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**A New Deal in the governance of climate change:
The Delphi Technique and Deliberation.**

ABSTRACT

In spite of wide-spread consensus on anthropogenic climate change, some contend that publications such as Stern's Economics of Climate Change (2006) and the Intergovernmental Panel on Climate Change Fourth Assessment Report (2007) presented a 'seemingly' consensual view, masking uncertainties and nuances expressed qualitatively amongst experts that feed into such bodies of evidence. Thus policy consensus should go beyond scientific consensus; taking into account wider considerations before legitimate decisions can be formulated. Increasingly, literature has begun to recognise that the Delphi technique is one vehicle by which this capturing of views and deliberation can take place. This is a novel application of the technique; originally developed to bring disparate and remote experts to a consensual position. This paper explores whether there is a role for Delphi in the advancement of opportunities in the governance of climate change. Five experts who had previously participated in a Delphi study conducted by the author in 2007 were interviewed through in-depth semi structured telephone interviews. The research demonstrates that consensus was not deemed necessary for the successful governance of climate change; rather drawing upon the diversity of views and opinions, actively engaging with participants so that iterative rounds can focus on agreed areas was paramount. The results go somewhat in suggesting that Delphi is one tool that can help reflect the wider picture for decision makers in gathering views and communicating with stakeholders, as opposed to solely relying on narrow means-end evidence, hitherto provided by natural scientists in a neoliberal framework of governance.

Introduction

In spite of wide-spread consensus on anthropogenic climate change, confirmed by high profile publications such as Stern's *Economics of Climate Change* (2006) and the Intergovernmental Panel on Climate Change Fourth Assessment Report (2007), some contend that such publications have stoked the fire of controversy as opposed to encouraging consensus¹ (Oppenheimer, O'Neill et al. 2007; Yohe, Tol et al. 2007). These contenders suggest that the summarised information provided to decision makers seemingly presents a consensual view, masking uncertainties and nuances expressed qualitatively that exist amongst the 'experts' that feed into this body of evidence.

This situation has been driven by a demand for evidence based policy, for which there is an apparent preference for pure scientific evidence. This is typically focussed on as a means-end outcome given the, hitherto, neoliberal emphasis in the governance of developed countries. However there is a growing concern that pure scientific evidence isn't sufficient in itself to provide solid foundations, given the varied and unpredictable nature of many environmental issues: "the expectations of policy for scientific knowledge based on empirical evidence are often unrealistic, because many environmental issues raise scientific questions for which empirical evidence is weak" (Wallington and Moore 2005).

Although certainty is desirable for decision makers, often, reducing uncertainty is the only feasible alternative given the imperfect information available (Webler, Levine et al. 1991). Documented anthropogenic increases in carbon dioxide are unprecedented; rendering traditional scientific methods of extrapolative forecasting for climate change inappropriate since "any such numerical extension necessarily assumes that the future process will be governed by the same mechanisms that have controlled past events" (Commoner 1978: 606). Thus, there exists a high degree of uncertainty in terms of predicting what the future climate will actually be like, and how this should presently be dealt with through policy measures (Heal and Kristrom 2002; Grundmann 2007). It has been noted that uncertainty cannot be eradicated simply by more scientific inquiry and that policies therefore have to be guided by other influences: "social priorities for what issues to value and what questions to ask influence how we make

¹ Consensus is by definition unanimous agreement not just on a course of action, but also on the reasons for it.

policy about environmental risks under conditions of uncertainty” (DeSombre 2002: 70).

Furthermore, the current economic crisis raises questions about short termist approaches to governance. One questions whether, hitherto, the evidence has been considered inconclusive; culminating in decisions that fail to protect the intergenerational health of the environment in favour of short-sighted policies that typically favour economic growth. In addition, Biermann (2007) notes that spatial and temporal dilemmas posed by environmental governance raise questions for the legitimacy of state action, in that drastic measures imposed today will mainly benefit countries beyond that state’s borders or future generations.

