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Appraising longitudinal trends in the strategic risks cited by risk managers in the international water utility sector, 2005–2015

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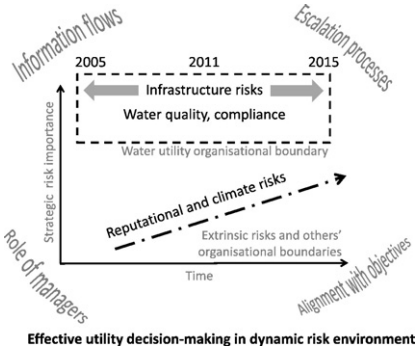
HIGHLIGHTS

- A content analysis of interviews with risk managers in international water utilities was completed.
- The analysis was supplemented with extended interviews with utility risk managers.
- Infrastructure risks have remained paramount throughout 2005–2015.
- Extrinsic risks are gaining significance with organisational implications.
- Utilities face hesitancy from managers about perceived barriers to implementation.

GRAPHICAL ABSTRACT



Effective utility decision-making in dynamic risk environment

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ABSTRACT

We report dynamic changes in the priorities for strategic risks faced by international water utilities over a 10 year period, as cited by managers responsible for managing them. A content analysis of interviews with three cohorts of risk managers in the water sector was undertaken. Interviews probed the focus risk managers' were giving to strategic risks within utilities, as well as specific questions on risk analysis tools (2005); risk management cultures (2011) and the integration of risk management with corporate decision-making (2015). The coding frequency of strategic (business, enterprise, corporate) risk terms from 18 structured interviews (2005) and 28 semi-structured interviews (12 in 2011; 16 in 2015) was used to appraise changes in the perceived importance of strategic risks within the sector. The aggregated coding frequency across the study period, and changes in the frequency of strategic risks cited at three interview periods identified infrastructure assets as the most significant risk over the period and suggests an emergence of extrinsic risk over time. Extended interviews with three utility risk managers (2016) from the UK, Canada and the US were then used to contextualise the findings. This research supports the ongoing focus on infrastructure resilience and the increasing prevalence of extrinsic risk within the water sector, as reported by the insurance sector and by water research organisations. The extended interviews provided insight into how strategic risks are now driving the implementation agenda within utilities, and into how utilities can secure tangible business value from proactive risk governance. Strategic external risks affecting the sector are on the rise, involve more players and are less controllable from within a utility's own organisational boundaries. Proportionate risk management processes and structures provide oversight and assurance, whilst allowing a focus on the tangible business value that comes from managing strategic risks well.

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1. Introduction

Water utilities manage risk and opportunity every day, delivering safe, wholesome drinking water that has the trust of customers; and treating wastewaters to protect the environment from pollution (Rouse, 2008). They do so against a background of (i) demanding regulatory commitments to achieve the required water quality and environmental protection standards (Allan et al., 2013); (ii) increasing political pressure to demonstrate organisational resilience to business threats (e.g. Ofwat, 2015); and (iii) within a context of rapidly changing workforce dynamics (Black and Veatch, 2015; Water Research Foundation, 2015). The risk governance arrangements that utilities put in place recognise a need for preventative risk management to begin at the top of an organisation and the necessity of interactions with external stakeholders (Jalba et al., 2010; Akhmouch and Clavreul, 2016).

One of the main motivations for utilities adopting formal risk governance is a desire to maintain the confidence of stakeholders by demonstrating their capacity to manage the substantive changes they face; in the short-, mid- and long-term, by building resilience into their organisational structures and long-term business thinking (Effective Utility Management Steering Group of the Collaborating Organizations, 2016). The demonstrable management of risk and opportunity, expressed through a pragmatic commitment to risk management across the portfolio of risks that a utility faces, has become a key requirement of responsible utility management (Pollard, 2016). Operationally, this is expressed for water utilities, for example, through the adaptation measures they put in place to respond to extreme weather events, climate change, population growth, demographic changes, infrastructure renewal and the requirements for financial sustainability. In doing so, water utilities demonstrate resilience across their enterprise; a requirement increasingly coordinated by the utility's 'risk manager', 'group risk manager', or 'head of assurance'.

There is now a growing body of technically-oriented management research on strategic risk (business risk, or enterprise risk) in the international water sector (Hrudey and Hrudey, 2004; Dalgleish and Cooper, 2005; MacGillivray and Pollard, 2008; Marsh, 2013; Luís et al., 2015, 2016; Water Research Foundation, 2009, 2013, 2015). Insights are being drawn from the insurance sector, from academe and from sector research organisations seeking to promote research-informed best practice. The drivers for this work include (a) an expectation that utilities can deliver 30–50 year 'masterplans' that scope out investments (and the risks to them) for politicians or funders; (b) a focus on value-for-money from those paying tariffs and their customer representatives; and (c) a genuine desire to improve the governance of preventative risk management in the sector (e.g. International Water Association, 2004; Rouse, 2008; Breach, 2012). The authors have developed a research interest in how utilities manage business-level risks to address these needs in practice; a research field that straddles the water environment and how it is managed through policy, regulation and other interventions in the context of wider environmental issues. Features of the relationship between the high level governance of strategic and business risk in a utility and the delivery of water and wastewater services on the ground, include (a) an ability to translate corporate risk management strategies into practice (Breach, 2012); (b) a recognition from Boards of their need to empower employees to manage risk better (Water Research Foundation, 2013, 2015); and (c) the absolute necessity of operator vigilance to maintain the 'basic assumption' of public health protection; the foundation of a water utility's business (Hrudey and Hrudey, 2004; Hrudey and Walker, 2005; Hrudey et al., 2006).

