professor of Geography
University of Oxford, Oxford, UK OX1 3QY
Sir Louis Matheson Distinguished Visiting Professor
Monash University, Caulfield VIC 3145, Australia
+44-1865-285197; +447717741738



12 June, 2012

Dear Sir/ Madam

Letter of Introduction

This letter serves to introduce Alex Money, who is reading for a Doctor of Philosophy degree under my supervision in the School of Geography and the Environment at the University of Oxford.

Alex is exploring the topic of corporate water risk, which is part of the broad spectrum of interdisciplinary water-related research currently undertaken at the University. We place great emphasis on balancing the academic rigour of our process with an awareness and understanding of the real-world dynamics in which practitioners operate.

As such a practitioner, your insights and opinions are therefore of great interest to us, and will help shape the outputs of this research. By contributing some of your time to this exercise, you will also be helping to ensure that the findings are relevant, up to date and of some enduring value.

All field research conducted by D. Phil students at Oxford is required to meet the strict standards of the Central University Research Ethics Committee. Your contribution will be collated on an anonymous and non-attributable basis, and any requests for additional confidentiality will be fully observed.

Should you have any questions, comments or concerns in relation to this research project, or indeed about the School of Geography and the Environment more generally, I would be pleased to hear from you. Meanwhile I very much hope that you will be able to support the work of our research students by contributing some of your time to this exercise.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'G. Clark', written over a horizontal line.

Gordon L. Clark

Tel: +44 (0)1865 285197 Fax: +44 (0)1865 275885 Email:
gordon.clark@ouce.ox.ac.uk

APPENDIX 2

Appendix 2B: CIO contact list

Firm	City	Telephone No.	CIO LastName	CIO Email	Status
Aberdeen Asset Management	Aberdeen	+44 131 528 4000	Richards	anne@abern-asset.com	COMPLETED
Advanced Investment Partners	Safety Harbor	+1 727 799 3671	Quigley	jon@advancedinvest.com	NR
Advantage Asset Managers (Pty) Ltd	Johannesburg	+27 11 505 1068	deKock	jdekock@advantagemanagers.co.za	REPLIED
ATI Asset Management	Sydney	+61 2 8259-7500	Burge	simon.burge@atiasset.com.au	NR
Australian Ethical Investment	Canberra	+61 2 6201 1988	Macri	dma@ethical.com.au	COMPLETED
Aviva Investors	London	+44 20 7809 6000	Abberley	paul.abberley@avivainvestors.com	REPLIED
Baillie Gifford & Co.	Edinburgh	+44 131 275 2190	Smith	smith@bailliegifford.com	REPLIED
Boston Common Asset Management, LLC	Boston	+1 617 720 5557	Zalosh	mzalosh@bostoncommonasset.com	NR
BT Investment Management	Sydney	+61 2 8253 2999	Godkin	sara.godkin@btim.com.au	NR
Cadiz Holdings Limited	Cape Town	+27 21 670 4600	Cadiz	frank.cadiz@cadiz.co.za	NR
Calvert Group, Ltd.	Bethesda	+1 (301) 951 4800	Krumsiek	barbara.krumsiek@calvert.com	NR
CB Richard Ellis Group, Inc.	Los Angeles	+1 213 683 4238	Herzbrun	doug.herzbrun@reglobalinvestors.com	NR
CCLA Investment Management Ltd	London	+44 20 7489 6040	Bevan	jame.bevan@ccla.co.uk	NR
Celeste Funds Management	Sydney	+61 (2) 9216 1800	Villante	frank.villante@celeste.com.au	NR
Change Investment Management	Sydney	+61 2 9232 2690	Wade	lwade@changeim.com.au	NR
ClearBridge Advisors	New York	+1 212 805 2020	Cohen	hdcohen@clearbridgeadvisors.com	NR
Climate Change Capital Group Ltd	London	+44-20-7939-5000	Evans	aeva@climateccg.com	NR
Colonial First State Global Asset Management	Sydney	+61 2 9303 6540	Dixon	ddixon@colonialfirststate.com.au	NR
Dalton Nicol Reid	Brisbane	+61 (7) 3229 5531	Nichol	jami.nichol@daltonnicolreid.com.au	NR
Domini Social Investments LLC	New York	+1 212-217-1100	Domini	ador@domini.com	NR
Earth Capital Partners LLP	London	+44 207 258 9940	Warner	rufus.warner@earthcapital.com	DECLINED
Element Investment Managers	Cape Town	+27 21 426 1313	Craig	craig@elementim.com	COMPLETED
Epworth Investment Management	London	+44 20 7251 4895	Sparkes	russe@epworthim.com	DECLINED
Eureka Funds Management	Sydney	+61 2 9255 0200	Kelly	bob.kelly@eureka.com.au	COMPLETED
F&C Asset Management	London	+44-20-7628-8000	Ribiero	fernando.ribiero@fandc.com	NR
First Affirmative Financial Network, LLC	USA	+1 303-798-0632	O'Keefe	kevin@firstaffirmative.com	NR
Five Oceans Asset Management	Sydney	+61 2 9994 7490	Selth	cselth@fiveoceans.com	NR
Futuregrowth Asset Management	Cape Town	+27 21 659 5427	Canter	acanter@futuregrowth.co.za	COMPLETED
Governance for Owners	London	+44 20 7614 4755	Butler	p.butler@governanceforowners.com	NR
Henderson Global Investors	London	+44 20 7818 1818	Jacob	david.jacob@henderson.com	DECLINED
Hermes Fund Managers	London	+44 20 7702 0888	Nusseibeh	s.nusseibeh@hermes.co.uk	NR
HSBC Global Asset Management	London	+44-20-7024-1099	Cheetham	chris.cheetham@hsbc.co.uk	NR
Impax Group plc	London	+44 20 7432 2619	Simm	i.simm@impax.com	NR
Insight Investment Management (Global) Ltd	London	+44 20 7930 5474	Nauphal	abdelnauphal@insightinvestment.com	NR
JPMorgan Asset Management	New York	+1 212-648-0801	Blum	chris.blum@jpmorgan.com	NR
Jupiter Asset Management	London	+44 20 7412 0703	Chatfeild-Roberts	jift@jupiter.com	NR
Legal & General Group plc	London	+44 20-3124-3610	Churchlow	robert@legalandgeneral.com	NR
Light Green Advisors, LLC	New York	+1 (206) 547-8645	Naimon	jnaimon@lightgreenadvisors.com	COMPLETED
Maple-Brown Abbott	Sydney	+61 (2) 8226 6200	Rossler	rossler@maplebrown.com	COMPLETED
Marc J. Lane Investment Management, Inc.	Chicago	+1 312 334 6912	Green	kgreen@marcjlane.com	NR
Mergence Africa Investments (Pty) Limited	Cape Town	+27 21 433 2960	DeBeer	fabian@mergence.co.za	NR
Miller/Howard Investments	New York	+1 845 679 5556	Miller	lowe@mhinvest.com	NR
Nelson Capital Management, LLC	Palo Alto	+1 650 493-1000	Kurtz	kurtz@nelsoncapital.com	NR
Newton Investment Management Limited	London	+44 20 7163 9000	Munroe	jeff.munroe@newtonim.co.uk	NR
Parnassus Investments	San Francisco	+1 415 778 2615	Ahlsten	todd.ahlsten@parnassus.com	NR
Pax World Funds	Portsmouth	+1 603 431 8022	Brown	cbrown@paxworld.com	UNAVAILABLE
Perpetual Investments	Sydney	+61 2 9229 9633	Williams	matt.williams@perpetual.com.au	NR
Portfolio 21 Investments	Portland	+1 503-224-7828	Madden	jim@madden.com	NR
Rathbone Greenbank Investments	Bristol	+44 20 7399 0399	Chillingworth	julia@rathbone.com	NR
RLAM	London	+44 20 7506 6748	Talbut	robert@rlam.co.uk	NR
Sanlam	Cape Town	+27 21 9504619	Cruywagen	cruywagen@sanlam.co.za	COMPLETED
Schroders	London	+44 20 7658 6575	Brown	alan.brown@schroders.com	COMPLETED
Scottish Widows Investment Partnership	Edinburgh	+44-131-655-8506	November	andriana@scottishwidows.co.uk	NR
Solaris Investment Management	Brisbane	+61 7 3259 7600	Donohue	denis@solariswealth.com.au	COMPLETED
Standard Life Investments	Edinburgh	+44 131 245 6833	Skeoch	keith@standardlife.com	NR
TD Asset Management USA	New York	+1 212-827-7061	Bell	mark.bell@tdam.com	NR
The Environmental Investment Partnership LLP	London	+44 20 8127 5837	Ivanovitch	ai@teip.com	NR
Threadneedle Asset Management	London	+44 20 7464 5888	Burgess	mark.burgess@threadneedle.co.uk	DECLINED
Trillium Asset Management Corporation	Boston	617 423 6655	Leighton	leighton@trillium.com	COMPLETED
Winslow Management	Boston	617 788 1601	Robinson	jrobinson@winslow.com	COMPLETED