Added to these dilemmas, in a survey assessing disparate expert opinion on estimated climate damages, a striking cultural divide has been discovered between natural and social scientists. Natural scientists (those with first hand understanding of the true extent to potential changes in the climate) estimated the extreme impacts of climate change to be far greater than that anticipated by social scientists (Nordhaus 1994). It is evident that these views amongst influential stakeholders need to be reconciled before any significant progression can be made in the governance of climate change:

Qualitative tools designed to help map stakeholder response can lead to stakeholders accepting diversity and respecting differences in perception. This is the beginning of the trust building process that is the key to the development of shared values – a point well recognised in the extensive literature on social capital. (Benn, Dunphy et al. 2008)

Inaction is no longer an option however, and the urgency for building trust and consensus is ever increasing (Innes 2004). Consensus-building is a key dimension in social systems adapting to and mitigating the effects of climate change (Tamura 2008). Social systems are just one pillar, alongside ecological and economic systems, that are central to the process of sustainable development (Mebratu 1998). Both social and ecological systems are complex, and therefore often resistant to radical change or counterintuitive in their behaviour, since they represent numerous interrelationships (Linstone and Turoff 1975, p.317).

A bridge of trust over a cultural divide?

Thus, it is claimed that policy consensus should go beyond scientific consensus (Wilenius and Tirkkonen 1997); taking into account wider considerations before legitimate decisions can be formulated – in particular if striving for a paradigm shift or a ‘new green deal’. It has been argued that a new mindset about approaches to consensus, facilitated by transparent and democratic deliberative methods, must be heralded in “recognition that environmental crises are interconnected with crises in human relations and decision-making” (Benn, Dunphy et al. 2008). This is not a new concept where climate change is concerned: guidance on cross-cutting issues presented by the IPCC Third Assessment Review (TAR), as far back as 2000, encouraged multi-stakeholder interaction in the implementation of adaptation and mitigation measures:

The TAR will be more useful as a practical guide for decision makers if it is able to assess the viewpoints of not only governments but also civil society, business, NGOs and other stakeholders. In matters affecting the implementation of adaptation and mitigation measures, institutional and governance issues will be crucial. (Munasinghe 2000: 85)

Climate change has multiple facets, and therefore multiple stakeholder dialogue is especially important given the current disparities in knowledge. Collating and communicating views will not be a solution in itself for the huge challenges presented by climate change; however, it will establish the necessary foundations from which robust and decisive governance can emanate.

The Delphi technique is one vehicle by which this capturing of views and deliberation can take place (Wilenius and Tirkkonen 1997; Benn, Dunphy et al. 2008). Delphi can be defined as “a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem” (Linstone and Turoff 1975:3). Makridakis and Wheelwright (1989) define Delphi as a technological forecasting technique which addresses long-term issues of a technological, societal, economic, or political nature. Delphi has also been presented as a planning tool (Delbecq, Van de Ven et al. 1975) and as a tool to evaluate policy options (Truroff 1975).

Delphi, interchangeably referred to in the literature as both a technique and a method, has three defining features: the respondents are experts in the subject area, there is more than one round, making it an iterative process, and there is controlled feedback

provided to the respondents in between rounds (Armstrong 1985:117). The input is typically subjective and does not depend on a statistically correct sample; instead it draws on the insight and experience of willing experts. Delphi can be useful in exploring the majority view from a number of diverse experts whose views would not otherwise be combined; linking back to suggestions (Wilenius and Tirkkonen 1997; Benn, Dunphy et al. 2008; Tamura 2008) that this method could usefully bridge the identified gap between scientific knowledge and social systems through endeavouring to build consensus and improving communication for the governance of climate change. This is a novel application of the technique; originally developed to reduce the impact of powerful personalities on other participants in bringing disparate and remote experts to a consensual position. Table 1 presents key features of the Delphi technique that lend themselves to the problems presented in the pursuit of the governance of Climate Change:

Table 1: The Delphi Method and Climate Change

| Delphi features | Climate Change |
|---|--|
| The problem does not lend itself to precise analytical techniques | Anthropogenic climate change and especially its social impacts have hitherto been difficult to analyse with analytic models because of the many uncertainties involved |
| Subjective judgements can contribute to the collective solving of the problem | The understanding of global problems, such as climate change and the formulation of policy options, require interaction between individuals and institutions |
| The problem is extensive, complex and/or interdisciplinary (experts have different training and there are problems finding a common language) | Climate change is a complex interdisciplinary problem and it is difficult to find common procedures and modes of action for its management |
| It is difficult to bring together a large group of experts, in which case the Delphi can be used as a tool for accomplishing this objective | The use of an intermediary may help in bringing together a broad range of specialised expert information on climate change |
| The participants should remain anonymous and domination by the majority or by powerful personalities is to be avoided | Climate change, and climate policy in particular, involve powerful interests and conflicts which the anonymity principle may help to clarify |

(Adapted from Wilenius and Tirkkonen 1997)

Sackman's in-depth critique of the Delphi technique (1975) sparked much debate. In their chapter evaluating technological forecasting, Makridakis and Wheelwright (1989:304) suggest that the pros and cons of other forecasting methods besides the Delphi Method are "little understood and talked about even less". This is not to say that the method has been discredited, rather that such scrutiny may have increased its validity, providing a richer understanding of its advantages and disadvantages over

other available methods. Skodvin (2000) warns that often, the means by which consensual knowledge is developed remains tacit - shrouded in the supposition that scientific consensus will implicitly equate to consensus on policy goals. She asserts therefore that processes used in the development of consensus should be subject to critical analysis in order to lend legitimacy to the outcome; such a critique of how consensus is developed is critical if policy measures regarding climate change are to be successfully implemented.

Seeking consensus has historically been seen to form a major part of the Delphi method, which was designed in the first instance to overcome the difficulties found with traditional forms of consensus through face-to-face round-table discussions (Helmer 1968: 120). Within Delphi, consensus is sought by feeding back a synopsis of the results after each round to respondents, asking those who give an answer outside of the mean response bracket to either change their forecast estimation, or to provide justification for their stance in between rounds. Following feedback, experts can change their estimation, gravitating towards the mean, so that in subsequent rounds there is more consensus of opinion on forecast estimates. Others stick their ground, sometimes providing a written justification for their unique thoughts to the researcher, which has either resulted in sustained divergence of opinion (a disensus position), or which has persuaded other experts in the panel to change their stance once this is fed back anonymously with the results – often referred to as *holdouts* (those who stick) and *swingers* (those who change) (Dalkey, Rourke et al. 1972: 32).

There has been much debate about the consensus generated by Delphi studies, in that it can appear to be forced or artificial, glossing over the finer nuances represented to create a one-size-fits-all consensus. There have been several suggestions of how consensus is signalled in Delphi processes, usually determined through the statistical measurement of variance in responses across rounds (Hanafin 2004) though there are no firm rules (Powell 2003). Some propose a natural signal for appropriate closure for the iteration of the research could be once judgements do not change after subsequent iterative rounds; representing the consensual position by a final median (Sniezek 1989). However most studies typically set a limit of two or three rounds (Scheibe, Skutsch et al. 1975) regardless of the outcomes. Increasingly, literature surrounding Delphi has begun to recognise that it has value in providing a true reflection of the

diversity in participant views. Murphy et al. (1998, cited in Powell 2003) note that divergence and dissent among experts can often provide valuable insights and findings, as opposed to areas of convergence alone. Linstone and Turoff (1975:6) suggest that ignoring and not exploring disagreements may result in the failure of a Delphi resulting in a generation of an artificial consensus, since drop outs may be dissenters who have lost interest in the process.

This is paralleled by the burgeoning Deliberative Democracy literature (Pellizzoni 2001; Dryzek 2002; Heysse 2006; Kerkhof 2006; Benn, Dunphy et al. 2008), suggesting that a veritable democracy should reflect engagement, deliberation and communication between actors (Dryzek 2002). This paper seeks to explore, from the point of view of former Delphi participants, whether this could suggest a role for Delphi in the governance of climate change.