Although there has been progress in recent years in implementing risk governance, there continues to be reluctance amongst some utility executives to embed risk governance processes within the wider business, typically underpinned by a perception that the costs of overcoming the barriers to implementation may outweigh the claimed benefits. In a climate of doing 'more for less', there is also the perception that the rhythm of risk management processes may not keep pace with the dynamic re-prioritisation of workloads within organisations. These perceptions and hesitancies have some foundation. Organisational transitions towards just, mindful and empowering cultures that encourage a two way flow of risk knowledge up and down the organisational structure; that communicate the organisational risk appetite; and that allow a 'golden line of sight' from corporate to organisational risk must be addressed (Water Research Foundation, 2009, 2013) if risk governance is to deliver measurable business value. Securing the requisite changes requires deep and long-term commitments to cultural change (Summerill et al., 2011; Water Research Foundation, 2009, 2015). In addition, the bureaucracy of unnecessarily complex or poorly-designed risk governance processes has been off-putting to some business leaders and can easily detract from the realisation of true business value.

However, if water utility executives ignore the changing nature of the strategic risks they face, which is the principal subject of this paper, they risk placing the viability of their businesses at significant and potentially existential risk. Risks are becoming more external in nature, less controllable by individual utilities and they now involve more actors than before. Here we are interested in appraising the longitudinal trends in strategic risk within the sector as cited and discussed by risk managers that work in water utilities usually within corporate facing roles. Our long term research goal has been to help improve the maturity of the water utility sector's risk governance capability (MacGillivray et al., 2007) so it can become more resilient to the threats it faces and maintain the ongoing confidence of customers and the wider public.

2. Methods

A time series of interviews with individual risk managers within the international water utility sector over a ten year period was analysed. Utilities were selected from the UK, North America, Canada, Europe, New Zealand and Australia by reference to (a) their research interest in progressing good management practice; and, typically (b) their nomination of a formal risk manager or group risk manager role within the utility. The periodicity of interviews (2005, 2011, 2015) was aligned to three research programmes that explored the progress international water utilities were having in implementing structured risk governance. Interviews were designed and conducted to probe aspects of water utility risk that had traction within the utilities studied, rather than ephemeral issues of the moment. To support this, questionnaire designs and formats were informed by prior literature reviews (MacGillivray et al., 2006; Summerill et al., 2010; Allan et al., 2013; Luís, 2014) detailed elsewhere (American Water Works Association Research Foundation, 2007; Water Research Foundation, 2009, 2015).

Transcripts from three cohorts of interviews (typically 45–60 min in length) were coded by reference to strategic risk terms. In addition to an exploration of strategic risks and core risk management implementation issues, interviews focused on the use of risk analysis techniques in the international water sector (2005); on the implementation of risk management cultures (2011); and on the integration of business risk management processes with other corporate decision-making contexts, such as strategic long-term planning (2015). For the 2005 cohort, transcripts from the free-flowing discourse that followed a structured set of interviews on risk analysis tools were analysed.

In addition to the content analysis described below, the principal researcher (RTCC) undertook three extended semi-structured interviews (typically 1.5 h, to incoporate open ended discussion) with water utility risk managers from the US, Canada and the UK to contextualise the trend analysis of risks over this period (subsequently referred to as case studies). These three utilities had each previously participated in all three research programmes.

2.1. Content analysis and interviews with representative case study utilities

High level corporate issues expressed using risk terms within water utilities in different countries were identified from historical interview transcripts (Table 1 for utility attributes).

The qualitative content analysis of the transcripts from 2005, 2011 and 2015 was undertaken, the transcripts being redacted before analysis to ensure confidentiality. Excerpts from eighteen structured interviews in 2005, twelve full transcripts from semi-structured interviews in 2011, sixteen full transcripts from semi-structured interviews in 2015 were analysed. An interpretive approach to the analysis was employed, to code the data into categories and sub-categories (Graneheim and Lundman, 2004; Fig. 1). Following established methods (Saldana, 2013) coding deployed NVivo™ 11 software (QSR International Pty Ltd., 2017). Initial coding, appropriate for transcripts (Saldana, 2013), was first performed to identify broad strategic risk themes. Adopting the convention of grounded theory, coding was iterative with new categories identified throughout the process (Robson, 2002; Fereday and Muir-Cochrane, 2006).

Secondly, themes identified in the initial coding were inspected to discern emerging risks and strategic risk topics, and to reorganise and establish any that were not identified during the initial process (Fereday and Muir-Cochrane, 2006). To minimise omissions, a keyword search was performed for each transcript (Welsh, 2002; Wiltshier, 2011). Then, the number of times a risk was coded (the coding frequency) was used as an analogue to rank the perceived importance of the strategic risks noted in the transcripts, benchmarked to the 2005 data set. Whilst coding frequency is not universally equivalent to importance (Holsti, 1969), it is recognised as a valuable form of data in some qualitative studies (LeCompte and Schensul, 1999; Maxwell, 2010), having been used to identify trends within time series data (Wiltshier, 2011; Azhoni et al., 2017). Using quantitative trend analysis coupled to a qualitative identification of key themes is one means of validating research designs such as this (Robson, 2002).

Thirdly, an analysis of three utilities with different organisational governance, legislative settings, and degrees of formalised risk governance (Table 2) was undertaken contextualise the longitudinal analysis above. The risk manager (or very close equivalent) at each utility was interviewed in depth to contrast different risk management structures within the utilities and approaches to realising the business value of good risk governance. Interviews were coded using the methods above, to identify barriers to risk governance, and the organisational value achieved by overcoming them.

Table 1
Characteristics of water utilities in this study.

