

The application of Full Cost Accounting in a Higher Education context – development of a methodological approach

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Abstract

This paper proposes the use of Action Research methodologies to apply Full Cost Accounting ('FCA') in new contexts.

The paper briefly summarizes the rationale for FCA, and the development of FCA including applications to date. It critiques FCA, recognising the calls in various literatures for dialogic, democratic and participatory 'accountings' (and the suggestions that FCA might be an appropriate vehicle for such accountings). It is argued that the application of FCA in a new setting is justified, and that the Higher Education sector in the UK is a suitable test-bed for such an application. The paper then proposes that as action research is built on dialogue and democratic participation, it is an appropriate means of developing and applying new FCA models. Soft Systems Methodology is put forward as a structured means of conducting action research in this context. Finally, it is illustrated how an 'FCA for Higher Education' model (based on the Sustainability Assessment Model) is being developed using a soft systems methodology 'learning for action' cycle.

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1. Introduction

Full Cost Accounting ('FCA') refers to accounting methodologies, techniques, tools or models² developed to measure in common monetary terms the full economic, environmental and social impacts of an organisation's activities.³ Traditional accounting is deficient in this respect as it often fails to recognise all such impacts, even though they lead to costs and/or benefits for stakeholders and unconnected third parties outside of the boundaries of the organisation.⁴ For example, the activities of organisations can lead to carbon dioxide (CO₂) emissions that have a negative impact on global society through global warming. However, although organisations will account for purchase costs such as the cost of car fuel and electricity, these purchase costs (equal to the prices charged by suppliers) will not fully represent the true cost to society of using fossil fuels to run vehicles or generate electricity (Richardson & Bent, 2003). Governments can seek to correct prices and alter behaviour using policy instruments such as green taxes. However, the use of these instruments is still in an embryonic stage (Howes, 2002 & 2003 a&b). It can therefore be concluded that market prices are often incorrect, and this leads to decisions by organisations and individual consumers that are not sustainable for the planet and its life-forms (Bebbington et al, 2001). The consequences of this market failure can be seen in the deteriorating indicators of planetary health presented in the 2007 United Nations 4th Global Environmental Outlook report (UNEP, 2007). FCA therefore aims to correct market prices and hence alter production and consumption decisions.⁵

It might be thought that the 'information gap' identified above has already been filled by the recent trend towards voluntary sustainability reporting by organisations, which usually takes the form of a narrative report backed up by a range of (mainly non-financial) key performance indicators addressing economic, social and environmental impacts. The major fault of such reports is that they are unregulated, and as a result they are not produced consistently across organisations despite the existence of best practice guidelines such as those produced by the Global Reporting Initiative (for example see Global Reporting Initiative, 2006) and the Prince of Wales Accounting for Sustainability Group (see Accounting for Sustainability, 2007). There is also a risk that the reports present an incomplete picture and are unbalanced, in that 'good' news is emphasised over 'bad'. However, the users of such reports also often suffer from information overload given the volume of information presented. In sum, it can be very difficult to gauge the sustainability (or more likely the un-sustainability) of an organisation by reading its so-called sustainability report. For a damning critique of sustainability reporting, see Milne and Gray (2007).

² Different authors have used different terminologies. The term 'approaches' will generally be used in this paper (unless specific discussions necessitate the use of the original authors' terminologies).

³ The reporting of the three impacts together is often referred to as 'triple bottom line' reporting (a phrase first coined by John Elkington – for example see Elkington, 2003), and is seen as giving a measure of the sustainability of an operation. However, see Section 3 for a critique of measures of sustainability at the organisational level. The most commonly-quoted definition of sustainable development is the definition in the Brundtland Report of 1987, which defined sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (reproduced in UNEP, 2007, p. 7).

⁴ Impacts from organisational activity borne by parties outside of an organisation are defined as externalities by economists.

⁵ There are many tools available that claim to measure sustainability, but only FCA to the author's knowledge seeks to directly correct prices.

A school of thought therefore exists that maintains that attempts at monetisation are necessary at the level of the individual organisation to 'disturb' the capitalist status quo, however flawed those attempts may be (for example, see Bebbington et al 2001, Richardson & Bent 2003 and Howes 2000). Further, it has been argued that FCA conducted in a dialogic, democratic and participatory⁶ form could be a powerful educator and agent of change, especially if monetisation is not absolute, the subjectivity of figures is explicitly acknowledged, and 'expert' input is diluted by input from multiple stakeholders (for example, see Bebbington et al 2006).