Methodology

The empirical findings of this paper emanate from five in-depth semi structured telephone interviews with former Delphi panel members. This initial Delphi panel was carried out whilst the researcher was on secondment to the Future Foundation, a London based consumer think-tank, conducting research into consumer attitudes towards climate change from July – October 2007. Here, the researcher conducted a three-round Delphi process (results currently unpublished), which focussed on expert views of the future of consumption in the areas of: Communications, Food, Housing & Construction, Financial Services, Relevant Policy Areas, Transport, Leisure & Tourism, Appliances, Other household goods, and General Areas. The aim was to forecast the likelihood of various scenarios in these categories occurring by two points into the future: 2012 and 2022. This was conducted with a heterogeneous panel of experts; representing fields from retail to consumer behaviour to corporate social responsibility (CSR) and climate change. The process was hosted on-line and participants were asked to give their details if they consented to taking part in follow up-research.

This experience provided the opportunity to build on suggestions identified in the literature that the Delphi technique can be a useful deliberative democracy tool, exploring this from the ‘expert participant’ perspective with a particular focus on the governance of climate change. Furthermore, it provided the pool of potential

participants for the empirical research conducted here, thus 17 out of the original 33 participants who had previously agreed to participate in follow-up research were invited to participate, with five out of the 17 agreeing, yielding a 29.4% response rate. Therefore, the research objective sought to understand participant reflections on the role and importance of consensus in the governance of climate change and whether the Delphi technique could thus be a contributory tool.

“If one believes it is vital to investigate attitudes then questioning will seem more suitable than observation” (Titscher, Meyer et al. 2000:6), signifying that interviews would be an appropriate method to gain an insight into respondents’ perceptions on consensus in climate change. Interviews were therefore used to collect respondent’s thoughts specifically on the Delphi methodology itself in relation to climate change research, as well as views on whether they perceived consensus as an integral component in forecasting how climate change may impact consumer societies.

Five semi-structured telephone interviews were conducted from October 13th 2008 – October 20th 2008. The number of questions asked in each interview ranged from 17 – 23 depending on how much the interviewer needed to probe further for quality data. Typically, interviews would last between 30 - 40 minutes, which is within Robson’s suggested reasonable time bracket to generate meaningful interview material without making unreasonable demands on participants’ time (Robson 1995:229). These could be described as follow-up interviews, as seen, for example in Nordhaus’ study (1994) – although the ten month gap between the end of the Delphi study (January ’08) and the follow up interview (October ’08) meant that, for those whose only exposure to Delphi was their experience with the Consumers and Climate Change project, some respondents did not easily remember the original process.

As for the respondents, three were established and well respected academics, working in fields of sustainable tourism, consumer behaviour and climate change. The remaining two were industry contacts, one the head of CSR of a large and well established UK pharmaceutical, health and beauty retailer, and the other with long-term experience of working with a manufacturer of leading brands in foods, home care and personal care (although this participant had strong connections with Cambridge University’s Programme for Industry, and was consequently quite academic in her responses).

Therefore, there was a disparate range of expertise across participants, and interview quality varied with the respondent's ability to recall their original participation in and reflections on the Delphi research process.

There was a distinct difference in the ways that the head of CSR reflected on the issues compared with the other respondents. His responses reflected more on the decreasing concern for the environment in light of the heightened economic crisis, suggesting that the economy was now front of mind for people working in his organisation. Furthermore, his views on consensus were somewhat ambivalent; suggesting that consensus already wholly existed on climate change, in Europe particularly, recognising that there were some powerful anti-climate change lobbies in America trying to disprove this consensus. Other respondents were more aware of the general debates regarding consensus and climate change, and were also aware of the uncertainties surrounding projections made by extrapolative forecasts that might impact the integrity of decisions on its governance.

As set out in Table 2, they will be referred to as R1 – R5 in discussing the results to preserve their anonymity, which was assured as part of adherence to ethical guidelines.