Code	Region	Ownership	Size[a]
Interview series: 2005			
2005	18 excerpts from the free flowing discourse of structured interviews with risk managers across UK (6), North America (4), Canada (4), New Zealand (1) and Australia (3)[b]		
Interview series: 2011[c]			
Utility A	Canada	Public	Large
Utility B	UK	Private	Large
Utility C	Canada	Public	Small/Medium
Utility D	UK	Public	Large
Utility E	USA	Public	Small/Medium
Utility F	UK	Private	Large
Utility G	USA	Private	Small/Medium
Utility H	Spain	Private	Large
Utility I	Canada	Public	Large
Utility J	USA	Public	Large
Utility K	USA	Public	Large
Utility L	UK	Private	Large
Interview series: 2015[d]			
Utility 1	Canada	Public	Large
Utility 2	Spain	Private	Large
Utility 3	South Africa	Public	Large
Utility 4	UK	Public	Large
Utility 5	USA	Private	Small/Medium
Utility 6	USA	Public	Large
Utility 7	USA	Public	Large
Utility 8	Australia	Public	Large
Utility 9	UK	Private	Large
Utility 10	Canada	Private	Unassigned
Utility 11	Australia	Private	Large
Utility 12	USA	Public	Large
Utility 13	Canada	Public	Large
Utility 14	Canada	Public	Large
Utility 15	Canada	Public	Large
Utility 16	USA	Public	Large

[a] Defined by litres potable water supplied per day/number of customers served. Small/Medium (<284 ML day^{-1}/425,000 customers), Large (>284 ML day^{-1}/425,000 customers) (American Water Works Association, 2014).
[b] American Water Works Association Research Foundation (2007).
[c] Water Research Foundation (2009).
[d] Water Research Foundation (2013).

3. Results

This study differs from the types of routine business risk surveys conducted by insurers, re-insurers and management consultants in which utility managers and business unit leads are requested to rank their units' business risks (on a 1 to 5 scale, say) which, when aggregated across the organisation, forms the basis of an 'enterprise-wide' risk ranking. Here, we draw on in-depth interviews with self-selecting water utility risk managers interested in implementing risk management. However, the data points at 2005, 2011 and 2015 have mixed variables in terms of the individual utilities interviewed (although there was a core set), some changes in risk manager personnel over the study period, and subtleties in the emphasis of individual questions. To this end, our interpretations must not over extend the limitations of the base data and its analysis. To support readers, we refer to Saldana (2013) who notes caution that a mere numeric frequency of a code or category from data analysis is not necessarily a reliable or valid indicator of a central/core category; and Namey et al. (2008) who suggests determining frequencies on the basis of the number of individual participants who mention a particular theme, rather than the total number of times a theme appears in the text. Given these constraints, our interpretations are calibrated by reference to our experiences of working on strategic risk issues within the sector over an extended period (2003–). For completeness, but not discussed here, a ranked citation of strategic risks by governance arrangement and utility size is provided in Appendix A.

3.1. 'Top strategic risks', 2005–2015

A histogram of strategic risk categories by coding frequency over the period 2005–2015 is presented in Fig. 2. The coarse, aggregate frequency data smooths any differences between years and provides a raw summary of risk issues cited over the whole period from all respondents. As expected, infrastructure asset risks ($n = 1$; asset risk) dominates the sectors' concerns, with a widely understood secondary group ($n = 4$) of reputational (licence to operate), climate change, water quality (public health and/or environment risks) and regulatory compliance (legal) risks represented. Thereafter, a tertiary group ($n = 5$) of financial through to maintaining water supply risks (Fig. 2) appears evident.

3.2. Time series of 'top strategic risks', 2005–2015

The top 10 ranked risks by coding frequency discussed by respondents in 2005, 2011 and 2015 are presented in Fig. 3 and Table 3 where arrows highlight those risks rising or falling, relative to 2005, in their coding frequencies over time.

Caution is required in interpreting this data because, notwithstanding interview design controls, changes in coding frequency may still

A	B	C
Barriers to risk management	Communication	
	Costs	
	Cultural barriers	Board
	Inconsistency	
	Manpower	
	Terminology	
	Time	
	Too complicated	
	Utility attributes	
Communication	Review of risks	
	Risk identification	
	Risk quantification	
	Risk ranking	
	Risk reporting	
	Stakeholders	
Decision making		
Drivers of risk management	Inconsistency	
Emergency management	Vulnerability	
Emerging risks	Assets	
	Capacity	
	Climate change	Flexible adaptation
	Competition	
	Compliance	
	Corporate risk	
	Credit rating risks	
	Customer services	
	Cyber risk	
	Economic risk	
	Energy	
	Environmental risk	
	External influences	
	Extreme weather	
	Fraud	
	Global economy	
	Insurance risks	
	Maintaining supply	
	Management risk	
	Natural disasters	
	Operational risk	
	Political risk	
	Reputational risk	
	Resilience	
	Security risk	
	Stakeholders	
	Strategic risk	
	Sustainability risk	
	Tax risks	
	Water quality	
	Water scarcity	
	Workforce	
	Workforce experience	
Enterprise risk management	Barriers to enterprise risk management	
	Drivers of enterprise risk management	Compliance
		Decision making
		Investment
		Management
		Regulation
	Economic value of risk	
	Foresight	
	Opportunity	

A	B	C
Human input		
Investment prioritisation		
Justification		
Lessons learnt		
Perception of risks		
Planning tool		
Preparedness for risk	Redundancy	
Quantitative vs qualitative assessment		
Relationships	Customer relations	
	Regulator relations	
	Stakeholder relations	
Risk culture	Blame culture	
	Complacency	
	Managerial leadership	
	Regulation	
Risk appetite		
Risk framework	Catchment management	
	Standard frameworks	
	Formalisation of risk management	
Risk mitigation		
Risk trends		
Risk vs business case		
Novel		
Maturity		
Tools	Appropriateness	
Self critical		
Sense of responsibility	Enforced responsibility	
Siloed risk management	Asset management	
	Capital	
	Commercial and business	
	Corporate	
	Environmental	
	Ethics	
	Financial	
	Health and safety	Corporate
		Operational
	Human resources	
	IT Risk	
	Legal	
	Operational	
	Risk governance	
	Security	
	Strategic	
	Water quality	
Technology		
Training courses		
Utility attributes		
Value of risk management		