This paper takes these premises as its foundations. It begins by summarising the development of FCA to date and synthesizing the critiques of FCA contained in the literature. The critiques have highlighted many moral, theoretical, technical and practical problems with FCA, and the fact that many of the applications have not been fully participative. Given these problems, extant applications have tended to be ad-hoc, experimental and incomplete, with little consistency in application (although the Sustainability Assessment Model – with a relatively long history of development and application – offers some hope). However, given its potential to deliver significant perceived benefits, certain commentators have argued that FCA is worth persevering with (for example, see Antheaume, 2007). It has been recognised that FCA is by no means the finished article, and that more development work is required; FCA has been described as an example of a sustainability accounting technique in its metaphorical teenage years (Frame & Cavanagh, 2008). Further, the idea has been floated that scientific advances in measuring impacts (and the increased involvement of markets in pricing the effects of impacts) may make monetisation of impacts more achievable – and hence FCA more successful – as time progresses (Antheaume, 2007). Increased sustainability awareness in general may also encourage greater acceptability of FCA (as compared to when previous applications were undertaken).

This paper adds to the calls for further development of FCA. It argues that development of FCA requires new applications to be undertaken in new contexts, as the process of 'trying again' may lead to a better technique. Of course, there is the danger that another application may fall at the same hurdles that have scuppered previous attempts; nothing is learnt and a cycle of failure is continued. Taking this on board, the paper proposes that FCA might benefit from using an 'off the shelf' methodological framework that has not previously been used in a FCA context. Given that commentators have argued that the educational impact of the FCA process (rather than the end figures produced) is its most beneficial output, and that the educational impact is at its most powerful when the process is dialogic, participatory and democratic, then it makes sense to adopt a methodological approach that incorporates dialogue, participation, reflection and learning as standard. The first 'new idea' that this paper therefore presents is that Action Research is an appropriate research methodology to utilise to develop and apply FCA, as it is built on dialogue and democratic participation. In particular, it is argued that Soft Systems Methodology (a variant of action research) should be utilised, as while it contains the standard action research motifs, it casts the process of enquiry as a system and adopts a structured task approach to each stage. It therefore addresses the major criticisms often levelled at action research - that it is unstructured, unscientific, and open to researcher bias – and allows the criteria of 'recoverability' to be satisfied.

⁶ I.E., a form that involves open discussion, and input from (and ownership by) many stakeholders. Dialogic, democratic and participative accountings are discussed more fully in Section 3.

The second 'new idea' that the paper puts forward, in order to try out the first, is that the Higher Education (HE) sector in the UK is a suitable test-bed for a new application of FCA given the current lack of holistic sustainability measurement tools available in the sector. Therefore, FCA should provide useful additional information. A case study organisation that is allowing FCA to be applied to a new campus development ('UniGreen') is then introduced and described, and an illustration is given of how a soft systems methodology 'learning for action' cycle is being applied by UniGreen to develop a 'FCA for Higher Education' model. Finally, the outputs produced to date are discussed.

The paper is therefore organized into the following sections. Section 2 summarises how FCA has developed, including applications to date. Section 3 critiques FCA, argues that the application of FCA in a new setting is justified, and proposes that action research is an appropriate means of developing and applying new FCA models. Section 4 critiques action research and its variant, soft systems methodology. Section 5 proposes the Higher Education sector in the UK as a suitable test-bed for a new application, and introduces the UniGreen case study. Section 6 constructs a soft systems methodology 'learning for action' cycle for the new campus development of UniGreen. Section 7 outlines the 'FCA for Higher Education' model that the dialogic process is developing. Finally, Section 8 contains some initial conclusions arising from the case study.

2. Development of Full Cost Accounting to date

A number of FCA approaches have been developed and applied by academics, non-governmental organisations and corporations, with the most sustained period of activity occurring since 1990. However, the overall number of applications in the public domain remains small, and most applications have tended to be ad-hoc, experimental and incomplete in nature, with little consistency in application (although the Sustainability Assessment Model – with a relatively long history of development and application – offers some hope).⁷ See Table 1 for a summary of the key FCA applications and associated literature to date. Applications are categorised according to the date that they appeared in the literature, and are then grouped in columns that reflect their major characteristics. The first two columns contain applications that have produced cost outputs. Applications in the first column have utilised damage costs (being costs that reflect the actual damage caused by specific impacts), and applications in the second have utilised an amalgam of avoidance and restoration costs (being the cost of avoiding a particular impact, or the cost of restoring the damage caused by the impact; avoidance costs have tended to be used in preference where available). The third column contains applications that have focused on the balance sheet (and which have valued 'natural' capital and/or recorded environmental liabilities), plus other miscellaneous approaches (namely Figge & Hahn's Sustainable Value). Applications that have demonstrated multiple characteristics appear in more than one column, connected by thick arrows. (For example, the AlcCo application utilised both avoidance/restoration and damage costings.) Thin arrows demonstrate how concept development literature has influenced subsequent applications (or how early applications have influenced later applications). Overall reviews of the field have been provided in the literature by, for example,

