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Societal concerns and risk decisions

David J. Ball [a,*], Sonja Boehmer-Christiansen [b,1]

[a] *Centre for Decision Analysis and Risk Management, School of Health and Social Sciences, Middlesex University, Queensway, Enfield, Middlesex EN3 4SA, United Kingdom*
[b] *Department of Geography, Hull University, Hull HU6 7RX, United Kingdom*

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Abstract

Societal concern is a relatively new term and refers to hazards with the capability to generate socio-political responses. Hazards invoking societal concerns pose a challenge to decision makers for they oftentimes have major policy implications yet frequently lack the analytic support affording them such elevated status. Regulators and corporate risk managers, therefore, have been confronted with the difficult question – *how and to what extent should societal concerns be factored into risk management decisions*? – a question which is compounded by the tendency of 'politicians' to want to accommodate these concerns. Here we first seek to explore the drivers of societal concerns prior to considering the implications for decision makers. We conclude that societal concerns stem from highly disparate causes, are not necessarily originated by the public as is often implied, and as such have markedly differing legitimacies. Furthermore, we note that attempts to incorporate societal concerns into risk decisions raise a host of methodological, political, and ethical issues which suggest, at the very least, that deep caution is required, especially where policy implications are high.

Keywords: Societal concern; Societal risk; Risk; Policy

1. Introduction

Within the UK pragmatism has customarily lain at the heart of risk management decision making. Thus, even in decisions involving human health risks, tools such as cost-benefit analysis and risk assessment have generally been regarded as providing at the least a useful framework for guiding policy [1]. This thinking has a long history and can be traced back over centuries to environmental concepts such as 'best practicable means' which sought to encourage sensible investment in pollution control. It has also figured more recently in important UK statutes such as the Health & Safety at Work Act 1974 which requires that risks be reduced only so far as is reasonably practicable, again implying a consideration of the costs as well as the benefits of risk control [2,3]. However, it has been argued that these 'rational' models of decision making lack sensitivity to qualitative factors which are important to human beings, and this has been offered as one explanation of why risk issues are at times controversial [4]. Thus, considerations such as voluntariness and the benefits of risky activities were identified as important by Starr as long ago as 1969 [5], and Slovic have since taken this work to new frontiers, unearthing factors such as familiarity, dread and affect [6].

Policy makers have heeded this research, and there have been some attempts to accommodate these concerns by the use of weightings in cost-benefit calculations or in risk decision criteria. For example, a number of agencies have introduced a degree of risk aversion into risk management decision criteria involving major hazards to account for what has come to be known as *societal risk*, that is, the risk of events involving multiple fatalities [7,8].

More recently, moves have been made to take account of other qualitative aspects of risks besides that of multiple fatalities in risk decision processes. For example, in 2005 HM Treasury produced guidance on managing risks to the public advocating the use of 'concern assessment' as an adjunct to risk assessment. Concern assessment, as described, would look at indicators such as familiarity, understanding of cause-effect mechanisms, equity, dread of consequences, controllability, and trust [9]. The

* Corresponding author. Tel.: +44 1603 665422; fax: +44 1603 665422.
E-mail addresses: D.Ball@mdx.ac.uk, david@osb.uk.net (D.J. Ball), Sonja.b-c@hull.ac.uk (S. Boehmer-Christiansen).
[1] Tel.: +44 1482 465349; fax: +44 1482 466340.

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UK Health and Safety Executive has also raised the issue of *societal concerns* in a recent landmark publication [10]. Here the HSE summarised its position on how people view different risks with reference to individual concerns and societal concerns. The former referred to how individuals see risk from a particular hazard affecting them and things they value personally. Societal concerns, in contrast, were defined as:

> ". . .the risks or threats from hazards which impact on society and which, if realised, could have adverse repercussions for the institutions responsible for putting in place the provisions and arrangements for protecting people, e.g. Parliament or the Government of the day. This type of concern is often associated with hazards that give rise to risks which, were they to materialise, could provoke a socio-political response, e.g. risk of events causing widespread or large scale detriment or the occurrence of multiple fatalities in a single event. Societal concern due to the occurrence of multiple fatalities in a single event is known as societal risk. Societal risk is therefore a subset of societal concerns." [10]