Fig. 1. Coding structure adopted, with primary (A), secondary (B) and tertiary (C) codes, the second column in this figure being a continuation of the first for presentational ease.

reflect 'issues of the day' at the point of interview, policy or organisational priorities at a particular time - none of which can be corrected for - or genuinely represent longitudinal changes over time. This said, the growing prevalence of strategic risk terminology over the study period across the whole set of transcripts and marked distinctions between the 2011 and 2015 set provide a sound case for an increasing articulation of strategic risk issues by risk managers within the sector and dynamic changes in risk priorities between interview sets. Asset risk is a continuing concern for water utilities because infrastructure failure is a key source of supply interruption (Fig. 3; Table 3). The data also suggests an emergence of external risks; climate change, political risk and reputational risk in the 2011 data set; stakeholders more broadly in the 2015 data. Lower down the rank order, issues of water scarcity, tax risk, fraud, financial sustainability, capacity and cyber risks emerge in the 2015 transcripts. In terms of overall ranking, resilience, climate change and operational risks become notably more frequent in citation

Table 2
Characteristics of water utilities included in case study.

Utility ID	Region	Ownership	Size[a]	Descriptor
Utility X	USA	Public	Large	Large municipal utility providing water to 1.7 million people and treating wastewater for around 2.2 million people.
Utility Y	Canada	Public	Large	Large municipal utility providing water and wastewater treatment to over 1 million people, in a city with high population growth rates.
Utility Z	UK	Private	Large	Large shareholder owned utility, providing water and wastewater services to 4.7 million people.

[a] Defined by litres potable water supplied per day/number of customers served. Small/Medium (<284 ML day^{-1}/425,000 customers), Large (>284 ML day^{-1}/425,000 customers) (American Water Works Association, 2014).

between 2011 and 2015 (Table 3). Financial risks show a higher rank in 2011 than other years. The increasing prevalence of total citations between 2005 and 2015 and between 2011 and 2015 may infer a growing recognition and articulation of strategic risks as organisational issues to be actively managed in the sector. This is borne out by the increasing attention given to strategic risk management over these years by regulators, insurers and financiers within the sector (Pollard, 2016). For completeness, when the time series data (Fig. 3) are normalised to per cent cite frequency (% frequency of cites for individual risks to total cites for the full risk set; Fig. 4), the prominence of asset risk is asserted, though diluted in the later years by other priority risks demanding risk managers' attention; and reputational and climate risks emerge alongside water quality and compliance risks (graphical abstract).

3.3. Realising organisational value from good risk governance

3.3.1. Drivers of, and barriers to risk management

We next turn to the three case study interviews. How does a dynamic portfolio of strategic risk within a utility, as discussed above, play out during attempts to implement improved risk management? Which strategic risks act as drivers for the implementation agenda, and which organisational tensions and forces are at play with respect to the power structures and political influences within utilities?

The case study interviews contextualised the study findings by reference to three utilities' experiences of implementing risk management in their organisations. Several drivers for implementation were identified. A financial driver for risk management was identified explicitly at Utility Z: "Fines or financial loss […] That is generally where it ends up", and was motivated by the desire to protect shareholder returns. Two utilities gave examples of fines they considered to exemplify the need for risk management. Municipal (public) utilities were driven less by investment returns and considered that "[we] work more broadly across citywide goals and creating more value" (Utility Y).

Different certification and/or regulatory requirements were identified within each country. The UK Corporate Governance Code (Financial Reporting Council, 2014, 2016), for example, stipulates a need to explicitly manage risk and was a driver for Utility Z. Within each national context, regulatory uncertainty (that is uncertainty about the future of policy incentives, or on how regulations might be implemented) was a driver of risk management efforts, with Utility Y identifying a new carbon levy that introduced uncertainty: "are we going to be regulated in terms of meeting carbon commitments?". Reputation, and the attending potential loss of a licence to operate, was identified across all three utilities as a driver: "a big reputational impact on us. It would probably cost us more than any financial impact" (Utility Y) and was a driver because, "[the directors] have to deal with it" (Utility Z). Barriers to risk management were identified, and are presented in Table 4 with illustrative quotes and identified methods of overcoming them.

3.3.2. Securing value: formalised risk identification, resilience and decision-making

In the absence of the centralised identification of risks within utilities, it was considered that "people don't know what to worry about" (Utility X), and when "unique risks arise, we deal with those only if the person in their silo is watching" (Utility X). Formal risk management therefore enables "broader discussion about what is in the risk register" (Utility Y). At Utility X, where this was not the case, it was considered that "[we do not] talk about things as risks, and we don't bring them together in any structured way". Utilities Y and Z used risk registers to formalise risk identification, and all three utilities used audit to ensure safety and procedures were being followed.

Utilities Y and Z identified resilience could be achieved by adopting an adaptive approach to risk management to ensure that "you don't go down one path and then you realise you are on the wrong path" (Utility Y), and "make sure that we are agile enough to respond" (Utility Z). Utility Z was required by government policy and regulatory approaches to manage resilience actively e.g. "[the] Civil Contingencies Act is driving resilience. We are being incentivised".