⁷ Difficulties associated with FCA described in Section 3 partly explain the low number of applications. Further, the policy environment has generally not been supportive of FCA and the accounting profession has been too conservative and client-driven to develop it (Bebbington et al, 2001). However, this now may be changing – for example, the UK accounting profession is currently supporting the Prince of Wales Accounting for Sustainability Group's work on social indicators of sustainability.

Bebbington et al (2001) and Antheaume (2007). The two most complete approaches are discussed in the sections below.

(i) Forum for the Future's Sustainability Accounting

The Forum accounting *methodology* (note – this was the phrase of the Forum authors) was developed from earlier work by BSO Origin (see Huizing & Dekker, 1992), Rubenstein (1992 and 1994) and Bebbington & Gray (see Bebbington & Gray, 2001⁸). Forum's Sustainability Accounting advocates the restatement and extension of the traditional profit and loss account, and the recognition of sustainability liabilities in the balance sheet (Richardson & Bent, 2003). As regards the profit and loss account, firstly, existing (but hidden) expenditure incurred during the accounting period on social and environmental areas is highlighted separately. Secondly, impacts created during the accounting period that are external to the organisation (and so do not appear in the accounts) are measured and then costed. The methodology adopts a 'narrow boundary' approach, in that it only identifies impacts that the organisation is directly responsible for. The costing stage involves the use of avoidance/restoration costs, although damage costs were also applied in the AlcCo experiment noted below (see Bent, 2004). The total avoidance/restoration cost figure can be deducted from accounting profit to give an alternative measure of profit, and a provision can be recognised in the balance sheet to reflect future avoidance or restoration expenditure.

The Forum methodology has been applied by Interface Europe, Anglian Water, Wessex Water, 'AlcCo' (an alcohol producer), 'ChemCo' (a division of a chemical company) and Forum itself. It continues to be used and reported by Wessex Water, and the water industry association 'Water UK' attempts a calculation for the water industry as a whole (see Water UK, 2007). Guidance on the approach is provided in the 'Sigma Sustainability Accounting Guidelines' (Richardson & Bent, 2003) and 'The Sigma Guidelines – Environmental Accounting Guide' (Howes, 2003a).

Forum have recognised that the applications of their methodology have generally been very incomplete. For example, only the AlcCo application tackled social impacts (of an alcohol product), and none of the named applications tackled wider economic impacts.

(ii) The Sustainability Assessment Model ('SAM')

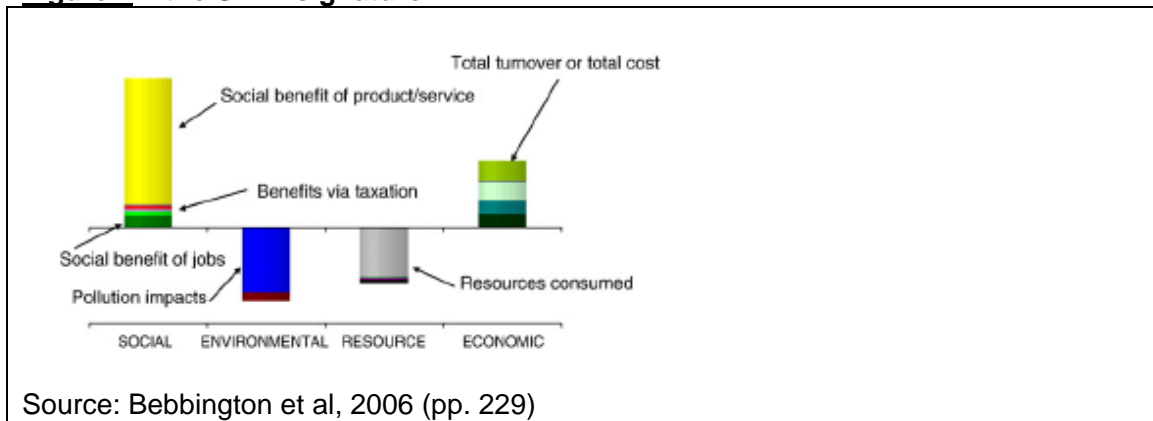
The SAM (which was developed by BP, oil industry consultants, and Professor Jan Bebbington) assesses the economic, resource, environmental and social impacts of a single project over its full life cycle and translates all impacts into monetary amounts using the damage cost approach. Two outputs are produced – a graph that highlights all positive and negative impacts (the SAM 'signature'), and an indicator (the SAM i) that measures how sustainable the project is (with 100% representing a fully sustainable development). Figure 1 below reproduces a SAM 'signature'.⁹

⁸ Bebbington & Gray's Sustainable Cost Calculation was applied to Landcare Research in New Zealand, and this included the study of a capital building project.