NB Selective information provided to protect privacy

Appendix 2C: Survey Form

2C.1 Introduction

4/24/2014

Corporate Water Risk Survey

Corporate Water Risk Survey

Reference:

Section 1: Introduction

1.2 How many years have you worked in your current or similar role?

☐ 10 or more

☐ less than 10

1.3 How many investment professionals does your firm employ?

☐ Under 5

☐ 5 to 20

☐ Over 20

1.5 How would you define "ESG investing"?

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2C.2 CDP Water Report

4/24/2014

Corporate Water Risk Survey

Corporate Water Risk Survey

Section 2: CDP Water Report

2.1 Are you aware of the CDPW report?

- ☐ Yes
☐ No

2.4 What would make the CDPW disclosures more useful?

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2C.3 Company disclosure of water risk

4/24/2014

Corporate Water Risk Survey

Corporate Water Risk Survey

Section 3: Company Disclosure of Water Risk

3.1 What proportion of your portfolio companies have initiated a discussion of water risk with you?

- ☐ Less than 1/3
- ☐ Between 1/3 and 1/2
- ☐ More than 1/2

3.2 What proportion have you initiated a discussion on water risk with?

- ☐ Less than 1/3
- ☐ Between 1/3 and 1/2
- ☐ More than 1/2

3.5 Do you benchmark and/ or compare companies using any of these GRI metrics?

Check investor is aware of GRI first

- ☐ EN8 Total water withdrawal by source
- ☐ EN9 Water sources significantly affected by withdrawal of water.
- ☐ EN10 Percentage and total volume of water recycled and reused.
- ☐ EN21 Total water discharge by quality and destination.
- ☐ EN25 Impact of discharge and runoff
- ☐ Other:

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2C.4 Professional environment

4/24/2014

Corporate Water Risk Survey

Corporate Water Risk Survey

Section 4: Institutional Environment - Professional

4.1 Does your firm have a 'house view' on the investment risks/ opportunities of water exposure?

☐ Yes

☐ No

☐ Other:

4.2 How often are water risk issues typically discussed in internal investment strategy meetings?

☐ Monthly

☐ Quarterly

☐ Occasionally (less than quarterly)

☐ Rarely/ Never

☐ Other:

4.3 How do you think your firm's knowledge of corporate water risk, compares to other investment firms based in your country?

☐ Above average

☐ Average

☐ Below average

☐ Other:

4.4 How do you think your firm's knowledge of corporate water risk, compares to other investment firms internationally?

☐ Above average

☐ Average

☐ Below average

☐ Other:

4.5 How would you describe how your firm incorporates water risk in the general investment decision process?

<https://docs.google.com/spreadsheets/formResponse?formkey=dEJmbGd1UHh3R2R1TXhSN2M1M3UitVGo5MQ&pid=2441589814697434081&itq>

1/2

APPENDIX 2

2C.4 Ct'd

4/24/2014 Corporate Water Risk Survey

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APPENDIX 2

2C.5 Personal environment

4/24/2014

Corporate Water Risk Survey

Corporate Water Risk Survey

Section 5: Institutional Environment - Personal

5.2 Is corporate water risk best understood from a sector specific or a country specific perspective?

☐ Sector

☐ Country

☐ Other:

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2C.6 Perception of risk

4/24/2014

Corporate Water Risk Survey

Corporate Water Risk Survey

Section 6: Institutional Environment - Perception

6.1 Please rank what most influences your perception of water risk?

	1	2	3	4	5
Company disclosure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NGO/ consultancy research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
News/ current affairs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personal experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6.2 Do you think where you live affects how you perceive corporate water risk as investor?