While municipal utilities were not driven explicitly by profit, adopting an enterprise risk management approach was seen as crucial to deciding "where do we get the best value for the investments we

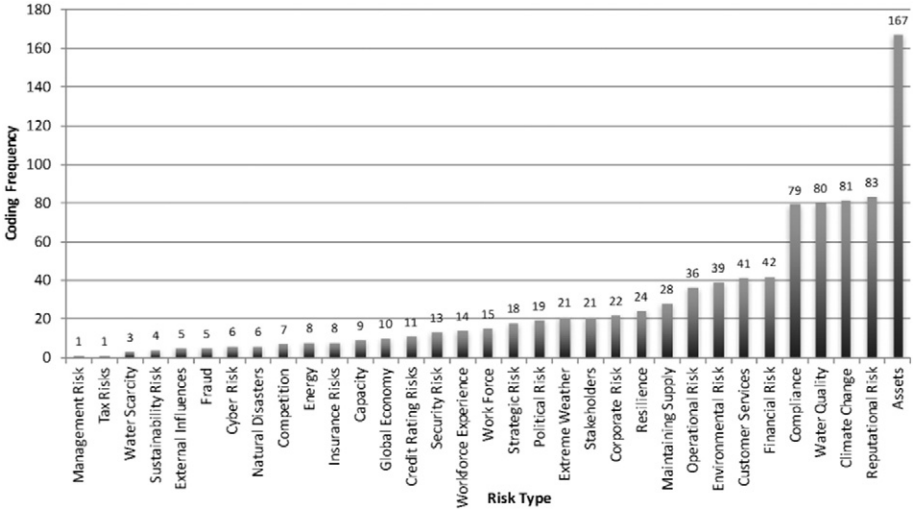

Fig. 2. Histogram of strategic risk types in the international water sector, 2005–2015.

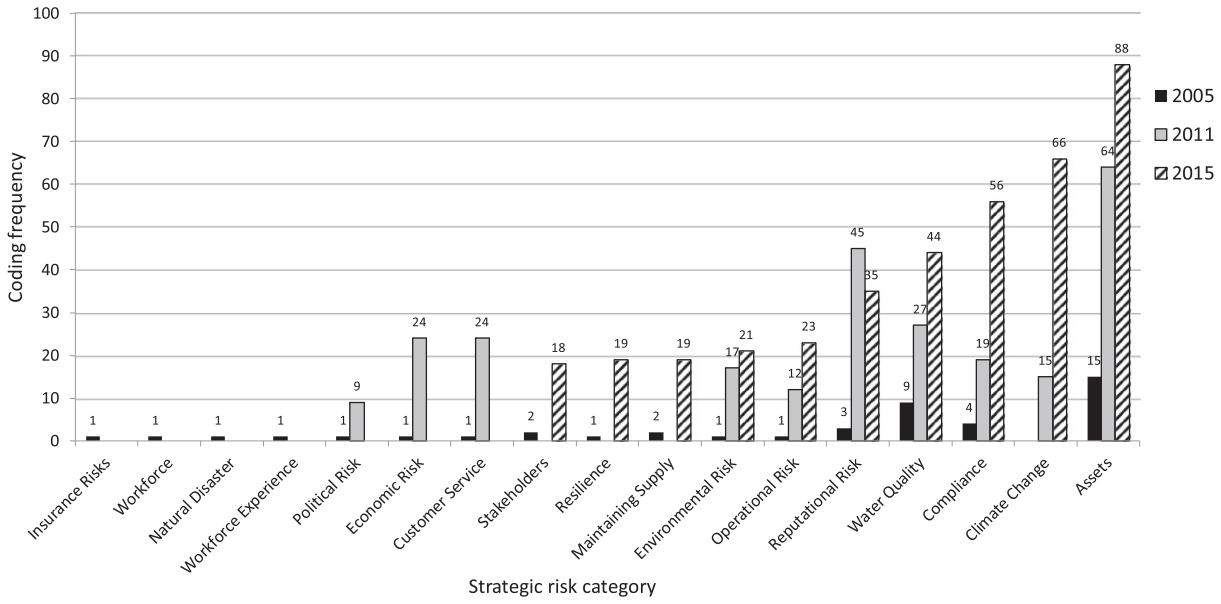

Fig. 3. Histogram of strategic risks cited by water utility risk managers, 2005; 2011; and 2015.

are making" (Utility Y). Risk management was needed to make effective decisions about "when the water treatment plants need to be refurbished… before they fail, but within a time we can work with" (Utility X). In the absence of formal risk management, it was considered that "[directors are] focusing their priorities in the wrong place" (Utility X). It was identified that risk management "isn't always mitigate, mitigate, mitigate; we are trying to create opportunities" (Utility Y). For example, opportunity was seen in putting off investment, with Utility Y saving between $50 and $70 million by demonstrating that appropriate treatment measures were already in place, and putting off investment into UV treatment. In this sense, business value was achieved by "aligning our key risks with our business planning" (Utility Y). Utility Z did this to the fullest extent, describing a "risk hierarchy to mirror our objectives hierarchy". Risk committees were used to ensure risk was mitigated in line with Board or management objectives, and "that drives action because the Board and the risk committee have decided what our risk appetite is coming top down" (Utility Z). Committees were used to escalate risks, with Utility Y beginning "to draw the line on the strategic risks… and we move those up to the steering committee" (Utility Y). Utilities Y and Z also used matrices of the likelihood and impact of risks as a tool to escalate risks; e.g. "We've agreed on our matrix what is a material risk" (Utility Z). The value of governance was identified by capturing strong cultural values to "sustain the culture here, which is good for risk governance" (Utility X). Internal and external relationships were identified as pivotal for making risk management work by "unlock[ing] it and have the relationships" (Utility Z).