⁹ The initial SAM model was described in Baxter, Bebbington and Cutteridge (2002 & 2003). A significant body of more recent literature has either detailed the application of the SAM to various projects, design decisions or industrial sectors, discussed its potential for application to new areas, evaluated its ability to engender change, or documented its further development (see Baxter et al 2004, Bebbington & MacGregor 2005, Bebbington 2007a&b, Bebbington & Frame 2007, Bebbington, Brown & Frame 2006, Bebbington, Brown, Frame & Thomson 2007, and Xing et al 2007&2008).

BP applied the SAM to a typical, single oil and gas field development. The SAM has since been applied to a number of projects in the oil and gas industry, and it has been used to assess concept decisions for an off-shore hydrocarbon development and the performance of the UK oil and gas industry as a whole. It has also been applied to projects in other fields (for example, it has been used to evaluate energy extraction from landfill, a tree planting scheme, a salmon farm, and a social housing project in New Zealand (Baxter et al, 2004, and Bebbington, 2007). It is currently being taken forward in an urban development form by the SUE-MoT project (for example, see Xing et al, 2008).¹⁰

Figure 1 – the SAM ‘signature’



Source: Bebbington et al, 2006 (pp. 229)

A number of shortcomings of the SAM have been highlighted in the literature. For example, when it was applied by BP, only the 25 impacts of a typical oil and gas field development that were deemed to be the most important were recognized and monetized (Baxter et al, 2003). Further, the SAM utilizes damage costs, which have been heavily criticized in the literature (see discussion in Section 3). It has also been criticized for not seeking to define sustainability at the operational level, allowing substitutability between forms of capital (rather than setting minimum standards in certain areas, i.e. highlighting critical natural capital that could not be eroded), and adopting a life-cycle approach that forces an organization to report sustainability impacts that it has no control over (Accounting for Sustainability, 2006). Baxter, Bebbington et al (2003) recognize, when justifying the BP SAM approach, the argument that organisations should only have to account for the impacts that they are accountable for. However, they justify their methodology by stating that it illustrates the impact of a project on sustainable development from the perspective of society.

However, the SAM appears to represent the most complete approach available that has actually been put into practice.

¹⁰ This follows the earlier proposal for a construction/property development SAM in Bebbington & MacGregor (2005).

Table 1 - summary of the development of FCA (by literature):

Date of publication of relevant literature:	Type of literature (by author):		Overview of applications sorted by major characteristic:		
	Literature explaining applications:	Concept development literature:	Costing focus:		
			Stream 1 Avoidance/ restoration costs	Stream 2 Damage costs	Stream 3 Balance sheet/ other focus
1992	Huizing & Dekker	Rubenstein, Gray	BSO/Origin		
1993		Gray et al			
1994	Rubenstein	Gray			
			Rubenstein		Rubenstein's green balance sheet
1996	USEPA			Ontario Hydro	
1997		Boone & Rubenstein		Powergen	
2000 (Forum 2000-03)	Atkinson Howes		Forum's ECA: Interface Europe Anglian Water Wessex Water Water UK		
Ongoing	Wessex Water		The SCC & Landcare Research		
Ongoing	Water UK				
2001	Bebbington & Gray				
2001 to date	Figge et al (multiple)				Figge & Hahn Sus'I Value
2002 - ongoing	Bebbington/ Bebbington et al Frame & Cavanagh	Bebbington/ Bebbington et al Brown & Frame Bebbington & MacGregor Xing et al		BP Sustainability Assessment Model (SAM), and the construction and UD SAMs	
2003	Jones				Jones' natural inventory valuation model
2003 (to 2006)	Richardson & Bent		Forum's Sustainability Accounting methodology: AlcCo ChemCo	AlcCo	
	Bent Taplin et al				
2004	Antheaume		Antheaume	Antheaume	
2005	Herbohn			Herbohn	
2007		Antheaume			

Source: Author.