Table 2: Interview respondents & area of expertise (in interview order)

| Respondent number: | Expertise: |
|---------------------------|--|
| R1: Industry/Academic | Manufacturer of leading brands in foods, home care and personal care & Cambridge University Programme for Industry |
| R2: Academic | Consumer behaviour, social scientist |
| R3: Academic | Climate change, natural scientist (has tried once, unsuccessfully, to conduct a Delphi) |
| R4: Head of CSR | UK pharmaceutical, health and beauty retailer |
| R5: Academic | Sustainable tourism, social scientist (has previously successfully conducted a Delphi) |

Grounded theory (GT) was the adopted strategy for data collection and analysis (Glaser and Strauss 1967; Charmaz 2006). The basic tenets of GT are that themes, codes and theories are developed and grounded within the data collected. In turn, the decision on the data analysis methods will often be constrained by the subject under study, the research objective guiding it, the type of data gathered, and how that data is subsequently recorded; for example depending whether data is fully recorded or

transcribed with notes and memos including body language will determine whether this can be used in the analysis.

In this case, the researcher recorded the dialogue of the telephone interviews solely for the purpose of transcribing them, which would ultimately facilitate data analysis. They were recorded using '*Call Burner*' software which records the call from *Skype*, and provides the caller with three saved files in MP3 format: a copy of the whole phone call, a copy of the recipients' voice file as well as a copy of the callers voice file which were saved onto a password secured network drive. The researcher was also responsible for transcribing each interview, using voice recognition software; listening to and repeating the dialogue of the recorded interview into a microphone plugged into the computer to maximise the speed of transcription. Each interview had to be listened to three times so that mistakes could be corrected before an accurate transcription was proofread and generated. This also offered an opportunity for the researcher to review and gain heightened reflexivity on the topics discussed, becoming more familiar with the interview dialogues and reaffirming thoughts on some categories that were clearly emanating from the interviews. The completed transcripts were emailed back to interviewees so that they could verify that they were happy with the content to be used in the research.

Analysis & Findings

Strauss and Corbin (1998) propose three types of coding: open coding, axial coding and selective coding – sometimes referred to as Strauss' coding paradigm (Titscher, Meyer et al. 2000: 78). The analysis was thus initially guided by open coding, where the researcher read through each interview transcription and paraphrased noticeable concepts arising from respondents' answers. Subsequently, the researcher regrouped the open codes into common themes so that a range of understanding about key phenomena could be generated. These themes were:

- Expert, expertise or characteristics
- Consensus and Disensus
- Experience and design of process
- Climate Change and Sustainability

Working along the axes and content of these codes, as per the suggestion by Strauss and Corbin (Strauss and Corbin 1998), it emerged that there was a clear hinging of the

concepts out of the data analysis around the debate on the legitimacy of consensus and disensus in the context of the Delphi technique. Legitimacy had links with the expertise of participants within a Delphi study, the outcome of both consensus and disensus, the process and study design, and also linked strongly with issues surrounding the governance of climate change. This aspect of consensus, with legitimacy at its core therefore became the core concept. The researcher then returned to the data, with a new heading of 'Legitimacy', bringing the relevant open codes under this heading, and the results will be presented along the thematic headings above, exploring how legitimacy impacts on each of these facets.

This refined the angle of the research for the results and discussion and prompted the researcher to return to the literature to read around issues of legitimacy in consensus and deliberation (Clark 2007), and to consider how the Delphi plays a role in this. This development required the researcher to reflect the link with legitimacy by slightly revising the overarching research objective; such are the advantages of a research approach framed by a grand tour question, so that new lines of enquiry are not immediately blocked off (Hussey and Hussey 1997:127).

R1 and R3 noted that, whilst political consensus is predominantly useful for legitimising decisions, they were wary of its pursuit solely for justifying legislation and regulation; rather there should be supplementary transparency and granularity in the presentation of this consensus so that better quality policy decisions were widely understood. R4 however felt that political consensus should be accepted on face-value in the belief that governments could be trusted to base their decisions on impartial evidence provided by established scientific experts. R5 also noted that demand for normative consensus is dependent on whether the target audience understands the debate:

...To explain something to the public or to politicians, which was the IPCC's goal, then the consensus is really important but if you're trying to explain the sophistication of a debate and that the audience is able to appreciate nuance and sophistications, I don't see it necessary to arrive at consensus.