4. Discussion

4.1. Risk trends

The trend analysis appraised in this study supports previous analyses (Marsh, 2013; Black and Veatch, 2015; Deloitte, 2016; Mercer, 2016), in which ageing assets and infrastructure were repeatedly identified as the major risk impacting on the resilience of companies within the water sector internationally over an extended period (Marsh, 2013; Black and Veatch, 2015). Risk managers also believed that climate change, as an augmenting factor, will reduce the resilience of infrastructure assets to other risks such as changing demographics (water demand), water scarcity, and operational risks (Black and Veatch, 2015; Deloitte, 2016). Increasingly, risks associated with extreme weather (2015 transcripts) and climate change feature on utilities' risk registers (Ofwat, 2015; Jude et al., 2017). Of note, the reported decline in workforce expertise and experience as an emerging risk for water utilities

Table 3
Top 10 strategic risks in 2005, 2011 and 2015 ranked by coding frequency, with arrows denoting rising (↑) and falling (↓) risks. Extrinsic risks shaded.

Rank	2005	2011		2015	
1	Assets	Assets	–	Assets	–
2	Water quality	Reputational risk	↑	Climate change	↑
3	Compliance	Water quality	↓	Compliance	↑
4	Reputational risk	Financial risk	↑	Water quality	↓
5	Maintaining supply	Customer services	↑	Reputational risk	↓
6	Stakeholders	Compliance	↓	Operational risk	↑
7	Financial risk; customer services; environmental risk; operational risk; insurance risk; workforce; political risk; natural disasters ; workforce experience; resilience	Environmental risk	–	Environmental risk	–
8		Climate change	↑	Resilience	↑
9		Operational risk		Maintaining supply	↑
10		Political risk	–	Stakeholders	↑

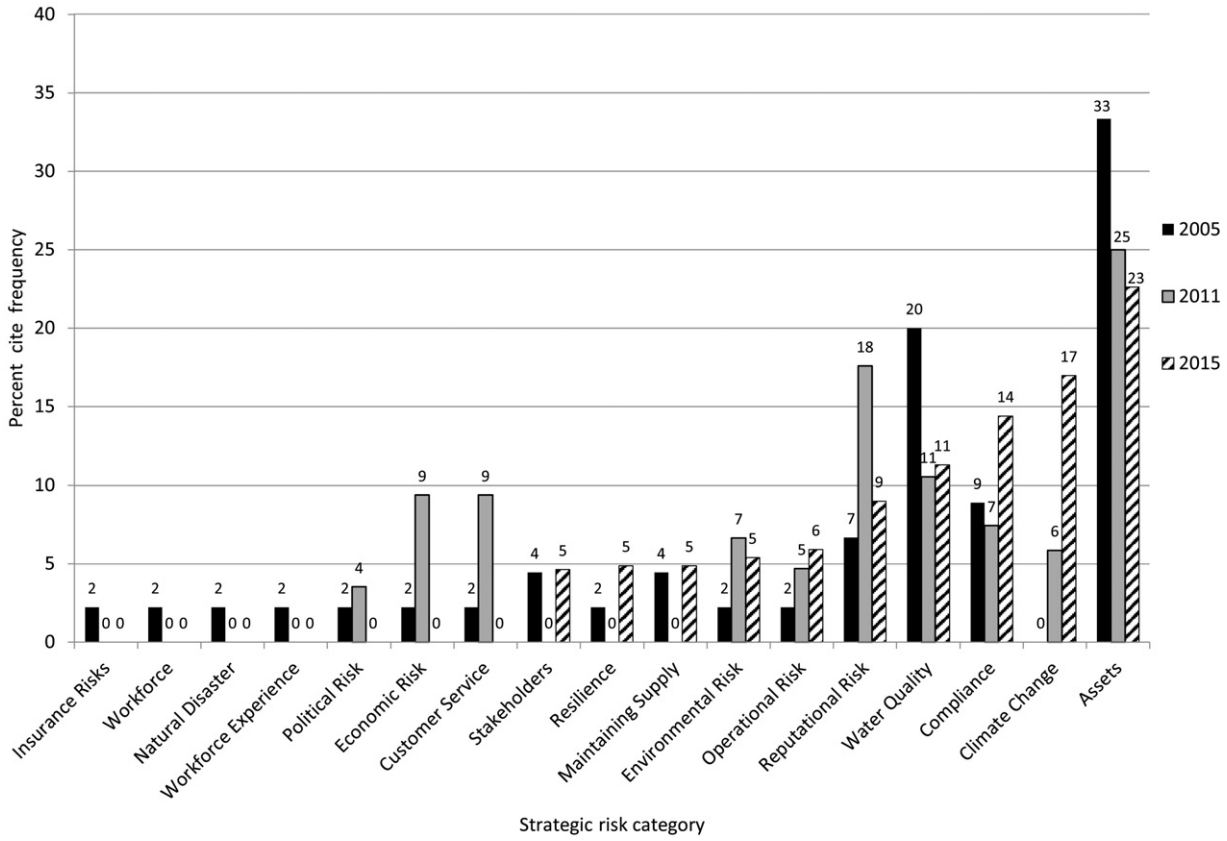

Fig. 4. Normalised histogram of per cent cite frequency to total cites for strategic risks in 2005; 2011; and 2015.

is a recurrent theme within the sector (Black and Veatch, 2015), identified as a priority at some US utilities (Water Research Foundation, 2015). Workforce experience as a strategic risk was identified in this research in terms of the loss of experienced workers, and the reporting of a new, arguably less experienced generation being employed to replace highly experienced retirees.

The emergence of cyber risks in the lower ranks of the 2015 dataset reinforces existing studies. There are concerns that managing data from increasingly 'smart' systems will add complexity to utilities (Black and Veatch, 2015; Deloitte, 2016). These results support the finding that cyber risks are more of a concern for larger utilities than small (Black and Veatch, 2015).