3. A critique of FCA, and the way forward

The literature has critiqued FCA around the following themes:

- (i) whether accounting for sustainability should be attempted at all;
- (ii) whether measures of sustainability should be attempted at the level of the individual organisation;
- (iii) whether (and how) monetisation should be attempted, and other practical issues; and
- (iv) the epistemology of FCA.

Each will be considered in turn below, before conclusions on the way forward are drawn.

(i) Should accounting for sustainability be attempted?

The deep greens¹¹ argue that “sustainability will not be achieved by either tinkering with a fundamentally flawed system and/or adding more of the very thing (economic calculative rationalism) that caused the problem in the first place” (Bebbington et al 2001, p. 29; also see Baxter et al, 2003). Atkinson (2000) also notes unease by commentators regarding accounting for the environment. Gray (1992), Bebbington & Gray (2001) and Bebbington et al (2001) all recognise the argument that it could be dangerous to attempt to account for such a complex issue as sustainability. However, they conclude that pragmatically working within the system (i.e., using accounting techniques to obtain some measure of sustainability or un-sustainability) might achieve some degree of reform of the system and aid sustainable development. Indeed, Bebbington et al (2001) state that this is the only realistic way forward given the bias of Western organisations towards ‘weak’ sustainability (a viewpoint on sustainability that does not seek to question or replace current notions of capitalism and economic growth), and indeed the attitude amongst business and government elites that the system as a whole (i.e., capitalism) cannot be questioned¹². They do however raise the hope that performing work within the system might illustrate the limitations of doing so and so promote potentially more radical agendas.

(ii) Should measures of sustainability be attempted at the level of the individual organisation?

Gray (1992) argued that as business organisations control much of the world’s industrial capacity and have been linked with environmental degradation, then they must be part of the solution (i.e., some attempt should be made to calculate sustainability at corporate level). Further, Gray envisaged that such a project would be a complement to rather than a substitute for measurement of sustainability at other levels. Bebbington & Gray (2001)

¹¹ The ‘deep greens’ or ‘deep ecologists’ are identified by Gray, Owen & Adams (1996) as occupying an anti-capitalist stance that advocates the complete dismantlement of the current capitalist system and the primacy of nature.

¹² Bebbington et al 2001 noted critiques of the Rio Earth Summit by commentators such as Hildyard 1995 (who argued that the summit did not get to the heart of the issues and failed to examine key structural features of un-sustainability) and Grubb et al 1993 – possible evidence of a hegemony by intransigent elites (author’s view). Further, Bebbington et al noted lobbying by the International Chamber of Commerce that resulted in ‘watering down’ of FCA proposals in summit documents.

noted that sustainability is a global concept, ideally left to states and peoples. They initially argued, however, that sustainability should be measured at the level of the individual organisation in order to prove the un-sustainability of business practices (given that 'business' is powerful and that it makes contested claims that it is already sustainable). Importantly, this view was amended by the end of their paper once the results of their Landcare Research FCA experiment (the subject of the paper) had been reviewed; given the difficulties encountered, Bebbington & Gray concluded that it was more appropriate to measure corporate *un-sustainability* (author's italics). Gray & Milne (2002 & 2003), and Milne & Gray (2007) repeat the argument that sustainability is a global concept, and they note that a complex web of interactions makes the measurement of sustainability at the level of the individual organisation impossible. They conclude that sustainability reporting makes no sense at the entity level, but they also concede that it might be possible to estimate how un-sustainable an organisation's activities are.

(iii) Should monetisation be attempted? If so, how? (plus other practical issues)

Antheaume (2007) sets out three arguments against monetisation, namely: placing a value on life, biodiversity etc is not morally acceptable as such attributes may have an infinite value; monetisation reduces moral, economic, aesthetic and physical dimensions to one dimension, and ranking is forced; and the environment should be protected for moral or aesthetic reasons and not economic ones. These arguments correspond to the 'deep green' philosophy.

Brown & Frame (2005) identify further arguments against the monetisation of impacts by synthesizing the literature critiquing cost-benefit analysis. Cost-benefit analysis (which can be defined as "an investment appraisal technique for analysing and measuring the costs and benefits to the community of capital projects" (Drury, 2004)) is used as it is seen as being superficially similar to FCA (although Bebbington et al (2006), in a paper that continues the Brown & Frame themes, argue that FCA is a distinct approach). According to Brown & Frame, monetisation can exacerbate environmental and social issues (by putting a value on all items and thus making them tradable/substitutable), and it can convey the false impression that figures presented are scientifically accurate and objective (when in reality scientific uncertainty makes them subjective and value-laden, and open to capture by management). They also highlight the concerns over the cost-benefit analysis assumption that humans are rational economic persons, the fact that cost-benefit analysis does not highlight distributional (equity) issues, and the reliance of cost-benefit analysis on the work of experts to generate figures (which might make figures inaccessible and difficult to understand). All of these issues could also apply to FCA, depending on how it is implemented.