☐ Yes☐ No☐ Other:

6.3 Have you had any personal experience of water scarcity or insecurity?

6.4 Do you think your personal perspective on water scarcity has any bearing on how you evaluate water risk as an investor?

☐ Yes☐ No☐ Other:
<https://docs.google.com/spreadsheets/formResponse?formkey=dEJmbGd1UHh3R2R1T0hSN2M1M3U1VGo5MQ&pid=2441589814697434081&itq>

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APPENDIX 2

2C.7 Perception of salience

4/24/2014

Corporate Water Risk Survey

Corporate Water Risk Survey

Section 7: Investor Perceptions of Stakeholder Salience

7.1 How should companies prioritise stakeholders when disclosing water risk?

	1	2	3	4	5
Shareholders/ Analysts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consumers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regulators	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Peer group	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7.2 Which stakeholders have the most influence in changing how companies use water?

	1	2	3	4	5
Shareholders/ Analysts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consumers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regulators	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Peer group	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7.3 What should companies prioritise in terms of water risk management?

	1	2	3	4	5
Disclosure/ measurement metrics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Government Relationships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supply Chain/ Knowledge transfer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responsibility initiatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7.4 Should shareholders always be the most important stakeholders for companies when considering water risk?

<https://docs.google.com/spreadsheets/formResponse?formkey=dEJmbGd1UHh3R2R1TX0hSN2M1M3U1VGo5MQ&pid=2441589814697434081&itq>

1/2

APPENDIX 2

2C.7 Ct'd

4/24/2014 Corporate Water Risk Survey

7.5 Are there any other comments that you would like to make on any aspect of this survey?

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APPENDIX 2

Appendix 2D: Investor Responses

2D.1 Investor AU02

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	1
1.2	Years in Role (1=>10)	2
1.3	No of IPs (1=<5)	2
1.5	Definition of ESG	Positive screening
2.1	Aware of CDP W (0=No)	0
2.6	How to improve CDP W report	
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	1
3.5	Using GRI (0=No)	0
4.1	House view on water	If we perceive water to be a problem in the sector, e.g. agriculture, then we won't buy any companies in there. Companies are reactive, will never engage
4.2	Strategy meeting (1=monthly)	3
4.3	Relative to domestic (1=above)	1
4.4	Relative to international (1=above)	1
4.5	Internal analysis comments	
5.2	Sector/Country (1=S,2=C,3=other)	1
5.2a	S/C comment	
6.1	Most influences percep (see form)	1
6.2	Where you live (0=No)	0
6.3	Personal experience	Own a rural property 100 acres NW of Sydney. All the farmers care about fire and water. Country is the most urbanised in the world so city folks and politicians don't understand importance of water to the country
7.1	Disclosure Priority 1 (see form)	4
7.1	Disclosure Priority 2 (see form)	1
7.1	Disclosure Priority 3 (see form)	3
7.2	Stakeholder Influence 1 (see form)	1
7.2	Stakeholder Influence 2 (see form)	4
7.2	Stakeholder Influence 3 (see form)	
7.3	Company Priority 1 (see form)	1
7.3	Company Priority 2 (see form)	4
7.3	Company Priority 3 (see form)	2
7.5	Any other comments? (Summary response below):	
7.5	<p>- we are positive screeners, so our initial interest in water risks lies in identifying companies that are offering products/services that address these risks directly, eg water treatment, filtration etc.</p> <p>- sectors where we've been particularly mindful of water risk to date include Energy (coal seam gas, oil drilling and pollution risk); Agriculture (tough area for us); Real estate (development impact, building management)</p>	

APPENDIX 2

	<p>- when looking at other companies we invest in, water impacts that could be critical include severe pollution incidents, water impacts that are interesting but not critical include water efficiency measures etc.</p>
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APPENDIX 2

2D.2 Investor AU08

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	1
1.2	Years in Role (1=>10)	1
1.3	No of IPs (1=<5)	3
1.5	Definition of ESG	taking principles of sustainability into all parts of acquisition and ownership process
2.1	Aware of CDP W (0=No)	1
2.6	How to improve CDP W report	Cannot be critical. it is a useful report
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	3
3.5	Using GRI (0=No)	0
4.1	House view on water	No house view. Any asset we look at we would consider all aspects of sustainability, including water. Sustainability paper presented every quarter. we don't have that many people looking at it compared to our peers
4.2	Strategy meeting (1=monthly)	2
4.3	Relative to domestic (1=above)	2
4.4	Relative to international (1=above)	3
4.5	Internal analysis comments	
5.2	Sector/Country (1=S,2=C,3=other)	1
5.2a	S/C comment	Depends on what you look at. massive amounts of farmland being purchased by China which is an issue here, but reflects their own water risks
6.1	Most influences percep (see form)	4
6.2	Where you live (0=No)	1
6.3	Personal experience	
7.1	Disclosure Priority 1 (see form)	4
7.1	Disclosure Priority 2 (see form)	1
7.1	Disclosure Priority 3 (see form)	
7.2	Stakeholder Influence 1 (see form)	1
7.2	Stakeholder Influence 2 (see form)	4
7.2	Stakeholder Influence 3 (see form)	
7.3	Company Priority 1 (see form)	4
7.3	Company Priority 2 (see form)	1
7.3	Company Priority 3 (see form)	
7.5	Any other comments? (Summary responses below):	
7.5	<p>Australia still denying climate change exists so there is a poor understanding of water risk. Costs a colleague just A\$50 to fill his swimming pool which is criminal. Desal is the way people are going but people aren't even doing rainwater harvesting even in Sydney Impression is that Europeans are well ahead of Australia when it comes to issues of sustainability</p> <p>Undoubtedly living in the driest continent affects how we look at water</p>	

APPENDIX 2

Fiduciary concerns - investors want you to do ESG/ PRI but don't follow up on the detail. used more as a green labelling device by increasingly cynical asset owners

Residential water charges - no alignment of interest so the more water use, the more utilities earn.