Accordingly, hazards giving rise to societal concerns are thus important not only for intrinsic reasons, but because they pose a threat to political authority. A possible consequence is that this may create serious dilemmas for decision makers and, by extension, for the scientific basis of risk assessment, which may thus come under pressure to support concern-driven policy over evidence-based policy. Nor is there any shortage of examples of hazards which might be deemed to invoke these kinds of societal concerns. Recent examples from the UK include the integrity of gas supply mains, the causes of flooding, terrorism, safety of adventure sports, disposal of offshore structures, the MMR vaccine, railway safety, control of foot and mouth disease, BSE, the availability of drugs on the NHS, and nuclear waste. Some commentators see such generalised and wide-ranging concern as leading to excessive risk aversion which in turn may threaten innovation and scientific progress [11]. For regulators and institutional risk managers, this poses a fundamental challenge, for example: 'To what extent should societal concerns be allowed to perturb more rationalistic decision making?', 'How, if at all, should societal concerns be factored into risk decisions?' and 'How, if at all, should societal concerns be balanced against societal benefits likely to arise from risk taking?'

These questions are as important as they are difficult. As long ago as 1989 the HSE identified 40 mainly qualitative factors that seemed to them important in judging the tolerability of risk [12]. These ranged over matters of national and local interest, economics, the nature of the risk assessment including uncertainties, and the form of the associated harm and benefits. Should societal concerns now be added to this list of factors which might tip the balance away from that of more rational, evidence-based, decision making? Given the social and economic implications of dealing with societal concerns, it could well be that circumspection is warranted. For this reason we here take a step back to consider some of the motivations that stimulate societal concerns prior to discussing their implications for decision making.

2. Drivers of societal concerns

Experience shows that societal concerns, although superficially about risk-related issues, are frequently about other things besides. This view was reinforced by the 2001 Health & Safety Commission & Policy Studies Institute (HSC/PSI) conference in London entitled 'Trade-offs in risk: are we getting it right?' The main case studies discussed were of gas pipelines and train safety. It was abundantly clear that societal concerns were viewed differently by the many stakeholders present, not precluding their exploitation as a means of furthering colossal investment programmes. Larger scale issues still, demonstrating a plethora of motivations, expectations and agendas, include 'global warming' and ozone-depleting substances [13]. In such cases as these it cannot be taken for granted that the real interest is to address an alleged societal concern of the 'public,' in whose name demands for control tend to be made. This has convinced us that it is crucially important for regulators or corporate risk managers to be as fully cogniscent as possible of *inter alia* the motivations behind and hence social legitimacy of hazards impugned as 'societal concerns' in deciding which actions to pursue and how far.

To pursue this argument we have first adapted a summary by Morgan and Henrion [14], whose interest was policy analysis, as a prototype. They observed that although it is frequently assumed that policy analysis is undertaken to provide better insight and understanding of a problem, this was not necessarily the case. Policy analysis may be conducted for a host of reasons besides the expected. Indeed, motives could be characterised as being of a political, commercial, professional or even personal nature. We hypothesise that Morgan and Henrion's summary of motivations of policy analysts might provide a useful template for recognition of motivations underpinning societal concerns. The adaptation is shown as Table 1.

Table 1 is subdivided into four broad classes. Under the first, labelled 'substance-based', concern is specifically associated with the hazard itself, either directly with the level of risk or nature of consequences, real or perceived, or with some other factor associated with the hazard other than safety. Within this group there are two main possibilities, denoted type 1 and type 2. Examples of type 1 societal concern could include road safety, with its obvious significant risk, or the risk posed by 'dangerous' dogs or even 'stranger danger' which are publicly perceived to pose a significant risk. Type 1 concerns are probably those which professional risk managers would regard as the most straightforward forms of societal concern since the root cause is the risk itself. This type of risk, once accepted as such, is most amenable to scientific analysis and standard forms of risk communication.