In addition to the arguments above against monetisation per se, FCA applications conducted to date and described in the literature (as previously summarised in Table 1) have also highlighted a number of practical issues. In sum, there has been: (i) an inability to identify all external impacts in some cases (for example, see Huizing & Dekker (1992), Bebbington & Gray (2001) and Antheaume (2004)); (ii) debates about whether narrow or wide boundaries should be set around analyses (for example, see Howes, (2000-2003)); (iii) debates about methods of monetisation (USEPA (1996), Richardson & Bent (2003), Atkinson (2000), Baxter, Bebbington & Cutteridge (2003), Howes (2000-2003), and Antheaume (2007)); and (iv) difficulties in either obtaining monetary values in certain cases, or choosing between multiple available values

(USEPA (1996), Atkinson (2000), Huizing & Dekker (1992), Bebbington & Gray (2001) and Antheaume (2004)). Cost, competitive advantage, organisational viability and litigation issues have also been noted (for example, see Howes (2000-2003). Further, as discussed earlier, the policy environment has generally not been supportive of FCA despite a call for it at European Union level, and the accounting profession has not been motivated to develop it due to it being driven by client needs and being conservative (Bebbington et al, 2001). As a consequence, the majority of applications undertaken to date have tended to be ad-hoc, experimental and incomplete (author's view).

A number of counterarguments to the issues raised above have been presented in the literature, by commentators who believe that undertaking FCA is a valuable exercise. Antheaume (2007) refutes the arguments against monetisation that he highlights (which were noted above). The first argument (that placing a value on life, biodiversity etc is not morally acceptable as such attributes may have an infinite value) is refuted with the stipulation of the fact that society already implicitly values human life when setting safety standards and suchlike. External cost evaluation methods only reveal and make explicit these values. To counter the second argument (that monetisation reduces moral, economic, aesthetic and physical dimensions to one dimension, and ranking is forced), Antheaume notes that organisations still rank even when they are faced with multiple dimensions. Further, external cost evaluation methods should only reveal existing choices and make these more explicit. Antheaume concludes that "using cost evaluation methods assumes that, despite their limitations, using them to experiment with full cost accounting is better than not using them at all" (pp. 214). He is also optimistic that scientific/data quality advances might now make FCA easier to perform in future.

It has been noted that FCA assists in strategic planning as the hidden costs of the 'business as usual' mode of operation revealed (this was particularly highlighted in Rubenstein's work (1994)). Further, Richardson & Bent (2003) argue that "it is better to be imprecisely right than precisely wrong when considering sustainability indicators" (p. 36) given the role that numbers can play in changing attitudes and selling change. Howes (2000) also notes that it is important not to place too great an emphasis on the precise costs obtained – he argues that most value is obtained from the process undertaken and the reporting at the end. Therefore, both Richardson & Bent and Howes highlight the fact that the whole FCA process should be educational, and that is where its real benefit lies. The discussions below on dialogics continue this educational theme (as well as the theme of transparency/making choices and values explicit, as noted by Antheaume above).

(iv) The epistemology of FCA

It has been stated in the literature that FCA can offer an epistemological approach that differs from traditional accounting if it is practiced in a dialogic, participatory and democratic way, and that such an approach may increase the chances of it being successful in driving the pursuit of sustainability (for example, see Bebbington et al, 2006).

Traditional accounting could be described as being technocratic, positivistic and monologic¹³, a description that extends to most forms of cost-benefit analysis and existing attempts at new social accounting tools (Brown & Frame, 2005). The problems

¹³ ... in that it seeks to provide definitive answers (within the bounds of materiality) based on prescribed standards and practices, and discourages the notion that there might be a number of valid answers

inherent in this approach have been highlighted in the critiques of cost-benefit analysis noted above. In response to these issues, dialogic and participatory 'accountings' (and dialogic accounting tools) have been widely called for in the accounting and other literatures (again, see Brown & Frame (2005) for an illustrative review containing many examples from the accounting, social science, 'hard science' and 'post-normal science' literatures; also note that Brown & Frame describe such dialogic approaches as socially constructionist in their epistemological outlook, and as incorporating hermeneutic rationality and decision-making). Bebbington et al (2007) have argued that social and environmental accounting research engagements incorporating dialogics are likely to be more successful than traditional approaches in stimulating emancipatory and sustainable social and environmental change. Brown and Frame give some explanations for this. They highlight the potential for dialogic processes to force critical reflection on the unsustainability of organisational practices, expose the value-laden nature of traditional decision-making models, facilitate stake-holder dialogue and to help to make decision-making more open and transparent.