120 MW gas fired power plant in Sydney, about 30 y.o. draws water from the treatment system for free. Gets through 3m litres per day, which is just evaporated off. 2nd highest water user in Sydney. V small plant too.

No coherent govt plan at the moment because pricing makes no sense. Coal fired power generators mean nexus between energy and water use, especially on hot days

Story: water usage was 100% more than all other shopping centres. One meter only. After 10 years of this, they investigated and found that urinals were free flowing. Took plumber just a week to fix it

APPENDIX 2

2D.3 Investor AU10

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	2
1.2	Years in Role (1=>10)	2
1.3	No of IPs (1=<5)	2
1.5	Definition of ESG	Do not negative screen unless requested to do so. ESG fed into valuation. coal seam gas in Australia is a key topic given costs associated
2.1	Aware of CDP W (0=No)	0
2.6	How to improve CDP W report	
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	3
3.5	Using GRI (0=No)	0
4.1	House view on water	No overarching house view, look at water risk on a stock by stock basis. Respondent is also a resources analyst. Recent drought and floods in Australia have highlighted risks. Impact on timing drives OPEX. Bottom up, stock specific rather than macro
4.2	Strategy meeting (1=monthly)	3
4.3	Relative to domestic (1=above)	1
4.4	Relative to international (1=above)	1
4.5	Internal analysis comments	Some of our superannuation clients take a very aggressive approach with ESG
5.2	Sector/Country (1=S,2=C,3=other)	1
5.2a	S/C comment	We take a rifle shot rather than shotgun approach to our investments.
6.1	Most influences percep (see form)	3
6.2	Where you live (0=No)	1
6.3	Personal experience	Issues are different by company. Sometimes about scarcity, sometimes surplus. The fact we suffer from floods and droughts raises it as a bigger issue
7.1	Disclosure Priority 1 (see form)	3
7.1	Disclosure Priority 2 (see form)	4
7.1	Disclosure Priority 3 (see form)	
7.2	Stakeholder Influence 1 (see form)	1
7.2	Stakeholder Influence 2 (see form)	4
7.2	Stakeholder Influence 3 (see form)	
7.3	Company Priority 1 (see form)	3
7.3	Company Priority 2 (see form)	1
7.3	Company Priority 3 (see form)	
7.5	Any other comments? (Summary responses below):	

APPENDIX 2

7.5

Only a minority of companies in Oz are in PRI so have an 'agenda'

Disclosure may make things easier for investors to analyse company but not the priority.

Government relationships and corporate responsibility a bit softer.

Only one of a number of factors. Coal seam gas highlights the ESG dimension. Subject needs to be seen in context. Water availability and costs has taken a higher significance than it has in the past

APPENDIX 2

2D.4 Investor AU12

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	2
1.2	Years in Role (1=>10)	1
1.3	No of IPs (1=<5)	2
1.5	Definition of ESG	Material risks and opportunities presented by ESG issues, and trying to add value through the analysis of those factors
2.1	Aware of CDP W (0=No)	1
2.6	How to improve CDP W report	Not very qualified. Aware but not an expert
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	1
3.5	Using GRI (0=No)	0
4.1	House view on water	Not a formalised view. Nothing to say - this is what we believe
4.2	Strategy meeting (1=monthly)	1
4.3	Relative to domestic (1=above)	1
4.4	Relative to international (1=above)	
4.5	Internal analysis comments	Water will come up not as a top down issue but will be raised informally as a bit of a chat when discussing a stock e.g. shale gas, or beverage sector. we talk about water risk a lot but don't think it is changing our views
5.2	Sector/Country (1=S,2=C,3=other)	3
5.2a	S/C comment	We are bottom up so start with stock then sector then country
6.1	Most influences percep (see form)	2
6.2	Where you live (0=No)	1
6.3	Personal experience	A lot of companies in Queensland were in grip of huge drought so it prompted a lot of discussion, talk about water savings. But after 2 years of floods everyone is a bit more relaxed. But companies who have made savings out of necessity have maintained it
7.1	Disclosure Priority 1 (see form)	1
7.1	Disclosure Priority 2 (see form)	3
7.1	Disclosure Priority 3 (see form)	
7.2	Stakeholder Influence 1 (see form)	4
7.2	Stakeholder Influence 2 (see form)	1
7.2	Stakeholder Influence 3 (see form)	
7.3	Company Priority 1 (see form)	1
7.3	Company Priority 2 (see form)	3
7.3	Company Priority 3 (see form)	
7.5	Any other comments? (Summary responses below):	

APPENDIX 2

7.5

Water became an issue when there was a drought a couple of years ago. Then fell of radar. Now back as issue in context of shale gas

I should prioritise shareholders as they're my clients! Shareholders then consumers people tend to sit round saying water is the next big risk, but a lot of the research shows that corporate risk looms less large than we perceived to start with.

Citigroup (Nick Brown) did a piece surveying mining projects around the world on which ones were at risk due to water scarcity, and it found that very few are.

I send my analysts to meet companies and the management of one ASX20 says that water is the last thing that keeps him awake at night. This is what I often hear.

There is a gap between perception and reality between in corporate water risk which is at odds with the social side.