Type 2 concerns involve peripheral impacts of hazards or their methods of control. They are no less genuine from a stakeholder's perspective, but less so from that of experts because the issues of stakeholder concern stray from the expert's focus. An example of a type 2 societal concern is provided by the furore which erupted over the disposal of the Brent Spar offshore oil storage vessel [15]. Although the dispute was largely framed in terms of alleged environmental contamination which might

Table 1
Summary of some of the drivers of societal concern

Underlying nature of a societal concern	Motivations/possible causes	Exemplars
Substance-based origins		
1. The associated risk is genuinely high or believed or predicted so	Specific concern over safety	Road safety, dangerous dogs, stranger-danger, nuclear power, dioxins
2. The hazard, or the way it is controlled, impacts adversely on some other valued aspect of life	Specific concern over other (non-safety) factors embroiled in the issue	Brent Spar, GM crops, mobile phone masts, passive smoking
Value-based origins		
3. The associated activity is inherently undesirable because it infringes ethical considerations of stakeholders	Ethical conflict	Human cloning, GM crops, nuclear power, fossil power, bans on smoking
4. The hazard is differently addressed	Does not accord with a specific group's beliefs about hazard management	Personal injury control, automatic train protection, adventure sports, food additives
5. The activity is undesirable because some perceive more important goals	Preference for other goals	DDT usage, organic farming, wind-farms
Process-based origins		
6. Consultation between risk managers and risk bearers is inadequate	Hubris; omitted voices	Local cases, e.g. PCB and dioxin emissions
7. Confidence of stakeholders in one another is poor	Lack of trust	GM crops, nuclear power, rail safety
8. Risk amplification has occurred	Activities of a particular group(s) give prominence to an issue	Terrorism, marine oil pollution, acid rain
9. Lack of concern about a risk (risk attenuation)	Apathy; powerlessness (real or imagined)	Measles, nuclear waste (1950s), greenhouse gas emissions
10. The same ends can be achieved by alternative and better means	Preference for alternative means	Flood management, use of bovine growth hormones
11. Failure, real or alleged, to consider risk transfers	Bounded or fragmented perspective	MMR vaccine, child-proof medicine bottles
Stakeholder-based origins		
12. A stakeholder group (not necessarily public) has promoted an issue according to its own beliefs or interests	Because it is in accord with their philosophy or ambitions	Automatic train protection, safety of ageing gas mains, protective surfaces in children's playgrounds, acid rain
	Because it is their job	
	Because they seek the publicity	
	Because it yields an advantage	

result from residual chemicals on the Spar, the concern expressed by the public most probably had more to do with their perception of the overall state and style of exploitation of the marine ecosystem by commercial interests in general. Other hazards generating peripheral impacts, ranging from visual intrusion to altered agricultural practices, include mobile phone masts, GM crops, and passive smoking [16].

The second category of societal concern listed in Table 1 is labelled 'value-derived' in recognition of the fact that all decisions are ultimately derived from underlying, perhaps undeclared, values [17,18]. Within this category three sub-groups are listed. First are those driven by overt ethical conflicts (type 3). Examples include the production and use of genetically engineered goods. No matter how many risk assessments are made, there will remain a fundamental conflict between those who oppose what they see as 'tinkering with nature' or playing God, and those who regard this research as essential for the well being of the human race or simply progress. Similar arguments pertain to human cloning, or the use of nuclear energy or 'dirty' fossil fuels.

Type 4 societal concerns are also value-based, but this time the values derive from mismatches between professional or institutional worldviews, codes of practice, and ways of working. For example, the UK's Royal Society for the Prevention of Accidents (RoSPA), as its name implies, is fundamentally concerned with accident prevention or at least their minimisation. Thus, RoSPA might well take a different view on, say, the safety of adventure sports from that of the HSE [10], the latter's philosophy being to manage risks properly, which is usually interpreted, in part, as reducing risks so far as reasonably practicable. In fact, many institutions and their associated professions have carved out their own specific approach to safety decision making, often in isolation from other professions, and these are in many cases divergent [19]. Inconsistencies in professional decision making provide fodder for the media, and the subsequent public exposure of these differences may itself lead to the generation of societal concerns. The story of Automatic Train Protection in the UK is one such case. British Rail and Railtrack did not seek to implement ATP believing that it is *inter alia* not justifiable on grounds of reasonable practicability [20,21]. Other groups, professional and lay, approach the matter from a different perspective and find it hard to comprehend how anyone could not wish to implement a system which is perceived to be working in some other European countries and which prevents inter-train collisions.