4.2. Formalised risk management

As risks are increasingly external to the business, it is recommended that utilities embrace business-wide (enterprise) risk management for the management of strategic risk. A centralised approach may often be necessary and beneficial (Sax and Torp, 2015) because strategic risks comprise features that straddle different business units and so coordination and oversight is required to identify and address such risks (International Risk Governance Council, 2009; Water Research Foundation, 2015). This was an issue for Utility X, where risk identification relied on individuals within individual siloes. Here, the need to have an overarching risk management approach supported by a high level risk register was identified. Formal risk identification can also limit the extent to which risk perceptions adversely influence the prioritisation of risks and can ensure the formal capture of high consequence, low probability risks that demand active contingency planning (The Royal Institute of International Affairs, 2012). While some executives may shy away from improved risk identification for fear of increasing workload, or increasing the number of risks on their register, mindful organisations (Weick and Sutcliffe, 2001) actively seek to identify emerging risks (Water Research Foundation, 2009). As Utilities Y and Z identified, an awareness of emerging risks enables a utility to be more flexible to change (Moore, 2014), even if this means uncomfortable truths being recognised by the Board (Water Research Foundation, 2015; Cranfield University, 2014). Flexibility is increasingly important because uncertainties in climate, demand for water, regulation, and water pollution have emerged onto the risk horizon, requiring an adaptive response (Andersen et al., 2014; Spiller et al., 2015).

4.3. Effective decision making

In a business climate in which external risks to utilities are growing in importance, 'experience and intuition no longer count as a guarantee for success' (Deloitte, 2016). Decision making can benefit from risk management on two fronts; better decisions are taken in light of relevant and readily available information (Stanton, 2012); and decisions are supported by evidence (Andersen et al., 2014).

4.3.1. Information flows

While centralised risk identification is necessary to ensure risks are managed across a utility, bottom-up communication remains essential, so as to inform Board decisions in a timely manner (Stanton, 2012; Sax and Torp, 2015; Financial Reporting Council, 2016). Maintaining 'lines of sight' both down business unit siloes and horizontally across the organisational structure of a utility is equally important for effective decision making (Water Research Foundation, 2009, 2015). The attitude and behaviours of individuals in management positions are essential in establishing an open culture that allows employees to raise issues (Sax and Torp, 2015; Financial Reporting Council, 2016), in turn reducing the possibility of Board level blindness to risk issues (Sax and Torp, 2015; Cass Business School, 2011).

Table 4
Illustrative quotes of the barriers to risk management and overcoming these barriers.

Barriers to risk management	Illustrative quotes	Overcoming barriers	Illustrative quotes
'Siloed' risk management	"risks are spread around the company and not really brought together in a framework" (Utility X)	Structured risk management approach	"we've had improved discussions, we have better debates, better reporting in terms of our risks" (Utility Y)
Lack of communication	"our supervisors and anyone below that doesn't have the opportunity to see the big picture of risk management" (Utility X); "when you get that discord between frontline people and managers or management you can create your own problems" (Utility Y)	Formalised risk escalation	"seeing which [risks] should actually emerge and be brought up and talked about more broadly across the department" (Utility Y)
Change resistant	"try to let people know well in advance that we're even thinking of something, so they're not surprised" (Utility X)	Leadership	"making sure that we have people [suited to] change management" (Utility Y); "I have a network across the group of about 20 risk champions" (Utility Z); "putting in place a department risk team and giving it a little bit of a profile" (Utility Y)
Lack of managerial buy-in	"[the executives] still see it as adding complexity and more work to their already busy daily lives" (Utility X)	Relationships	"all those layers of trust and relationship building are very important to protect and to deal with risk" (Utility X)
		Leadership	"if he is in line then our directors are in line, I get good attendance at the steering committee of the directors and the general manager, and I think everyone is on side, there is no question about it" (Utility Y)
		Identify drivers	"If you can use a case study, get people to tell a story around that, that brings it to life" (Utility Z); "you've got to get into 'Why'? What is in it for them?" (Utility Z)
Why add formal risk management?	"we seem to be managing our risks, why do we need to formalise anything" (Utility X); "some people see it as bureaucracy" (Utility Z)	Culture	"You need people in that group who buy-in, that get the why for them, so that they will own it and drive it" (Utility Z)
		Appropriate tools	"I accept that it is bureaucratic and it has drawbacks, but I am nice, here is a low key way of doing it" (Utility Z)
		Identify drivers	"an example of a case study, of a loss event, where an asset has failed, a pipeline or something. Do you remember how much that cost you?… I give them a pain point to remember" (Utility Z).
Too detailed/too complex	"most of the directors find the detail too much" (Utility Z)	Appropriate tools	"Directors like things in 3s and 5s… give the detail in the appendix" (Utility Z) "the bowtie approach, at operational level they've really run with that" (Utility Y)
Negative connotation of risk	"the word risk itself suggests stress" (Utility X)	Demonstrate upside	"trying to move the discussion broader than just mitigate because we have to comply, to opportunistic risk management" (Utility Y)

4.3.2. Formal escalation processes

Utility Y and Z used risk matrices in their risk escalation process. While risk matrices may not capture the complex and interrelated nature of risks fully, they do provide utilities with foresight beneficial to strategic planning (The Royal Institute of International Affairs, 2012), and allow risks to be escalated against formal thresholds of appetite or materiality (Water Research Foundation, 2013; Burlinghame and Chalker, 2017). This research identified that communicating material risks to directors appropriately can overcome managerial reluctance to engage in what they may perceive as a complex process (Moore, 2014).