The suggestions for dialogic approaches in the social and environmental accounting literature have been built around an evaluation of the works (in the main, although not exclusively) of Freire and Soderbaum¹⁴, in addition to the critiques of cost-benefit analysis. Bebbington et al (2007) note that a Freirian dialogic approach is a cyclical process that involves the 'problematizing' of a 'limit situation', the opening of dialogue that creates the framework for praxis, and re-development of the solution to the problem (and/or the identification of a new limit situation) – in other words, a process of dialogue, action and reflection. It is also an approach that builds commonalities in worldviews by not denying that contradictions exist at the start of the dialogic process. Bebbington et al argue that such an approach could successfully be applied to social and environmental accounting, and give the example of ecological footprint analysis as a tool with dialogic potential that could 'disturb' and 'problematize' the normal narrative of eco-efficiency and unmask power issues. They also state that including a researcher within an organisational process opens up dialogue; even if it only allows people to explain why the organisation is as it is, it is a way of illuminating previously hidden worldviews and commitments.

Brown and Frame (2005) highlight Soderbaum's replacement of 'rational economic men' with 'political economic persons', and his advocacy of positional analysis for sustainable development decision-making. Soderbaum's positional analysis is a pluralistic approach that involves the identification of the 'many sides' of a situation, reflection on multiple-stakeholder viewpoints, and the systematic treatment of monetary and non-monetary aspects (Soderbaum cautions against reducing all impacts to monetary amounts).

Given the critiques of cost-benefit analysis and Soderbaum's positional analysis, Brown and Frame set out their principles for a critical dialogic approach, which consist of: (i) recognising multiple ideological orientations; (ii) allowing people to monetise to the extent that they are comfortable; (iii) being open about the subjective and contestable nature of calculations; (iv) ensuring accessibility for non-experts; (v) providing a dialogic toolkit; (vi) ensuring that the exercise is supported by effective participatory processes; (vii) paying attention to power dynamics; and (viii) recognising the transformative potential of accounting. They argue that the Sustainability Assessment Model ('SAM')

¹⁴ For example, see Söderbaum 1982, 1987, 1990, 1992a-b, 1993, 1999a-c, 2000, 2001, 2004a-c and particularly 2004d, and Freire 1970, 1994 and 1998.

form of FCA (introduced in Section 2 of this paper) *could* fit the bill as a dialogic and democratic tool “as part of a broader dialogic toolkit” (p. 34), although they note that certain issues need to be dealt with surrounding the availability of data, the role of ‘experts as facilitators’, resistance from decision-makers and the accountancy profession, and the risk of managerial capture.

Bebbington et al (2006) also champion the potentially dialogic, participatory nature of the SAM. Further, they argue that SAMs might overcome the negative issues associated with cost-benefit analysis discussed earlier, and hence be a more favourable alternative to cost-benefit analysis when accounting for sustainability. Firstly, monetisation is defended as it allows debate in a language that managers understand, so economic rationalism can be fought on its own ground. Further, the SAM allows space for non-monetary ‘bubble’ items – it does not insist on monetisation in all cases. Identification and discussion of contentious impacts that cannot be monetised is therefore possible. Secondly, the subjectivity of figures produced is defended because this subjectivity is explicitly acknowledged by the SAM; it is made clear that figures do not represent ‘objective truth’, and the SAM does not claim to know the ‘correct prices’. Thirdly, it is argued that distributional issues are better dealt with by the SAM than cost-benefit analysis, as the SAM ‘signature’ is more transparent than cost-benefit analysis outputs. Fourthly, it is argued that the reliance of the SAM on experts is diluted via the involvement of all stakeholders: “Decision-makers, stakeholders, and technical advisors are viewed as working together as co-investigators” (pp. 233). The SAM is pluralistic, and involves dialogue between parties with different interests and/or ideologies.