A further manifestation of 'value-derived' societal concerns arises where the parties involved have different priorities. This,

type 5, societal concern is exemplified by the virulent argument over the banning of DDT [22]. On the one hand, DDT is the easiest and cheapest way to kill malaria-carrying mosquitoes and saves millions of lives especially children. On the other, it is seen as posing a risk to the environment, with the environment presented as an undifferentiated global 'whole' instead of particular species or habitats that might be protected in other ways. A similar argument may be made for controversies over wind-farms, in which some parties want to achieve emission reductions, while others argue for the preservation of landscapes or what they regard as more secure means of supply. In general, the Green lobby values perceived advantages to nature, such as biodiversity, above direct human health benefits.

The third category of societal concerns listed in Table 1 is termed 'process-derived.' Here societal concerns arise primarily because of the way in which hazards have been managed rather than because of any associated substantive risk or ethical conflict. It is common knowledge that even very small risks can give rise to significant concern if, for whatever reason, consultation between duty holders and those exposed to a risk is deemed inadequate, or if there is distrust [23–26]. Processes may fail in a number of ways, and this category has been subdivided, somewhat arbitrarily, into six. There is no shortage of examples. Type 6, inadequate consultation, and type 7, distrust, for instance, were both manifest in the PCB and dioxin contamination controversy surrounding the chemical waste incinerator outside Pontypool in Wales in the 1990s [27].

A further cause of societal concerns is risk amplification (type 8). Risk amplification may occur inadvertently through the normal, though complex, operations of society in dealing with any particular issue. As Sapolsky, has said, "There is no shortage of information about risks. Let a potential risk be identified and soon all possibly relevant professions, agencies, and trade groups will offer public positions in order to protect established interests or proclaim new ones. Add the news appeal of risk stories, the availability of advertising dollars to defend and promote products, and the ongoing flood of scientific reports and there is a flood of guidance for the concerned" [28]. This phenomenon is illustrated by numerous environmental scares, including the alleged death of German forests from 'acid rain' in the 1980s [29], and the overstatement of dangers to the ecology of the ocean from oil pollution [30]. In each of these large-scale cases, amplification supported major political battles against the emerging Green party in Germany and the extension of national jurisdiction over large areas of the oceans.

The other side of the coin may arise when there is insufficient concern about some particular hazard (type 9). In the case of the low uptake of MMR vaccine in the UK, for example, it is now so long since there has been an epidemic of these diseases in Europe that even health workers are unfamiliar with them. It is therefore unsurprising that the interest of the public, here indeed society as a whole, has waned, and it is left for worried experts to try to generate a societal concern, a task which has been compounded by additional scares over alleged links with autism.

Societal concern type 10 occurs when different beliefs exist about how best to proceed. Within flood management, for example, there has been a gradual shift in preference over the years from hard, engineered defences towards the use of soft, more natural defences [31]. Although this change has occurred in part because of societal concern over the impact of engineering-style defences on the environment, it may be that new concerns will arise once the softer strategies are in place.

A further important, process-derived, cause of societal concern (type 11) may arise where particular safety interventions are introduced without due consideration of the possibility of risk transfers. As described by Graham and Wiener [32], risk interventions may simply shift an existing risk to some other group, may transform it into a different kind of risk altogether, or may increase risk through some unanticipated behavioural response or other mechanism. Thus, the provision of well-marked road crossings may invite some pedestrians to cross without looking both ways, and medicine bottles with 'child-safe' caps may encourage parents to leave those bottles nearer to a child's hands or, even, not to lock the medicine cabinet at all.

The final category of societal concern listed in Table 1 (type 12) is denoted as stakeholder-derived, implying the existence of some kind of self-interest. As observed by Rayner, self-interest is a critical motivator for some groups [33]. It may also play a subsidiary role in many other categories. The phenomenon is widespread and can be deliberate or unintentional, altruistic or self-seeking, sensible or misguided. Promoters of this kind of societal concern range from individual single-issue campaigners, to corporations and of course governments and governmental organisations. Motivations range from passionate beliefs about safety, health or 'nature,' to aspirations of gaining a commercial or publicity advantage, or professional and political self-interest. In some cases perpetrators may not be aware of their role in creating the concern, believing merely that they are doing their normal professional job. Although type 12 is the last type of societal concern listed in Table 1, it is probably the most pervasive.

