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Peter J. Crowe

Auckland University of Technology, peter.crowe@aut.ac.nz

Terry Nolan

Auckland University of Technology, terry.nolan@aut.ac.nz

Richard Varey

The University of Waikato, rvarey@mngt.waikato.ac.nz

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Public Discourse as Information System: the Use of SSM to Facilitate 'Healthier' Stakeholder Discourse

Peter J Crowe, Terry Nolan
Department of Management
Auckland University of Technology
Auckland, New Zealand
Email: [peter.crowe, terry.nolan}@aut.ac.nz](mailto:{peter.crowe, terry.nolan}@aut.ac.nz)

Richard Varey
Waikato Management School
The University of Waikato
Hamilton, New Zealand
Email: rvarey@mngt.waikato.ac.nz

Abstract

This paper explores dialogue between the diverse stakeholders affected by the introduction of the BioFuels Sales Obligation policy in New Zealand. The research will use 'rich pictures' within the framework of Soft Systems Methodology (SSM) to evaluate the extent to which such abstract visualization might facilitate the communication of different viewpoints. It will examine whether the act of representation might encourage individuals, organizations and interest groups to reflect upon their beliefs and assumptions thereby contributing to a healthy discourse around the subject of New Zealand biofuels.

Keywords

Discourse, communication, participation, SSM, biofuels

Introduction

This paper describes an exploration of public discourse around the introduction of biofuels to New Zealand. It will examine whether the act of visual representation, in the form of 'rich pictures' and other schema composed during interviews, will uncover stakeholders' beliefs and assumptions thereby contributing to a healthy discourse around the topic. These visual representations form elements within the Soft Systems Methodology (SSM) framework (Checkland, 1999). The Greek word "aletheia" is adopted in this paper to describe the process of 'revealing' or 'unconcealing', in this case of the pre-suppositions lying beneath the discourse. The term, implying sincerity, actuality, and reality, is significant to this study since Heidegger reappropriated aletheia as a conception of truth emerging from visual representation as distinct to notions of correspondence or coherence embedded within the language of Western rationality (1993; 1996).

Background

In February 2007, the New Zealand government announced the introduction of a 'Biofuels Sales Obligation' requiring 3.4 per cent of fuel sold by oil companies to be biofuel by 2012. The obligation will be met by the sale of a mix of bio-diesel and bio-ethanol blended petrol. Biofuels are combustible materials produced from biomass in the form of alcohols, esters, ethers, and other chemicals (*Sustainable bioenergy: a framework for decision makers* 2007). As one element of biotechnology, the production of biofuels has developed in response to growing concerns regarding the unsustainable use of non-renewable resources for food and power. Increasing concerns over climate change have tended to expedite the commercialisation process; some say (Anslow 2007; Anthrop 2007; Boswell 2007; Zah & Hagmann 2007; among others) that by disregarding the overall environmental impact or 'footprint' caused by biofuels production the 'solution' may be more damaging than the 'problem' it was designed to improve. The claims for biofuels' environmental sustainability rest chiefly on how, and from what organic source, they are produced. Conflicting views are beginning to appear as the complexity of this issue becomes apparent. The UN for example, recently issued a report raising concerns over the environmental impact of developing biofuels. As well as expressing alarm over the impact of diverted food crops on poorer countries, the report argues that any reduction in emissions due to the production and use of biofuels could be more than counteracted by accompanying deforestation containing centuries of carbon (Vidal 2007).

So far public discourse in New Zealand has tended to focus on the beneficial aspects of introducing biofuels. The NZ government has been the main source of information on the subject with the Department of Trade & Industry (Flagler 2007) collating data and expert opinion from the Ministry for Economic Development, Ministry of Transport and Crown Research Institutes. The production of bio-ethanol and bio-diesel has been presented largely as a renewable fuel source that will reduce New Zealand's reliance on overseas oil producers and respond to its commitment under the Kyoto agreement to reduce carbon emissions. From a technical point of view meanwhile, pilot studies have proved successful with commercial transport companies reporting no significant difficulties in adapting their fleets.