APPENDIX 2

2D.5 Investor SA03

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	1
1.2	Years in Role (1=>10)	1
1.3	No of IPs (1=<5)	2
1.5	Definition of ESG	
2.1	Aware of CDP W (0=No)	0
2.6	How to improve CDP W report	
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	1
3.5	Using GRI (0=No)	0
4.1	House view on water	But rather than think of water from an environmental sustainability point we worry about it from an infrastructure point, recognising that these companies will need to invest more.
4.2	Strategy meeting (1=monthly)	2
4.3	Relative to domestic (1=above)	1
4.4	Relative to international (1=above)	2
4.5	Internal analysis comments	We get perspectives from company management who are investing in new technologies or sources of water that makes clear to us how important this is. Gives us unique insights into what is going on.
5.2	Sector/Country (1=S,2=C,3=other)	2
5.2a	S/C comment	Both are important, but country key
6.1	Most influences percep (see form)	4
6.2	Where you live (0=No)	1
6.3	Personal experience	I live in Cape Town by the sea with lots of dams etc. but summers are hot and dry and municipality says you cannot water gardens before 6, and only twice a week. Lower rainfall and rivers means cannot use water the way we like. Municipalities have been encouraging households to think about how they use water to promote efficiency
7.1	Disclosure Priority 1 (see form)	4
7.1	Disclosure Priority 2 (see form)	1
7.1	Disclosure Priority 3 (see form)	
7.2	Stakeholder Influence 1 (see form)	1
7.2	Stakeholder Influence 2 (see form)	4
7.2	Stakeholder Influence 3 (see form)	
7.3	Company Priority 1 (see form)	1
7.3	Company Priority 2 (see form)	4
7.3	Company Priority 3 (see form)	
7.5	Any other comments? (Summary responses below):	

APPENDIX 2

7.5

There is a probably a better view internationally about water risk than there is domestically.

Partly because we are constrained by the stocks we can invest in (small universe), partly because the research is international rather than SA emphasised, partly because disclosure is poor, partly because the disclosure metrics are seen to be too low.

Awareness of required infrastructure spending affects the valuation of the company.
Our perspective on this is much better than internationally

APPENDIX 2

2D.6 Investor SA04

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	2
1.2	Years in Role (1=>10)	2
1.3	No of IPs (1=<5)	2
1.5	Definition of ESG	Considering ESG as part of the investment process. Fixed income house so as part of credit analysis review and assess issuer on ESG basis and come up with a score and price for that risk if necessary
2.1	Aware of CDP W (0=No)	1
2.6	How to improve CDP W report	Greater transparency by companies; improved engagement and willingness from companies. All realise we are not yet where we need to be. Companies leave and say they will get to it.
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	1
3.5	Using GRI (0=No)	0
4.1	House view on water	No house view
4.2	Strategy meeting (1=monthly)	3
4.3	Relative to domestic (1=above)	2
4.4	Relative to international (1=above)	2
4.5	Internal analysis comments	
5.2	Sector/Country (1=S,2=C,3=other)	3
5.2a	S/C comment	Has to be seen both ways. Cannot be looked at in isolation
6.1	Most influences percep (see form)	1
6.2	Where you live (0=No)	1
6.3	Personal experience	Experience of what happened to energy demand in SA with poor infrastructure paints picture of what is likely to happen with water.
7.1	Disclosure Priority 1 (see form)	1
7.1	Disclosure Priority 2 (see form)	3
7.1	Disclosure Priority 3 (see form)	4
7.2	Stakeholder Influence 1 (see form)	1
7.2	Stakeholder Influence 2 (see form)	4
7.2	Stakeholder Influence 3 (see form)	
7.3	Company Priority 1 (see form)	1
7.3	Company Priority 2 (see form)	4
7.3	Company Priority 3 (see form)	2
7.5	Any other comments? (Summary responses below):	

APPENDIX 2

7.5

We realise that there are things that need to be done, and we have just started on the process

Locally we understand a lot more about the South African market context than foreigners coming in

A company has a responsibility to shareholders, who do actually have a lot of power, but are not always the voice that does things. It is other stakeholders such as consumers and government who influence companies most

Shareholders should be playing a bigger role but are just ambivalent in most cases, at least locally.

Abroad shareholders may have a stronger voice. Locally, investors are very passive. These issues are very new still to SA investors. Since last year local regulations have been introduced that says pension funds must consider ESG as part of their investment criteria. This will highlight water risk as an ESG risk, going forward.

SA investors still trying to figure out what ESG means to them.

We signed up to CDP as much so that we could understand issues rather than drive the agenda.

APPENDIX 2

2D.7 Investor SA06

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	1
1.2	Years in Role (1=>10)	1
1.3	No of IPs (1=<5)	3
1.5	Definition of ESG	We don't have a definition but are signatories of the UN protocol. We work according to PRI definition. In terms of Governance it is more SA specific, but E and S are standard.
2.1	Aware of CDP W (0=No)	1
2.6	How to improve CDP W report	Aware of report but don't know contents
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	1
3.5	Using GRI (0=No)	0
4.1	House view on water	Everything comes down to valuation of company. We would look at risks e.g. water contamination, penalties to pay etc, and how that affects valuation
4.2	Strategy meeting (1=monthly)	3
4.3	Relative to domestic (1=above)	1
4.4	Relative to international (1=above)	3
4.5	Internal analysis comments	
5.2	Sector/Country (1=S,2=C,3=other)	3
5.2a	S/C comment	depends on risk. some work better on sector, some on country or regional e.g. river catchment
6.1	Most influences percep (see form)	1
6.2	Where you live (0=No)	1
6.3	Personal experience	
7.1	Disclosure Priority 1 (see form)	3
7.1	Disclosure Priority 2 (see form)	1
7.1	Disclosure Priority 3 (see form)	
7.2	Stakeholder Influence 1 (see form)	4
7.2	Stakeholder Influence 2 (see form)	
7.2	Stakeholder Influence 3 (see form)	
7.3	Company Priority 1 (see form)	1
7.3	Company Priority 2 (see form)	
7.3	Company Priority 3 (see form)	
7.5	Any other comments? (Summary responses below):	
7.5	<p>If there were issues driven by our clients, we would engage with companies. SA is a water scarce area. More aware of issues as water restrictions come in, low rains, big issue is pollution by mines of underground water resources. Influences the way we invest</p> <p>On Q7.3, shareholders should be priority in terms of our clients' view, but I'd say consumers should be top, or local communities. Not shareholders</p> <p>Provision of water and sanitation to local communities. Don't have issues eg of dams being built and consumers displaced. Water issues quite pertinent in country at moment. We might be more aware than someone who lives in Europe and US.</p>	