Although we believe the characterisation in Table 1 is useful in pointing out the disparate causes of societal concerns, which is our primary interest, it suffers from an obvious shortcoming which is that individual societal concerns do not readily map on a one-to-one basis onto the listed categories. Indeed, and as the right hand column indicates, any given societal concern may well originate from a mix of these causes. It may also be a matter of opinion which is the most important. It is necessary to bear in mind, however, that what is being dealt with here are ideas, not engineered objects or cans on supermarket shelves. Ideas have fluid boundaries and necessarily carry with them boundary problems. The work of Paul Slovic, for example, on the perception of risk, shows that a rather large number of qualitative characteristics of risk influence public perception, yet that while informative, many of these characteristics are statistically interrelated [25]. Likewise, Collins and Evans, in their analysis of expertise, conclude that although the classification of expertise is fraught with boundary problems, this seeming imperfection of science should not automatically lead to paralysis [34]. Indeed, if one accepts the central tenets of Cultural Theory [33,35], and hence the existence of several discrete and legitimate worldviews, it

is unavoidable that differences of opinion will exist over how individual societal concerns map out onto any set of descriptors.

However, the point of our listing of motivations is to identify the diverse underpinnings of societal concerns and the fact that many bear little relationship to the actual associated hazard and its risk. Few fit the rationalist vision of being about quantified risk. More are associated with complex peripheral implications of hazards or their management, with expectation of commercial or political benefit, with ethical concerns, or with beliefs about how things should be done. Yet others arise because of procedural issues. Most pervasive of these, perhaps, are those that are associated with some form of self-interest: financial, personal, professional, institutional, political or commercial. It follows that the choice about if and how to incorporate societal concerns into risk management decisions should, therefore, be made only after a careful political analysis of stakeholder claims, with the response depending upon the type of societal concern identified.

3. Further reflection

In its first major report the UK's Better Regulation Commission (BRC) identifies a growing disquiet about the management of risk in UK society and what is seen by many as a rising tide of regulation, exacerbated by periodic inappropriate responses to 'risks of the day' [36]. Our investigation of the provenance of societal concerns leaves us uneasy that it is a contributory factor to this tendency via its potential for leverage on decision making through its ambiguity and vulnerability to exploitation. As described by Löfstedt in the case of Brent Spar and other well-known incidents [37], or as in the issues of gas supply mains and railway safety as raised at the 2001 HSC/PSI conference, or as in the many examples cited by the BRC [36], it cannot be ruled out that societal concern is oftentimes something that the politically minded presume to exist when seeking legitimation for some action they favour. Much also is today justified on the grounds of casual references to 'safety', 'environmental health,' 'sustainability' or 'precaution', when the meaning of these terms is equally vague and subject to manipulation. Sandin, for instance, has conducted a revealing analysis of the precautionary principle which demonstrates how it can be configured to mean all things to all men [38]. The existence of societal concern surrounding matters such as these is indeed an issue the risk manager cannot dismiss, but the legitimacy of a concern cannot be assumed merely on the basis of a claim, even one appealing to the high moral ground. Claims need analysis, irrespective of whether the advocate is a prime minister, senior civil servant, industrialist, CEO, or Greenpeace. Responding to concerns may involve rather little in some cases, in which situations it may not matter, but it could also entail significant changes affecting taxation, transport systems, energy costs or individual freedom, and as such the culture and well-being of an existing way of life. Thus, as a first stage in the review of alleged cases of 'societal concern,' we strongly recommend that an analysis is made of the interests, including beliefs and political tactics, adopted by those who claim to speak in the name of the public, society or even future generations.

In particular, we note that the term is used when NGOs, especially environmental ones but also those dealing in public safety, demand state action against economic actors in the name of nature, climate, or accident prevention. A particular target of these groups has tended to be what is loosely called the corporate sector, the wealth-creating sector, hence the 'revolutionary' or leftwing tendency among those seeking more and stricter regulation in order, allegedly, to address the concern. The danger is of course that in reality a backward looking, risk-averse society is gradually encouraged [11,39]. In logic, however, society should include the concerns of businesses or even bureaucracies and people like nurses and teachers and other state employees that tend to excluded from the ambit of this term. In practice, though, the term tends to be applied to anything in the pubic arena that displeases those claiming to speak in the name of 'the planet,' or the 'public.' We conclude that the term 'societal concern' cannot but be a difficult one, the meaning of which remains blurred and which requires a tactical rather than a technical response in most cases.