The debate moved into the public domain with the publication of a special supplement within a national newspaper, in which local developments (Macfie 2007; Tindall 2007) were sited within the broader context of international media reports ('Europe's dilemma' 2007; Mukherjee 2007; Robison 2007). The newspaper section was set out as an adversarial debate around matters such as the accrual of economic and environmental benefit or detriment arising out of biofuels development. As such, the debate was dominated by positivist devices for forecasting and measuring technological development, underpinned by statistical evidence from either side.

If public discourse is viewed as an information system, then arguably its function is to gather and disseminate knowledge and understanding while preventing any body of knowledge from becoming solidified and/or reified. By empowering its representatives to make decisions that support the good of society, public discourse also validates the action subsequently instigated by those decisions. Thus a democratic society draws legitimate support from the ideal of unprivileged participation in such discourses. As Deetz states, "*Good decisions require appropriately distributed information, openness to alternative perspectives and reasoning based on personal insights and data rather than authority relations*" (1992, p. 178). In this respect, critical theory has much to contribute to how these discourses might be apprehended.

A quick meta-analysis of the discourses outlined above uncovers polarised claims and counter-claims to knowledge of a scientific 'truth' pertaining to the efficacy of this fuel source. It is interesting to note how the positivist epistemological approach, which seeks to explain a phenomenon in an objective, value-free manner can thus become so contradictory when issuing from different mouths. Accordingly, this paper proposes adopting interpretive/hermeneutic approaches to understand rather than explain these discourses. As the first line of this paragraph suggests, the scientific paradigm dominates the nature of the discourse thereby subjugating issues such as social values, identity or cultural representation, and hence systemically distorting decision-making and public consultation. Drawing principally from the works of Deetz (1992), Gadamer (1975), Habermas (1989; 1990; 1996), Mumby (1988) and Rorty (1980), we continue by examining theories of communication, discourse and knowledge.

Problems of Discourse

The 'problem' of discourse has been scrutinised by researchers since ancient times. The nature of the debate surrounding biofuels developments appears to concur with Rorty's awareness (1980) that certain values or ways of expressing those values within this debate are more persuasive than others. Within the literatures, the 'dominant' discourse is determined by (among others), political power structures (Bourdieu 1988), authority relations – i.e. claims to knowledge and expertise (Deetz 1992), a dominant language of positivism (Habermas 1989; Kuhn 1970), a dominant language of capitalism (Ilich 1973) and barriers to participation (Clegg 1989).

A commonly identified outcome of dominant discourse is its tendency to become self-producing and self-referential (Deetz 1992). Both these traits are redolent of 'autopoietic systems', a theory adopted to draw attention to how social systems can become distorted in their self-production (Maturana & Varela 1980; Mingers 1989). Morgan explains the 'egocentric' tendency for organizations to resist adapting to changes in their surroundings by expanding to dominate their external environments (1997). This systemic reification of normative views suggests communication in and around an organization will in turn be distorted, as the system becomes increasingly disconnected from anything that it does not itself produce. Operating in such an 'autobiographic' environment, such a system is likely to remain receptive principally to views that conform to the organisational system's own views and set of imaginary relations, and move to subordinate any views that do not. Habermas uses the term "communication pathologies" to describe the discursive manifestation of this systemic distortion. His notion of 'systemically distorted communication' becomes pathological when it a) endangers the survival of human and other species by limiting the adaptation of the system to its changing environment b) violates normative standards already shared by community members and, c) imposes arbitrary limits on the development of individualization and the realization of the collective good. Conversely, a healthy discourse is one that is systemically co-creative, learning and differentiating for its participants (Deetz 1992; Ledington & Ledington 2007).

In contrast to Habermasian speech 'distortions', Rorty favours 'normal and abnormal forms of discourse' by which conversation takes the place of theories and thereby epistemologies. Normal discourses are judged

according to agreed conventions, whereas abnormal discourses open up possibilities in which the world can be conceptualised. Rorty's "main purpose" (1980, p. 132) is to destroy the illusion that a particular vocabulary – a way of conceptualising the world – is a description of "the way things are". In adopting hermeneutics, he suggested a pragmatic mechanism for coping whereby the real issue concerns ways we wish to talk about humans and the world we live in (130). Rorty's stance is widely criticised for failing to locate discourse within a particular socio-political milieu in which power is inevitably present; leading to certain voices becoming privileged because of their ability to frame perceptions of the world in their own terms (136). The problem, according to Mumby is how to prevent the open-ended nature of Rorty's dialogue from "*degenerating into empty rhetoric or idle chatter*" (1988, p. 132).