4.3.3. Alignment with objectives

Embedding risk management into a utility's corporate objectives has long been called for (Westerhoff et al., 2005) and is one way of ensuring opportunities are pursued without exposing the utility to risks considered excessive (Water Research Foundation, 2013; Luís et al., 2015, 2016). Utility Z had a risk statement that mirrored their corporate objectives statement, which meant that insight into risks threatening those objectives drove effective, justifiable decision making at the operational level (Cranfield University, 2014; Deloitte, 2016). It was felt that in the absence of a formal means of including risk within decision making, Utility X did not make the most of prudent, informed, risk based decisions to pursue opportunities actively (Andersen et al., 2014; Deloitte, 2016). Utilities Y and Z used committees to embed risk management into Board-level objectives and to oversee risk governance (Caldwell, 2012). In return, committees offer executives assurance that risks are being managed effectively (Moore, 2014). To be successful in influencing behaviour, committees must have the full support of the Board (Caldwell, 2012).

4.3.4. The role of managers

The case study interviews support the proposition that managerial buy-in is essential for the success of risk management (Health and Safety Executive, 2011; Sax and Torp, 2015; Financial Reporting Council, 2016). However, there is a mixed experience of engaging executives in risk management (Summerill et al., 2011). If some executives within a company have reservations about risk management, the true value of risk governance may not be realised in their organisations. In the UK, all companies listed on the London Stock Exchange are required to manage risk effectively and transparently (Financial Reporting Council, 2014). For Utilities X and Y, a risk to the certification or licencing of elements of the utility, while identified as a driver of risk management (Pollard, 2016), did not appear to incentivise managers sufficiently to adopt a vigorous approach to risk governance. This reinforces the idea that national policy and regulatory approaches have an important role to play in incentivising good governance within a utility (Clarvis et al., 2014). Future research into the role of national policy and regulation would be advantageous to establish which have driven the best risk governance approaches.

5. Conclusions

This research can claim only modest progress in bridging the gap between enterprise risk management research and the strategic concerns of water utility executives. It appraises risk trends over time and tackles the underlying hesitancies that act as barriers to implementing effective risk governance approaches and realising their value. Our results, secured from the frequency coding of strategic risk terms used by risk managers in the water sector, suggest that external risks to utilities are increasingly prevalent. In the absence of good risk governance, utilities leave themselves vulnerable to risks that are unusual, initiated externally, have multiple actors and that may fall between the 'siloes' of typical business units, or are underlying persistent risks (Sax and Torp, 2015).

By implementing explicit risk governance and improving communication across vertical and horizontal structures in their organisations, utility strategies can become far better informed about emerging risks (Sax and Torp, 2015; Water Research Foundation, 2015), and operational decisions can be better aligned to corporate objectives (Cranfield University, 2014). In this way, risks can be managed more effectively and strategic business management improved.

For utilities, formal risk identification is recommended to promote fuller discussion around risk, and to manage perceptions of risk. Risk management should be a regular agenda item on management team meetings at all levels within an organisation. Overseeing risk management centrally using a standardised approach can help ensure that risks that might otherwise fall between the functional units of a utility are identified, appropriate mitigation developed and implemented and then success or otherwise tracked. Formal risk escalation, using appropriate tools such as nested risk matrices, ensures material risks are addressed at the appropriate level and ensures material risks are managed at the appropriate level of the organisation (Water Research Foundation, 2013).

Critically, the results emphasise the important need for risk management to be seen as a dynamic and engaging process. For example, directional arrows can be used in risk matrices to indicate whether individual risks are increasing or decreasing. In addition, it can be helpful to indicate the target position for each risk, if the mitigation actions are to be successful. This will provide an indication of the risk appetite for each issue. A clear statement of risk appetite, to be communicated from the Board, is necessary to inform decision-making at an operational level. Establishing a risk committee is one means of providing oversight and challenge of risk management activities and in this way provides assurance to executives, and influence behaviours. The Board, or equivalent, must lead by example to establish an open culture of trust and accountability, supported by executive arrangements and behaviours.

Policy makers and regulators through policies, regulations and guidance need to encourage utilities to take an adaptive approach to risk so as to nurture resilient businesses. Risk governance creates value, because a flexible utility is well placed to continue to make strong decisions to avoid loss, prioritise investment, and pursue opportunity, in spite of an increasingly uncertain operating environment (Andersen et al., 2014).

This study has its limitations. We did not purposefully set out in 2005 to design a longitudinal study and in order to compare risks across a time period, it would have been advantageous to have a dataset with a directly comparable number of sources in every year (Wiltshier, 2011) with identical interview questions (Mercer, 2016) and an unaltered cohort of respondents. Instead, whilst a core set of questions was posed on strategic risks, the interviews had varying foci of risk analysis tools (2005), risk management cultures (2011) and risk integration with other corporate processes (2015). Changes in the people carrying out particular roles in a utility over time are inevitable and the study could not correct for alterations in staffing over this period. As far as possible, this was considered in the selection of a trend analysis method where risk rank and coding frequency were examined, to minimise the impact of this limitation.

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Appendix A. Appendix

Table A
Top 10 risks by utility attribute, ranked by coding frequency.

Top 10 risk by utility ownership		
Rank	Public	Private
1	Assets	Assets
2	Climate change	Reputational risk
3	Reputational risk	Climate change
4	Compliance	Compliance
5	Water quality	Water quality
6	Financial risk	Operational risk
7	Environmental risk	Financial risk
8	Customer services	Customer services
9	Operational risk	Environmental risk
10	Extreme weather	Maintaining supply
Top 10 risk by utility size		
Rank	Small/Medium	Large
1	Assets	Assets
2	Financial risk	Reputational risk
3	Reputational risk	Climate change
4	Climate change	Compliance
5	Water quality	Water quality
6	Customer services	Environmental risk
7	Extreme weather	Operational risk
8	Compliance	Financial Risk
9	Operational risk	Customer services
10	Political risk	Maintaining supply

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