- R5

However, this differs from the views expressed in the deliberative democracy literature. Kerkhof (2006) notes that the complexity of environmental problems poses a challenge not just for governments but for science, policy and society; and that the involvement of

society in developing a consensual position is paramount to increase awareness and support for policy measures whilst simultaneously enhancing the legitimacy of decisions.

Discussion

- Delphi and building consensus or expressing disensus

The complexity and practicalities of gathering the views of society is inescapably difficult, not to mention costly and time consuming. Nonetheless, the UK Government recognised the need to improve its code of conduct on public consultations, indicative by its ‘Government Consultation Policy Review’² launched June 2007. However, in the government response to this (Better Regulation Executive 2007), only 8% who participated were classed as ‘citizens’³, perhaps suggesting that apathy exists amongst society on policy development issues. This is a fragile situation; after all, the concept of democracy would be undermined if people were forced to participate. However if no preventative action is taken on climate change when the window of opportunity is open to do so, then this may leave no option but to ultimately force the hand of political consensus to impose solutions in the longer term. However, if people or key stakeholders were specifically invited to participate in a deliberative process, this could potentially assuage their apathy and encourage them to put their views forward. Therein lies the potential of the Delphi technique.

Increasingly, Delphi is being identified as an emergent tool for communication across disparate groups in assessing the extent of disensus (Wilenius and Tirkkonen 1997; Benn, Dunphy et al. 2008), as opposed to enforcing consensus on the outcome by aggregating forecasts into one mean response. The majority of respondents also felt that it was an appropriate tool for gathering views and opinions – reflecting a preference to embrace disensus as opposed to forcing consensus, similar to the views of Nelms and Porter (1985). R5 suggested that consensus could be a possible outcome of a Delphi,

² See: <http://www.justice.gov.uk/news/announcement150607.htm> accessed 25/02/09

³ Breakdown of participants in Effective consultation Citizens 8%, Companies 5%, Experts/academics 4%, Professional Bodies 7%, Public Sector 19%, Third Sector 23%, Trade Associations 28%, Trade Unions 1%

but that this would be extant consensus that existed purely by chance independent of the Delphi process, most likely to be present amongst a homogenous group with a similar outlook:

It is all about the sampling, so if you've only sampled behavioural psychologists then you'll get more of a consensus which will be around changing behaviour, than if you'd sampled technology experts who will be more likely, I guess, to say that we are going to engineer our way out of this problem.

- R 5

Therefore, transparency in the sample used in the process and the development of the outcome is required for a deeper understanding of their innate ontology. However, as discussed in the literature, the engagement across different facets of society is key to the acceptance of, and willingness to cooperate with, policy measures for environmental governance (Munasinghe 2000; Swart 2000; Tamura 2008). It is debatable then whether, in adopting Delphi in gathering the views across multidisciplinary areas, there could be separate Delphis running concurrently for different groups of people. This would not reflect the actual diversity of society however in splitting the participation in this way, and it could produce distinct, potentially unrelated, outputs that may be difficult to reconcile. If combining different groups, the research suggests that it is important to offer contextual information on the purpose and vantage point of the study to participants, so that there is a shared understanding from the outset, as well as continued engagement in order to maximise the quality of the outcome, which supports a similar view proposed by Linstone (1975:561).

The analysis showed that, as discussed in the literature, the Delphi method is blighted by peripheral factors that can impair the quality of the outcome. Whilst some suggest that continued iteration will eventually lead to consensus (Sniezek 1989), this research identified that participants felt that too many rounds could jeopardise the legitimacy of the outcome due to increased attrition; suggesting that the final outcome basis could be based on too narrow a sample of participants and be unreflective of a broad range of views, that would hopefully have existed at the outset. Respondents therefore agreed that two or three rounds was sufficient, concurrent with the findings of Scheibe et al. (1975). Furthermore, it goes against the ethical principles of research (ESRC 2007), as well as the concept of democracy, to compel participation throughout the process. R1 suggested that transparency in those that have contributed is therefore important for improved interpretation of the final outcome, if different when compared to those at the

outset of the process. Therefore, if the researcher can capture the reason participants drop out (one option would be by means of an 'exit' survey); this may alert the researcher to any shortcomings with the a priori design or approach, and help support in the presentation or interpretation of results.