Along with Habermas, Gadamer (1975) promotes self-reflection in the quest for reaching understanding through discourse. For Gadamer however, all thought including critical reflection is possible only on the condition of participation within a culturally situated tradition. This viewpoint posits that understanding arises through the dialectic of questioning by parties already situated within a shared culture of historically constituted conditions. It is not surprising perhaps, that a criticism levelled at Gadamer's work is that it too overlooks the possibility of embedded power and domination within a given tradition (see also Poupeau 2000). Foucault (1986) contends that any attempt to separate power and knowledge is futile since the production of knowledge is political all the way down. To separate knowledge and power would be to claim that we could separate statements of 'fact' from the values and mechanisms that constitute them as such. Foucault argues that each institution of society has its "regime of truth", its general politics of truth. A particular regime of truth is constituted through a set of mechanisms and discursive practices which legitimises claims and is itself dependent on the legitimacy of those claims. Such claims are reinforced due to the non-egalitarian and diffused nature of the relationship, through membership and structure.

Power is pervasive within and between organisations and within society itself (Introna 1997), with two opposing conceptualisations: sovereign power and strategic power. The first of these conceptualisations; Hobbes' notion of 'sovereign power' is generally regarded here as irrelevant (although one may argue the sovereignty of positivistic language forms). A better means for interpretation is provided by Machiavelli's 'strategic' conceptualisation by which he considered alliances, strategies and networks as central to his conception of power. Power develops out of local, contingent actions from within networks, which when linked together create the "illusion of grand design" (Introna 1997, p. 128). Where conditions such as this exist, discursive closure is bound to follow with the phenomenon of autopoiesis leading organizations and social systems to operate as closed systems to the extent that institutional arrangements are taken as self-evident. The effect on communication is that, "*The conditions of discourse in pursuit of a legitimate consensus cannot proceed since an unknown false consensus is already in place*" (Deetz 1992, p. 176). Working in tandem with policy makers and systems of public governance, corporate systems may be autonomously structured towards discursive closure with both division, and apparently legitimate consensus, used to channel dissent within the broader social environment.

Systemic distortion, or what Habermas calls "communication pathologies", may be due to confusion over communicative action, where actions are orientated to reach an understanding, and strategic action, where actions are orientated to success (Deetz 1992). This confusion is ripe for exploitation. In situations where a party is not deceiving him or herself, manipulation may occur where strategic action is concealed under the appearance of communicative action. Similarly, discourse as an information system can be distorted. Even within research using SSM, distortions can be created by the dominant conditions of discourse, which either inadvertently or deliberately confuse distinctions of strategic and communicative action.

SSM was developed as a way of "*talking about how to interact with complex problem situations involving multiple perspectives and problem owners*" (Ledington & Ledington 2007). They point out how many papers in the literature begin with an opening statement and then proceed to ignore the idea. Many SSM researchers implicitly seek the 'right/best solution' or act on the belief that if there is at least some debate then a fresh consensus (solution) will emerge. Consequently, in seeking to facilitate dialogic engagement and reflection rather than consensus between participants, we adhere to Bohm's *et al* view that dialogue should be considered a process rather than an outcome. "*Dialogue is a way of observing, collectively, how hidden values and intentions can control our behavior, and how unnoticed cultural differences can clash without our realizing what is occurring*" (Bohm, Factor & Garrett 1991).

Research Design

With the aim of attaining dialogic engagement, Soft Systems Methodology will be used to deconstruct discourses using rich pictures and root definitions. By applying systems concepts to qualitative research, SSM is particularly suitable for the analysis of Information Systems. The research will examine whether the act of representation might encourage individuals, organizations and interest groups to reflect upon their beliefs and assumptions thereby contribute to a healthy discourse around the subject of New Zealand biofuels.