This same difficulty has of course been noted by academia which, over the last three decades, has sought to tackle the related problem of differential risk perceptions by trying to explain and then bridge the gap between priorities based on concerns and those described as evidence-based. Amongst these efforts the psychometric studies of Slovic [6], the work of cultural theorists [17,40], and many other sociological analyses [4] are notable. Also, from economics has come the notion of contingent valuation as a means of identifying weighting factors which might, by their insertion into risk decisions, somehow accommodate these societal concerns [16,41], and from decision analysis the notion of decision models which might be used in an analytical and systematic sense to identify some role for societal concerns in prioritisation [9,42].

Lately, though, participative approaches to decision making are most in vogue as a means of resolving these dilemmas. These involve stakeholders in decision making processes, thereby presumably addressing societal concerns [43]. In this world, openness, transparency, participation and deliberation are the fashionable terms. Overall this is a trend which was largely forecast in 1995 by Fischhoff [44] (see Table 2), and which has been supported by cogent advice from many commentators. Shrader-Frechette argues, for example, that "objectivity requires simply the possibility of intelligible debate over the merits of rival paradigms", and talks in terms of a "procedural rationality" [45], while others speak of the remedy lying in communication processes that promote practical discourses about the integration of public values into joint decision making efforts, processes built upon intensive dialogue and mutual social learning [46]. Should such processes be achievable, they might of course help satisfy three important goals: drawing upon the widest possible sources of knowledge and expertise; ensuring that the concerns and values of all those affected are part of the process; and making resulting decisions more palatable and thereby implementable [47].

Appealing though this appears the difficulties and counter-risks should not be underestimated. For example, one is not only confronted with issues of practicality, but also those of

Table 2
Developmental stages in risk decision making [44]

- All we have to do is get the numbers right
- All we have to do is tell them the numbers
- All we have to do is explain what we mean by the numbers
- All we have to do is show them that they have accepted similar risks in the past
- All we have to do is show them that it is a good deal for them
- All we have to do is treat them nicely
- All we have to do is make them partners
- All we have to do is all the above

cost and power differentials [48,49]. These tend to undermine attempts at 'communication' and the result could be a subversion rather than enhancement of democratic processes if proper safeguards are not in place. Another important and unresolved difficulty revolves around the incorporation of scientific knowledge. As Collins and Evans put it, this perceived need to extend the domain of technical decision making beyond the technically qualified Õlite so as to enhance political legitimacy has replaced the original predicament with the 'Problem of Extension,' that is, a tendency to dissolve the boundary between experts and the public so that there are no longer any grounds for limiting the indefinite extension of technical decision making rights [34]. Pioneers of deliberative decision making were well aware of this problem and champion the need to maintain and even strengthen technical input to major policy decisions [45,47,50], since it focuses on observed rather than perceived effects, e.g. on health or risk of damage based on empirical evidence, and gives some assurance of a balanced treatment of the risks and benefits under consideration. Referring back to Fischhoff's Table 2, it can be seen that this continuing requirement for high quality analytic input to policy decisions is also implied by the last entry 'All we have to do is all of the above.' However, the reality of what is happening may be less straightforward.

A struggle has existed between supporters of rational approaches to decision making and those decrying science and rationalism since The Enlightenment [4]. One manifestation is in the contest between those advocating the use of the analytic techniques of science and economics, and those who see science's objectivity as just another myth, such that "science no longer holds any absolute truths" [51]. In extremis, the latter leads to the relativist perspective that "all views should be given equal credence as subjective representations of alternative realities" [52].

Thus, for those with relativist tendencies, the Fischhoff history departs at its penultimate line ('All we have to do is make them partners'), providing an opportunity for a new kind of expert – one skilled in facilitation – to take centre stage. These new experts then have control over the process and in particular the quantity and quality of technical input. The balance then, between technical input and public input may lie anywhere along a spectrum ranging from, as Shrader-Frechette describes it, naïve positivism to cultural relativism [45].