This research suggests therefore that the Delphi technique is an appropriate tool for gathering the plural views of society and key stakeholders, providing that the planning process and inter-round feedback is transparent; reflecting the range of views and where different majorities lie.

- Delphi and the governance of climate change

Wilenius and Tirkkonen (1997) demonstrated that the features of Delphi lend themselves well to supporting the governance of climate change. Why there has not been an increase in take up on the use of this tool in this field in the intervening 12 years is undocumented, although the research uncovered subtle links with the disparities identified in the literature between natural and social scientists (Nordhaus 1994). R5 had unique insight having successfully orchestrated a Delphi process on the topic of sustainable tourism at PhD level. He noted a paradigm difference between traditional forms of climate change research, and suggested that the relative infancy of social science research in this area could suggest that the potential of adopting a Delphi has, until now, been overlooked. The other respondents were less familiar with the Delphi technique in its applicability for climate change governance; however, the majority of respondents suggested that the use of scenarios were important for deliberating the legitimate governance of climate change.

The Delphi has an inherent flexibility in allowing respondents to participate in the design phase; empowering respondents to contribute to the baseline from which deliberations begin, as well as the overall design; affirming Mullen's (2003) view that the flexibility of the Delphi is a key strength of the method. The research highlighted that such engagement with respondents in the early stages could increase knowledge sharing, trust and understanding across disparate groups – a view upheld by the literature on social capital (Benn, Dunphy et al. 2008).

In relation to the research objective of understanding participant views, it was difficult to observe any clear trends in the data on whether the Delphi is an appropriate tool in the governance of climate change, since the majority had only limited experience with the method, which suggests further research could contribute to deeper exploration of this. Nevertheless, the data doesn't discount the Delphi technique as an appropriate tool either with one respondent, highly experienced with the Delphi technique, clearly vociferous in supporting the literature that presents the method as effective in collecting multiple views on the means for the governance of climate change (see for example, Wilenius and Tirkkonen 1997; Benn, Dunphy et al. 2008).

Implications for policy and future research

This study provides salient findings for current and future research on gathering evidence for policy and the improved governance of climate change in light of continued ecological and environmental crises. In particular, it suggests that decision makers must highlight the legitimacy of any decisions made with transparent processes, reaching out across diverse facets of society as opposed to solely relying on the narrow evidence, hitherto provided by natural scientists. Policy making bodies, and businesses alike, are all searching for the best approach to solving the emergent problems posed by climate change, but it is important not to confuse such motion, by lamenting the potential catastrophe, with the progress in piecing together an effective response.

Deliberation in itself is not a panacea for the huge challenges posed by climate change. However in a recent presentation delivered by the Head of Sustainable Development in the European Commission's DG Research (Dewandre 2009), the need to bridge the gap between natural and social science, policy and strategy implementation was stressed; connecting these knowledge pools to empower people to act. These policy questions at EU level require wider involvement of civic society in order for the answers to be applicable.

This research suggests that the Delphi method can be a contributory tool for consultation on policy - meeting the growing demand for equity and deliberation in democracy (Swart 2000). In light of risks presented by climate change specifically, and the pressing need for action, Delphi can aid decision makers in bringing together representatives from across disparate stakeholder groups in gathering evidence of how

each participant proposes that identified policy-science-society bridges can be built by better understanding the gaps in knowledge. Furthermore, the research suggests that for a legitimate outcome, the findings should not be stifled by aggregating views into a seemingly consensual position, but to draw on the diversity of views and opinions, actively engaging with participants so that the iterative rounds can focus the attention on agreed key areas.