Peter Checkland and his colleagues at Lancaster University developed SSM as a qualitative methodology to deal with complex situations while maintaining adequate standards of rigour. The earlier SSM literature offered a seven-stage method that emphasised the action aspect of the methodology (Checkland 1999). This focus on strategic over communicative action appears to have prompted the subsequent, prescriptive styles of application. What was later categorized as ‘SSM Mode 1’ has frequently been applied mechanically to ‘solve’ rather than address problematical situations (Mingers 2000). Indeed, Checkland’s major publications appear to chronicle the struggle of SSM to move from thinking about ‘problem-solution’ to facilitating ‘healthy discourse’ i.e. *Systems thinking, systems practice* (1999) depicts the classic rethinking of hard systems approaches, *SSM in action* (1989) represents the development from Mode 1 to Mode 2, while *Information, systems and information systems* (1998) begins to create a language of the context of ‘discourse’ (Ledington & Ledington 2007). This development from problem to process, solution/outcome to discourse, is particularly apposite to the framing of the present research.

The initial seven-stage model included two stages (stage 3 and 4) occurring “below the line” denoting a distinction between the ‘real world’ and ‘systems thinking-about-the-real world’. While Checkland argued this line was ‘more heuristic than theoretical’, the division was seen as implying a ‘false dualism’ and subsequently dropped (1997). Despite its erasure, negotiation of this line is still critical to meaningful comparison of espoused theories and theories-in-use in SSM (Argyris, Putnam & McLain Smith 1985), although Ledington & Ledington claim this aspect remains underdeveloped (1999). A more responsive, less formulaic approach of SSM, Mode 2, was subsequently developed that applied soft systems concepts to participatory action research. Importantly, Mode 2 emphasises reflective learning as an essential element of this epistemological approach to problematical situations (Gold 2001).

Dialogue, here conceptualised as a co-creative, dialectic and learning communication process, is the specific form of communication at the heart of SSM. It openly embraces the multiple ‘worldviews’ held by participants, each of whom is trying to act ‘purposefully’. SSM constructs conceptual models of this purposeful activity, which can then be compared with unstructured perceptions of the real world (Rose & Haynes 1999). Rich Picture building is a form of unstructured modelling used to provide visual representations of dialogues and assist in uncovering features of the problem domain. Formal textual models are also developed to define the ‘root definitions’ – the ‘what?’ ‘how?’ and ‘why?’ of transforming the problem – and analysed according to the empirically derived ‘CATWOE’’: Customers, Actors Transformation, *Weltanschauung*, Owners, and Environmental Constraints (Checkland & Poulter 2006). Whether textually or pictorially generated, these conceptual models are not representations of the real world; they are merely theoretical constructs used to help formulate and structure *thinking* about ‘problems’ (Rose & Haynes 1999). This thinking process often takes the form of conversations, prompted by questions generated by the models, exploring desirable and feasible improvements to these complex soft systems. Figure 1 (below) provides an overview of this process.

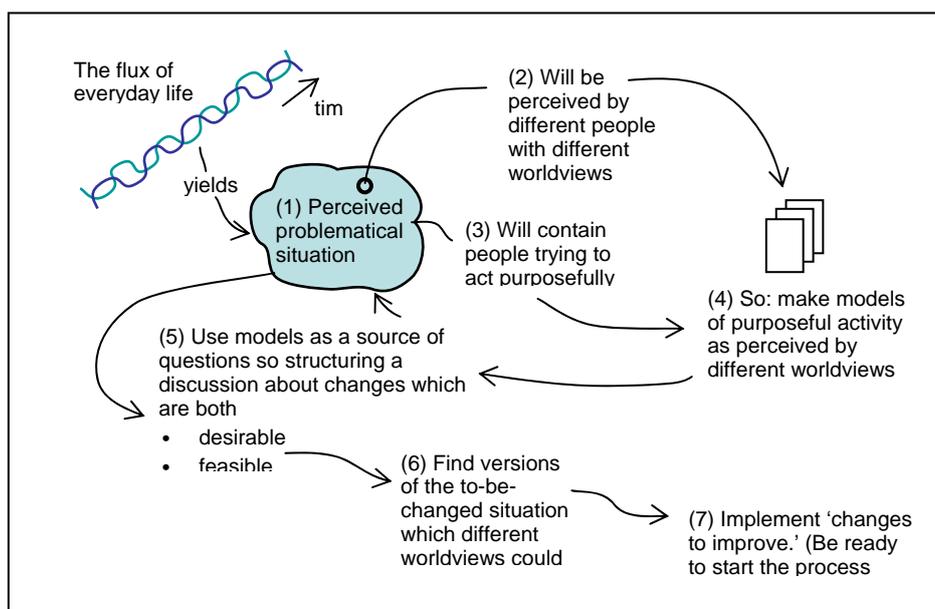


Figure 1: SSM's cycle of learning for action (adapted from Checkland & Poulter 2006)