APPENDIX 2

2D.8 Investor UK01

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	1
1.2	Years in Role (1=>10)	1
1.3	No of IPs (1=<5)	3
1.5	Definition of ESG	Cannot give you a crisp definition though I am sure I could read you one off the UNPRI page. Internally, it's trying to think about the broader externalities that investment in an entity can involve, which might not be directly financial ones. Can be to do with environment, labour force, intergenerational transfers, e.g. mining projects. Also an aspect of ensuring that companies to whom we allocate our clients' money are properly structured
2.1	Aware of CDP W (0=No)	0
2.6	How to improve CDP W report	Aware of CDP, didn't know there was a specific water report. However am sure that my SRI team will be aware of it, but it just has not come across my desk.
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	1
3.5	Using GRI (0=No)	0
4.1	House view on water	House view is too strong a way to put it as we are a bottom up house. But we look at global resources in the context of finite supply, not just water but oil and softs. It has been raised internally that water related technologies and water inspired conflicts will become higher on the agenda. It has not come up yet because we are not early stage investors in emerging tech that is driving the paradigm shift. But it is not our house style to get into this at the early stage
4.2	Strategy meeting (1=monthly)	2
4.3	Relative to domestic (1=above)	2
4.4	Relative to international (1=above)	2
4.5	Internal analysis comments	We are aware of the importance of water related technology and the geopolitical significance of water related conflict, but our investment approach is not one that would give us early exposure those trends
5.2	Sector/Country (1=S,2=C,3=other)	2
5.2a	S/C comment	If defining as risk of being insufficient to keep water alive it's a geo-political risk, rather than sector one. Iraq was invaded for oil resources. If people run out of water the threat is immediate
6.1	Most influences percep (see form)	2
6.2	Where you live (0=No)	1
6.3	Personal experience	If you live in Scotland there is a lot of water around. But not just about where you live, but what you experience. I get out to Mideast a lot so first hand

APPENDIX 2

		awareness of issues there, but have also been to Singapore where exposed to water reclamation projects.
7.1	Disclosure Priority 1 (see form)	1
7.1	Disclosure Priority 2 (see form)	
7.1	Disclosure Priority 3 (see form)	
7.2	Stakeholder Influence 1 (see form)	3
7.2	Stakeholder Influence 2 (see form)	4
7.2	Stakeholder Influence 3 (see form)	
7.3	Company Priority 1 (see form)	1
7.3	Company Priority 2 (see form)	
7.3	Company Priority 3 (see form)	
7.5	Any other comments? (Summary responses below):	
7.5	<p>I don't know a great deal about this topic but presumably that's part of the point of this exercise</p> <p>From a UK perspective we are not used to worrying about water. But have spent time in the Hebrides and even there in the summer there is a limitation.</p> <p>More of an awareness now than say 10-15 years ago, where mantra was about free water. From a UK perspective this is down to marginal supply. But if you travel internationally don't need to spend much time in Yemen to see the dam works that Sheba put up</p> <p>I have been talking primarily about insufficiency, but corporate water risk in terms of flooding is equally a concern. how narrow are the definitions here</p> <p>I would put shareholders at top because if disclosed to shareholders it is by definition disclosed to the others</p> <p>One interesting development is that as EMs deepen and mature for investment, there is increased appetite for Africa and MidEast.</p> <p>May well be that increased flow of capital in water challenged areas may bring this up on the agenda. Capital is coming in from loans, general capex etc.</p> <p>Relative GDP growth points to this as the next opportunity so there is increased appetite. Africa is still largely a private equity market, albeit sourced institutionally.</p> <p>Africa now in a place that HK and Singapore were a generation ago. Look at what SG has done with water</p> <p>Politically it is going to be quite difficult for foreign investment money to be seen to be coming in and making vast profits from what many would regard as basic human rights - access to water. But like Argentina/ Repsol, expropriation of assets remains a real risk.</p>	

APPENDIX 2

2D.9 Investor UK20

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	1
1.2	Years in Role (1=>10)	1
1.3	No of IPs (1=<5)	3
1.5	Definition of ESG	Section 172 of 2006 companies act which requires companies to think of a broad range of stakeholders. There is no equivalent clause in fiduciary trust based contract that makes clear that asset owners should think about these wider stakeholders. I am concerned that sometimes asset managers hide behind narrow definitions of return and risk to justify not taking on ESG responsibility, when there is nothing to stop them taking this on.
2.1	Aware of CDP W (0=No)	1
2.6	How to improve CDP W report	One of the difficulties relates to quality of data and ways of access. CDP has done a good job in improving quality and reliability over last 10 year but it's not complete. Much of the historic data is interpolated and not that valuable.
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	1
3.5	Using GRI (0=No)	0
4.1	House view on water	Yes. Water is a critical issue, more valuable than oil. Not just security of supply but also new Orleans risks given cities near deltas. Israelis interested in Golan heights because of watershed
4.2	Strategy meeting (1=monthly)	3
4.3	Relative to domestic (1=above)	1
4.4	Relative to international (1=above)	1
4.5	Internal analysis comments	Launched a climate change fund 5 years ago where water was a thematic issue.
5.2	Sector/Country (1=S,2=C,3=other)	2
5.2a	S/C comment	First thinking both were equally important but even if you are in a water abundant area, it is still relevant in terms of comparative advantage. All companies are affected by water availability, no matter what the sector
6.1	Most influences percep (see form)	2
6.2	Where you live (0=No)	1
6.3	Personal experience	If you live in the north of England right now, last 24 hours would have you thinking. if you experience great floods/ droughts, it sharpens your interest in the topic
7.1	Disclosure Priority 1 (see form)	4
7.1	Disclosure Priority 2 (see form)	2
7.1	Disclosure Priority 3 (see form)	3
7.2	Stakeholder Influence 1 (see form)	4
7.2	Stakeholder Influence 2 (see form)	