With awareness of the principal research limitations of time, word count and financial resources; it is acknowledged that nature of the data gathered in the course of this research is primarily investigative; offering different insights into using Delphi as a tool in the governance of climate change, as opposed to producing outcomes replete with grand theories, which would be imprecise at best with a pool of five participants. Again this strongly continues to link to the data that has been collected: “Given the grounded theorist’s dependence on data, one’s emerging theory is both enabled and constrained by the type and quality of data collected” (Seaman 2008). However, this does suggest that there may be room to develop the quality of the theory in future research that might not be faced with the same constraints.

Within the sphere of climate change governance, it seems there are plentiful opportunities for social science research in reducing the discord between policy, science, media and society (Weingart, Engels et al. 2000). Updating the research conducted by Nordhaus (1994) in identifying and measuring the gulf between natural and social scientists would contribute towards understanding the reasons for this discord. Future research could also extend, test and elaborate the applicability of the Delphi in collecting a variety of stakeholder views in the governance of climate change, as well as other complex, multidisciplinary areas. Opportunities also present themselves in undertaking a different approach to the methodology, for example perhaps a survey of respondents’ reflections may generate different, or more representative and generalisable insights for the researcher or policy maker to engage with. Alternatively, an Action Research strategy could be adopted to also go beyond arm’s length data collection and analysis; thus incorporating the implementation and monitoring of results.

Conclusion

This research demonstrated that consensus was not deemed necessary for the successful governance of climate change, although its uses are acknowledged in simplifying a message for a particular audience. Rather, the findings suggest that a legitimate outcome should not be stifled by forcing or aggregating views into a seemingly consensual position, but to draw on the diversity of views and opinions, actively engaging with participants so that the iterative rounds can focus the attention on agreed key areas. Thus, the research reinforced emerging literature that the Delphi technique is a useful tool in gathering a disparate range of views (Rowe, Wright et al. 2005), refuting its original purpose of arriving at a consensus (Helmer 1968). However, its advantage of removing the impacts of powerful personalities remains key; thus Delphi may be more successful than other face-to-face alternatives. In order to maximise the utility of the outcomes from a Delphi approach, there are issues associated with demonstrating legitimacy that may impair its outcomes if left unaddressed, though process transparency could help overcome these hurdles.

With regard to the applicability of Delphi in the governance of climate change, legitimacy issues surround the inclusion of a broad base of stakeholders – that is, beyond experts who undertake pure scientific research. The engagement and reflection on the process will empower these stakeholders to impart their position and beliefs in their answers more clearly. These answers should not be shoe-horned by the researcher into an apparent or shrouded consensus, despite political pressure to do so. Rather, the research demonstrated that there should be an acceptance of diversity, and this can be clearly reflected if participants have a degree of input into the overall design of the Delphi. In this way, participants will feel less constrained by undertaking a study which is framed by a collection of their views. It may also increase the feeling of engagement in the process, and thus reduce attrition; overcoming one of the criticisms suggesting that drop outs can threaten the legitimacy of the final Delphi output (Sackman 1975).

In moving forward on climate change governance, it is essential that there are a number of tools adopted so that a true reflection of society can be created and incorporated into robust policies. The Delphi in itself is not, and will never be, a panacea to the threats of climate change. The results go somewhat in suggesting that it is one tool that can help reflect the wider picture for decision makers in gathering views and communicating with stakeholders, as opposed to solely relying on narrow means-end evidence, hitherto

provided by natural scientists in a neoliberal framework of governance. In doing so systematically, and transparently; the legitimacy of any decisions taken will be bolstered, justifying a course of action which could otherwise come up against fierce resistance in the attempt to realise ambitious mitigation targets. This is particularly true in the governance of climate change, where to stimulate sufficient mitigation drastic changes in current engrained societal behaviours is likely. This ultimately may help in increasing trust in and knowledge of the reality of the pressing issues, and may result in a more successful approach in encouraging more pro-environmental behaviour across the board. The current economic crisis, whilst used by many to delay mitigation action, provides a clear opportunity for a departure from a 'business as usual' scenario to achieve a 'green new deal'.

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