In this research, participants will be drawn from six, key stakeholder groups: policymakers, scientists, commercial organizations, business interest groups, environmentalists and consumers. An initial interview will be conducted with participants from each group in which rich pictures will be developed concurrently with dialogue between researcher and participant. In each interview, a conceptual model and/or root definition will be

developed iteratively to represent the worldview or *Weltanschauung* of that particular stakeholder (stages 1 to 4 in Figure 1 above). This will allow each participant real-time reflection on what is said compared with what is represented visually, in a process comparable to Schön's reflection-in-action through 'conversations' with drawing (1983).

Having completed the first round of interviews, the resulting models/root definitions will provide information about relative power, expertise, levels of interest and assumptions underlying the discourse. The findings from the first round will be presented to a focus group comprising members of each stakeholder group. These models will be used by the researcher to stimulate dialogue *about* dialogue. The substantive issue of biofuels developments is then reduced to second-order importance where improvement of the communicative process takes pre-eminence. This represents the 'Transformation' element of Checkland's 'CATWOE' directed at public discourse viewed as an information system.

The process outlined here confirms the researcher's aim to facilitate the improvement of dialogue. What differentiates this research from most other SSM inquiries is that we do not seek 'improvements' to the substantive issue of biofuels development but *aletheia*, the truth first glimpsed when something is disclosed or unconcealed (Heidegger 1996). In Figure 2 (below), the original conception for SSM(c) is concerned with the problematical *content* depicted as an epistemological approach for 'solving' content relating to 'x' (in this case the issue of biofuels development). However, we consider the taken-for-granted conduct and rules governing *discourses* about 'x' to warrant their own examination and therefore adopt as our approach SSM(p) which is concerned with the *process* of using SSM to conduct the study. Our inquiry, as articulated by Ledington & Ledington and Bohm (above), is 'confined' to improving dialogue *about* the biofuels issue.

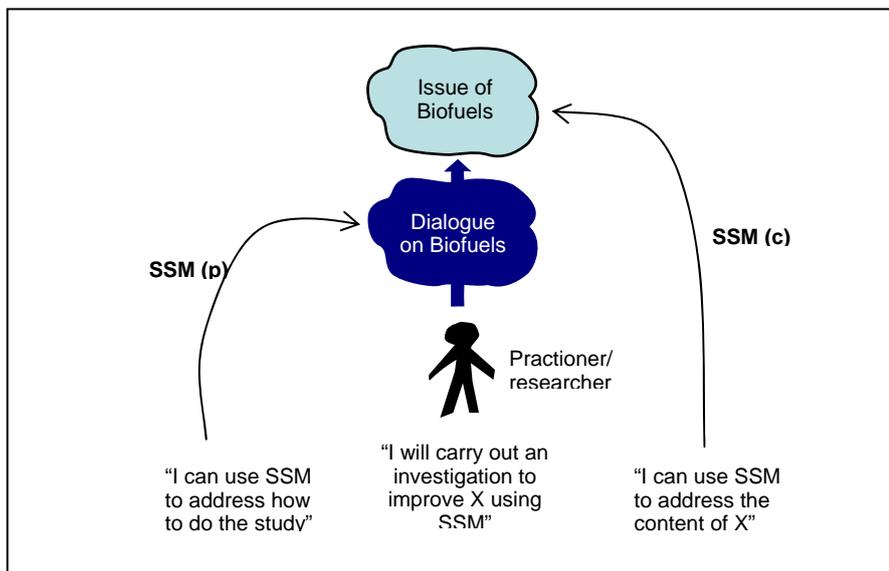


Figure 2: SSM(p) concerned with the process of using SSM to do the study and SSM(c) concerned with the problematical content (adapted from Checkland & Poulter 2006)

Conclusions

SSM provides a means of examining various ontologies by creating space to examine the presuppositions that underlie most speech acts within discourse. In this case, what comes in for examination is the bias towards claims to knowledge based on quantitative data so far dominating the discourse surrounding biofuels developments. The use of positivist language, expressed as objective and value-free forecasts and measures, may intentionally or unintentionally, conceal the underlying values and intentions of its protagonists. In a situation such as this, power lies with those who have access to the 'strongest' data; that which carries the authority of dominant, normative distortion. However laudable the aims of stakeholders in this discourse, these 'hard' facts do not account for the 'soft' contextual complexity of purposeful human activity systems.