APPENDIX 2

7.2	Stakeholder Influence 3 (see form)	
7.3	Company Priority 1 (see form)	1
7.3	Company Priority 2 (see form)	3
7.3	Company Priority 3 (see form)	
7.5	Any other comments? (Summary responses below):	
7.5	<p>Back in the apartheid days we used to see SA-free portfolios, or portfolios without guns etc., but these are specific mandates and nothing general like S172 is in place. It is an obvious area where more should be done. if you got past the trustee pools and spoke to ultimate beneficiaries you would probably find many who wanted/ expected to see ESG feature higher.</p> <p>Not aware of any occasion where company has approached us about water. We would definitely engage with less than 1/3 on this topic. We have a team that look at ESG issues but water engagement does not take up much of their time. This is because we are broadly invested in sectors where water is not really an issue.</p> <p>Aware of GRI but we are not subscribers to it</p> <p>Interested in agricultural commodity prices which move independently to other factors. Reason to believe that prices are on a rising trend.</p> <p>Fracking could reduce gas prices so these activities are interesting but jury still out in terms of implications for water quality and supply. Extractive sector is good example of needing to understand water risk.</p> <p>Would put shareholders at bottom of pile in terms of disclosure priority. Firm believer that we cannot get to where we need to be in terms of water and carbon, without more effective use of taxation and regulation. Otherwise companies won't pay in terms of true costs</p> <p>We need to create the right kind of incentives to get the right kind of behaviour. Taxation should be done in a fiscally neutral way. Incentives needed for politicians to take things seriously, beyond one or two electoral cycles.</p>	

APPENDIX 2

2D.10 Investor US09

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	1
1.2	Years in Role (1=>10)	1
1.3	No of IPs (1=<5)	1
1.5	Definition of ESG	ESG is a new moniker for what was called social investing. a new bottle for old wine
2.1	Aware of CDP W (0=No)	0
2.6	How to improve CDP W report	
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	1
3.5	Using GRI (0=No)	0
4.1	House view on water	View is that water is embedded energy. Squeezing that energy out is a tremendous opportunity. Also droughts and scarcity will make this a business requirement in US, Australia, Asia. It's a vital problem but we are not looking at GRI or CDP to provide the solutions or leadership on water
4.2	Strategy meeting (1=monthly)	2
4.3	Relative to domestic (1=above)	1
4.4	Relative to international (1=above)	1
4.5	Internal analysis comments	We are bottom up, so looking at aggregates is therefore probably not that helpful.
5.2	Sector/Country (1=S,2=C,3=other)	1
5.2a	S/C comment	I was deeply involved in one of the predecessors of RiskMetrics. GRI has lots of useless measures, they toss everything in. Our focus is to find metrics that help to frame the challenge, and point a path to solution
6.1	Most influences percep (see form)	2
6.2	Where you live (0=No)	0
6.3	Personal experience	I live in a water surplus area and have no experience of water scarcity or insecurity
7.1	Disclosure Priority 1 (see form)	4
7.1	Disclosure Priority 2 (see form)	2
7.1	Disclosure Priority 3 (see form)	3
7.2	Stakeholder Influence 1 (see form)	3
7.2	Stakeholder Influence 2 (see form)	4
7.2	Stakeholder Influence 3 (see form)	2
7.3	Company Priority 1 (see form)	3
7.3	Company Priority 2 (see form)	1
7.3	Company Priority 3 (see form)	
7.5	Any other comments? (Summary responses below):	

APPENDIX 2

7.5

Just one company has engaged with us on water risk

Companies should prioritise technology to improve their water management. Corporate responsibility initiatives should be placed last.

Shareholders are not the arbiters of how companies use water. The CDP is deluding itself if it thinks that's what it's going to get from this exercise. The idea that water risk is something that you deal with in the distant future, or that someone else deals with, or that the government deals with, is the status quo.

The future is companies taking responsibility. It begins with measuring, then engaging supply chain, then benchmarking.

Those are things that companies can do. For investors, water risk isn't why investors are giving money to companies. Investors can play a minor role, but there are v few investors that know enough about water to provide value to companies.

The role investors can play is to point out that water is scarce in India but not scarce in Georgia (US) so they can highlight stuff but investors are not knowledgeable. That's the company's job. Water is embedded energy that people will come to eventually.

The GRI's approach is not going to help, though CDP has a good network. The measurement piece can be of use, but CDP/ GRI do not have anything on the solutions piece.

Also the problem is that it ends up with investors lionising companies that disclose.

Water regulators in every country know the issues better than anyone. They're working on these things day in and day out. They know much more than investors in London. We're bringing power to the table but not necessarily legitimacy.

For example it is easier to get the water expert at Coke to talk about issues in Mongolia than it is to get the Mongolian regulator.

Two ways of thinking about it. 1) The investor community can be like a big publication and write about water issues. 2) There is efficiency to be gained and profits to be made by doing thing differently

There are some wonderful water related solutions out there. Capitalists need to fund these firms. Water is under-priced and getting this right is what will get capitalists to invest money.

Question - who can get pricing right? Maybe investors. Okay, they didn't get carbon pricing right but maybe they can do better on water. Farmers are paying 1/100 of price per litre than city dwellers in many places.