This contest over decisions involving societal concerns is no illusion. In the context of genetically modified crops, Tait has observed that "The two paradigms (analytic versus relativist) . . . one inspired by Enlightenment thinking, represent . . . polar opposites . . .. With a few notable exceptions, each would acknowledge a role for the other, but such accommodation is often cosmetic and conceals deep-seated differences in interpretation of language and concepts related to the interests, values and disciplinary frameworks of the protagonists" [53]. Thus, where relativism has established a foothold, there are some who would knowingly weaken the role of analytical inputs to decisions. A similar threat to rationality has been reported in the context of Britain's legacy of nuclear waste, an issue invoking substantial societal concerns but one also demanding, in view of the colossal health and welfare implications, nothing less than the best technical input [54]. Indeed, the proliferation of concern in Britain over the perceived threat to rational decision making is now being spearheaded, not just by agencies such as the Better Regulation Commission [36], but also by many leading social scientists [34,49,55,56].

4. Concluding remarks

For a number of reasons we conclude that risk managers who have to engage with societal concerns should be very wary. First, we observe that although there is a tendency to associate societal concerns, and risk contests in general, with the public, who have thus been the focus of much academic research, the case is that risk conflicts are common among and originate from all sectors of society. In particular they are stimulated by the disparate motivations of organised groups, owing as much to political, commercial, social and professional self-interests and beliefs as the wishes of the public. Thus, to fully comprehend the meaning and significance of societal concerns, it is necessary to scrutinize them with great care.

Second, decision makers need to be constantly aware that loading societal concerns onto risk decisions is not necessarily synonymous with addressing the interests of the wider constituency. Departures from 'rational' decision making, for whatever reason, shift the spotlight away from maximising other commodities such as health, safety and welfare and, as Elvik has noted in the case of road safety [57], raises as many ethical issues as it seeks to address, a concern expressed many years ago by Lichtenstein et al. [58], who spoke out against the use of risk-averse utility functions by societal decision makers.

Third, although there is incontrovertible evidence in support of the view that policies based entirely on scientific evidence

are seen as an inadequate response and are unlikely to gain public support, so also is there an emergent view that policies responding to lay-people's perceptions of risk tend towards over-regulation and ultimately an over-accumulation of risk management activities [36,59]. Concern about a proliferation of disproportionate risk management activities has prompted the Health and Safety Executive to issue a statement on those risk management objectives which it sees as sensible, and those which it does not [60]. Interestingly, there is an inference that this concern is also shared by the peoples of Europe. A recent Eurobarometer survey [61] discovered, in answer to the question: 'Should science and technology decision making be based on the advice of experts about the risks and benefits involved or the views of the general public?', found across the 25 Member States a three to one preference for the former, along with a preference for decisions to be based upon an analysis of risks and benefits.

Finally, although academic models describing a pluralist society permeated by different values, worldviews and aspirations, point perhaps inexorably to the need for more inclusive discourse over values and beliefs particularly when addressing issues of societal concern, it should not be overlooked that even though the processes by which such issues are incorporated into decision processes are still experimental and very few have been subject to rigorous evaluation [62], this has not prevented their naïve application to issues of major societal consequence such as the disposal of nuclear waste [54] and global warming. There is grave danger lurking here, for in some sectors, even of academia, the drive to incorporate a value-based element into decision making over societal concerns actually runs very deep. The sometimes-hidden agenda is to replace science, economics and all aspects of rational decision making with processes anchored solely in public consultation and deliberation, with rational elements having at most a secondary and minor role [49,55]. This relativist approach, as observed by Shrader-Frechette [45], is reminiscent of a society pleading for policy-making based solely on expertise, intuition and wisdom, or on 'open discourse,' to the exclusion of what can also be learnt from quantitative risk assessment and cost-benefit analysis and hence of "a starving man pleading that only steak will satisfy him." As Löfstedt has said, while acknowledging that his view is contrary to current popular and political opinion, "dialogue risk communication and stakeholder involvement in the policy-making process is not the be-all and end-all of risk management" [37]. We support both propositions.

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