Many might argue that evidence for Habermasian 'pathologically distorted communication' is apparent in the crisis scenario of climate change. It appears that the very things that most of us take for granted in the developed world now threaten to destroy us. Critical theory claims to provide a guide to human action by helping people understand their true interests and by helping them escape from ideological coercion. While individuals may not be able to agree abstractly on what is the 'good', a community that shares commonalities of communication can at least agree abstractly on how to make valid decisions.

In the context of the discourse on biofuels, reflection on the part of the researcher and participants is an inevitable necessity due to the conjoint building of rich pictures/root definitions. Reflection is further enhanced at the second stage when participants are asked to consider their respective positions *vis à vis* the rich pictures of others. SSM is at once an epistemology and a methodology: the act of reflection inevitably shapes actions which follow. Thus, SSM combines rigour through its methodological approach with flexibility in its application.

Appreciation of SSM as a process reflects a concern with *means* rather than purely focusing on *ends* or outcomes. The 'health' of public discourse is dependent on the rigour of this process. Whereas untruth is something disguised, overlooked or forgotten, *aletheia* refers to the truth that first emerges when something is unconcealed or uncovered. Allowing something to appear becomes the first act of truth. *Altheithia* as truth is not then something that is connected with that which appears. In the current context, the rich pictures generated through dialogue are not merely representations of the way things are, but of the discourse process. Quoting Bohm: "...it is proposed that a form of free dialogue may well be one of the most effective ways of investigating the crisis which faces society, and indeed the whole of human nature and consciousness today. Moreover, it may turn out that such a form of free exchange of ideas and information is of fundamental relevance for transforming culture and freeing it of destructive misinformation, so that creativity can be liberated" (1987, p. 240).

References

- Anslow, M 2007, 'Biofuels - facts and fiction', *The Ecologist*, vol. 37, no. 2, pp. 34-6.
- Anthrop, DF 2007, 'Analysis highlights limits on energy promise of biofuels', *Oil & Gas Journal*, vol. 105, no. 5, pp. 25-9.
- Bohm, D, Factor, D & Garrett, P 1991, *Dialogue – a proposal*, viewed 16 September 2006, <<http://www.david-bohm.net/dialogue/>>.
- Bohm, D & Peat, FD 1987, *Science, order, and creativity*, Bantam, New York.
- Boswell, A 2007, 'Biofuels for transport – a dangerous distraction', *SGR Newsletter*.
- Bourdieu, P 1988, *The Essence of Neoliberalism*, *Le Monde*, viewed 28 May 2007, <<http://www.analitica/biblioteca/>>.
- Checkland, P 1999, *Systems thinking, systems practice*, John Wiley & Sons, Ltd, Chichester, West Sussex.
- Checkland, P & Howell, S 1998, *Information, systems and information systems - making sense of the field*, John Wiley & Sons, Chichester, West Sussex.
- Checkland, P & Poulter, J 2006, *Learning for action: a short definitive account of soft systems methodology and its use for practitioners, teachers and students*, John Wiley & Sons, Ltd, Chichester, West Sussex.
- Checkland, P & Scholes, J 1989, *SSM in action*, Wiley, Chichester.
- Checkland, P & Tsouvalis, C 1997, 'Reflecting on SSM: the link between root definitions and conceptual models', *Systems Research and Behavioural Sciences*, vol. 14, no. 3, pp. 153-62.
- Clegg, SR 1989, *Frameworks of power*, Sage, London.
- Deetz, SA 1992, *Democracy in an age of corporate colonization: developments in communication and politics of everyday life*, State University of New York Press, Albany, NY.
- 'Europe's dilemma', 2007, *The New Zealand Herald*, 26 February, p. 7.
- Flagler, B 2007, 'In search of the better oil', *Bright, reflecting business brilliance, New Zealand Trade and Enterprise*, vol. March/April, no. 21, 14 March, pp. 10-5.
- Foucault, M 1986, 'Disciplinary power and subjugation', in S Lukes (ed.), *Power*, Blackwell, Oxford, pp. 229-41.
- Gadamer, HG 1975, *Truth and method*, Continuum, New York.
- Gold, J 2001, 'Storying systems: managing everyday flux using mode 2 soft systems methodology', *Systemic Practice and Action Research*, vol. 14, no. 5, pp. 557-73.
- Habermas, J 1989, *The theory of communicative action: a critique of functionalist reason*, vol. I & II, Polity Press, Cambridge, UK.
- 1990, 'Discourse ethics: notes on a program of philosophical justification', in S Benhabib & F Dallmayr (eds), *The Communicative Ethics Controversy*, MIT Press, Cambridge, MA.