Role is for local investors to go into local markets and make case for appropriate pricing

APPENDIX 2

2D.11 Investor US17

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	1
1.2	Years in Role (1=>10)	1
1.3	No of IPs (1=<5)	2
1.5	Definition of ESG	A method of investing that incorporates a more total view of a company's prospects. Investors who don't look at this are missing some of the picture
2.1	Aware of CDP W (0=No)	1
2.6	How to improve CDP W report	Aware of it but not close to it. I employ a team of analysts who follow it in detail. Not in a position to make a comment on how it can be improved
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	3
3.5	Using GRI (0=No)	1
4.1	House view on water	We subscribe to Sustainalytics and go with their ratings. We think water is one of the top priorities to address worldwide. 8-10 years ago the board would get together to discuss emerging social issues, and water appeared from at least 10 years ago
4.2	Strategy meeting (1=monthly)	1
4.3	Relative to domestic (1=above)	1
4.4	Relative to international (1=above)	1
4.5	Internal analysis comments	Many of F&B companies we invest in are the food processors rather than big water consumers. So it is difficult for us as activists to control the suppliers. We're always trying to find leaders within universe, e.g. Unilever has just come on list. Interested in companies that maximise their resources. Combination of engaging with companies and seeking out best practice
5.2	Sector/Country (1=S,2=C,3=other)	1
5.2a	S/C comment	
6.1	Most influences percep (see form)	4
6.2	Where you live (0=No)	1
6.3	Personal experience	If you are living in Arizona right now I am sure you are much more aware of the water issue than if you live in Alaska. I was visiting a friend in Cape Cod and they are recycling the rain water as wells are so expensive. I go to holiday in the Caribbean where I see them recycling water. I have a condo in Maine and because water is too expensive they don't have hydrants. I have seen wildfires in Colorado and California. It all seems interrelated
7.1	Disclosure Priority 1 (see form)	3
7.1	Disclosure Priority 2 (see form)	2
7.1	Disclosure Priority 3 (see form)	4
7.2	Stakeholder Influence 1 (see form)	3
7.2	Stakeholder Influence 2 (see form)	2

APPENDIX 2

7.2	Stakeholder Influence 3 (see form)	4
7.3	Company Priority 1 (see form)	3
7.3	Company Priority 2 (see form)	1
7.3	Company Priority 3 (see form)	4
7.5	Any other comments? (Summary responses below):	
7.5	I assume supply chain initiatives would have the most impact as working within the chain drives changes in behaviour.	

APPENDIX 2

2D.12 Investor US18

2C ID	Form Question	Response
1.1	Role (1=CIO, 2=Other)	1
1.2	Years in Role (1=>10)	1
1.3	No of IPs (1=<5)	3
1.5	Definition of ESG	ESG definitions leave out sustainability. ESG should be part of sustainability which includes profitability and growth. Traditional definitions less useful as you move to triple bottom line; it is a critical part of it but not the total answer
2.1	Aware of CDP W (0=No)	1
2.6	How to improve CDP W report	I haven't looked at it recently. I am interested in solutions and it is not clear to me that any solutions are included in the report
3.1	Co. initiated (1=<1/3)	1
3.2	Investor initiated (1=<1/3)	3
3.5	Using GRI (0=No)	1
4.1	House view on water	We look at every metric we can get our hands on and GRI is one of those. We tend to screen for positive and negative outliers from within the database. We are keenly aware that water is a key resource and increasingly short in supply. but we don't have an overarching view on water
4.2	Strategy meeting (1=monthly)	1
4.3	Relative to domestic (1=above)	1
4.4	Relative to international (1=above)	1
4.5	Internal analysis comments	We have people focusing on this issue internally. A broader awareness is there, but specific knowledge is good. There is more awareness of water issues internationally than amongst US money managers. Domestic firms are pretty parochial
5.2	Sector/Country (1=S,2=C,3=other)	1
5.2a	S/C comment	
6.1	Most influences percep (see form)	4
6.2	Where you live (0=No)	1
6.3	Personal experience	The more progressive and forward thinking companies are very aware of the issues, particularly those with high dependence. But they don't talk about it a lot in public
7.1	Disclosure Priority 1 (see form)	3
7.1	Disclosure Priority 2 (see form)	1
7.1	Disclosure Priority 3 (see form)	2
7.2	Stakeholder Influence 1 (see form)	1
7.2	Stakeholder Influence 2 (see form)	3
7.2	Stakeholder Influence 3 (see form)	2
7.3	Company Priority 1 (see form)	1
7.3	Company Priority 2 (see form)	4
7.3	Company Priority 3 (see form)	3

APPENDIX 2

7.5	Any other comments? (Summary responses below):
7.5	<p>Water has come up frequently in meetings this summer, reflecting the drought in the US</p> <p>In the US as a whole we have a lot of awareness right now, but within the US it matters less. So it is more the media agenda within a country.</p> <p>It's tough to answer who the influencers are as this is geographical. Investors and consumers are probably the more important.</p> <p>Shareholders should not be the most important stakeholder when considering water. Employees are critically important and they should rank highly. I cannot be driven by the corner office. It really starts at company and moves from there.</p> <p>Based on questions you've asked, the findings of your paper could be useful for a broad range of readers including corporations, suppliers and regulators.</p> <p>One comment I would make is that ESG acronym is too narrow. Climate change and resource scarcity are the two big issues. Water is key to both of these</p>

APPENDIX 2

Appendix 2E: Response Matrix

	Australia	South Africa	United Kingdom	United States	Total
Responses	4	3	2	3	12
CEO	2	2	2	3	9
Over 10 years	2	2	2	3	9
<5 investors	0	0	0	1	1
5-20 investors	3	2	0	1	6
>20 investors	1	1	2	1	5
Aware of CDPW	2	2	1	2	7
<1/3 engaging	4	3	2	3	12
<1/3 engaged	2	3	2	1	8
Uses GRI	0	0	0	2	2
Quarterly+ mtg	2	1	1	3	7
Above Avg.	3	2	1	3	9
Sector	3	0	0	3	6
Co. Disclosure most influences perception	1	2	0	0	3
Regulator most influences perception	1	1	0	2	4
Research most influences perception	1	0	2	1	4
Where you live	3	3	2	2	10
Top disc priority: shareholders	1	1	1	0	3
Top disc priority: suppliers	0	0	0	0	0
Top disc priority: consumers	1	1	0	2	4
Top disc priority: regulators	2	1	1	1	5
Top 2 disc priority: shareholders	3	3	1	1	8
Top 2 change infi: shareholders	4	1	1	1	7
Top 2 change infi: regulators	4	3	2	1	10
Top co. priority: metrics	2	3	2	1	8
Top 2 co. priority: metrics	4	3	2	3	12
Top 3 priority: govt rels	1	1	0	0	2