- 1996, *Between facts and norms: contributions to a discourse theory of law and democracy*, Studies in contemporary German social thought, MIT Press, Cambridge, MA.
- Heidegger, M 1993, 'The Origin of the Work of Art', in DF Krell (ed.), *Basic writings: from being and time (1927) to the task of thinking (1964)*, HarperCollins, New York.
- 1996, *Being and time*, State University of New York Press, Albany.
- Illich, I 1973, *Tools for conviviality*, Open Forum, Calder and Boyers, London.
- Introna, LD 1997, *Management, information and power: a narrative of the involved manager*, Macmillan, London.
- Kuhn, T 1970, *The structure of scientific revolutions*, University of Chicago Press, Chicago.
- Ledington, PWJ & Ledington, J 1999, 'The problem of comparison in soft systems methodology', *Systems Research and Behavioural Science*, vol. 16, no. 4, p. 329–37.
- 2007, SSM in facilitating healthy discourse among stakeholders in the community to P Crowe, 3 May.
- Macfie, R 2007, 'NZ joins biofuel bandwagon', *The New Zealand Herald*, 26 February, p. 9.
- Maturana, H & Varela, F 1980, *Autopoiesis and cognition: the realization of the living.*, Reidl, London.
- Mingers, J 1989, 'An introduction to autopoiesis – implications and applications', *Systems Practice*, vol. 2, pp. 159-80.
- 2000, 'An idea ahead of its time: the history and development of soft systems methodology', *Systemic Practice and Action Research*, vol. 13, no. 6, pp. 733-55.
- Morgan, G 1997, *Images of organization*, 2nd edn, Sage Publications Inc, Thousand Oaks, CA.
- Mukherjee, A 2007, 'Water for corn, but none to spare for people', *New Zealand Herald*, 26 February, p. 8.
- Mumby, DK 1988, *Communication and power in organisations: discourse, ideology and domination*, Ablex, Norwood, NJ.
- Poupeau, F 2000, 'Reasons for domination: Bourdieu versus Habermas', in B Fowler (ed.), *Reading Bourdieu on society and culture*, Blackwell, London, pp. 69-87.
- Robison, P 2007, 'The biofuels backlash', *The New Zealand Herald*, 26 February, pp. 6-8.
- Rorty, R 1980, 'A reply to Dreyfus and Taylor', in DK Mumby (ed.), *Communication and power in organisations: discourse, ideology and domination*, Ablex, Norwood, NJ.
- Rose, J & Haynes, M 1999, 'A soft systems approach to the evaluation of complex interventions in the public sector', *Journal of Applied Management Studies*, vol. 8, no. 2, pp. 199-216.
- Schön, DA 1983, *The reflective practitioner: how professionals think in action*, Basic Books, New York.
- Sustainable bioenergy: a framework for decision makers*, 2007, UN-Energy.
- Tindall, S 2007, 'Why we can't afford to wait', *The New Zealand Herald*, p. 10.
- Vidal, J 2007, 'UN warns against rush to biofuel crops', *The Guardian Weekly*, 18 May, p. 10.
- Zah, R & Hagmann, M 2007, *Biofuel does not necessarily mean ecologically friendly*, EMPA - Materials Science & Technology, viewed 14 June 2007, <URL: http://www.empa.ch/plugin/template/empa/*/60542/---/l=2>.

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