(v) Summary and conclusions

Discussions thus far have highlighted concerns over: the measurement of sustainability impacts per se; measurement at the level of the individual organisation; monetisation of impacts; and the many practical difficulties encountered when undertaking FCA to date (which has led to the conclusion that the majority of extant applications of FCA have been ad-hoc, experimental, and incomplete). However, it has been argued that some attempt at monetisation to disturb the status quo is necessary, however flawed that attempt might be. It has also been argued that FCA conducted in a dialogic and democratic form can be a powerful educator and agent of change (especially if monetisation is not absolute, the subjectivity of figures is explicitly acknowledged, and expert input is diluted by input from multiple stakeholders), and the SAM has been advocated as a form of FCA suitable for such an approach.

It should also be noted that many of the extant applications have not been explicitly or consciously conducted in a fully participative or dialogic fashion (some of the latter SAM applications, which have attempted to be participatory, could be seen as an exception). Therefore, it could be argued that the claims made about participative and dialogic versions of FCA lack proof and require further testing – there have been insufficient dialogic applications to assess the potential positive benefits to date. Further, existing applications described in the literature have generally shown that FCA has not tended to have been fully embraced in the organisations in which it has been applied, it has not been utilised on an on-going basis following initial calculations, and it has not achieved a shift in ‘worldviews’ within the organisation. These views have been further corroborated by discussions between the author, a former developer of FCA and a current developer of sustainability accounting; both of these parties had talked to or worked with a variety of organisations who had implemented FCA.

There have been recent calls in literature to persevere with FCA and to undertake new applications of FCA to 'iron out' problems inherent in its implementation. For example, see Antheaume (2004 & 2007), Milne & Gray (2007), Unerman et al (2007) and Frame & Cavanagh (2008) in addition to Brown & Frame (2005) and Bebbington et al (2006). Frame & Cavanagh argue that the SAM is a model in its metaphoric teenage years that requires further development, and, as noted earlier, Antheaume (2007) argues that scientific and data quality advances might now make FCA easier to perform.

Given the above, this author believes that the application of a revised model in a new context (via a dialogic approach) is therefore required to: (a) further understand the difficulties inherent in the FCA process; (b) determine whether advances in scientific knowledge and sustainability awareness now make FCA calculations more feasible; (c) corroborate reasons why FCA does or does not become legitimised within organisations and affect the decisions made/actions taken; and (d) ascertain whether FCA engagements incorporating dialogic approaches increase the effectiveness of FCA.

Of course, as noted in the introduction, there is the danger that another attempted application may fall at the same hurdles that have scuppered previous attempts; nothing is learnt and a cycle of failure is continued. FCA might therefore benefit from using an 'off the shelf' methodological framework that has not previously been used in a FCA context. Given that commentators have argued that the educational impact of the FCA process (rather than the end figures produced) is its most beneficial output, and that the educational impact is at its most powerful when the process is dialogic, participatory and democratic, then it makes sense to adopt a methodological approach that incorporates dialogue, democratic participation, reflection and learning as standard. Action Research is such a research methodology; its principles bear a strong resemblance to the dialogic theories and frameworks laid out in the social and environmental accounting literature.

Section 4 below provides details of – and critiques – action research, and justifies the use of its soft systems methodology variant, while highlighting the links with the dialogic discussions above.

4. A methodological framework to develop and apply new Full Cost Accounting models

(i) Action research - background

Action research has been defined as "social research carried out by a team encompassing a professional action researcher and members of an organisation or community seeking to improve their situation" (Greenwood and Levin, 1998, p. 4); "a type of applied social research that aims to improve social situations through change interventions involving a process of collaboration between researchers and participants. The process is seen to be both educational and empowering" (Newton, 2006, pp.2); and "a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview" (Reason & Bradbury, 2006, p.1). Importantly, action research wants to change the world as well as understand it (Coghlan and Brannick, 2005).

Greenwood and Levin state that action research consists of the following stages, which must all involve both the researcher (acting as a facilitator/teacher) and stakeholders: (i) definition of the problems to be examined (where all parties set the agenda); (ii) the

generation of relevant knowledge about the problems identified; (iii) the learning and execution of social research techniques; (iv) the taking of actions; and (v) the interpretation of results of actions based on learning. Further, they argue that three key elements must be present for research to be classed as action research – research, participation (i.e. a democratic process) and action (conducted with the aim of altering an initial situation). Newton (2006) cites Waterman et al (2001), who argue that action research involves a cyclic process of intervention and evaluation (Lewin’s action research ‘spiral’), and partnership/collaboration between the researcher and the researched as a device to reduce the distance between them (this is a break with traditional research, which argues for separation between the two parties to ensure objectivity).

(ii) The epistemological and ontological positions of action research

Both Greenwood and Levin (1998) and Reason and Bradbury (2006) link action research to the critical theory and pragmatic schools, and the works of Dewey (who believed that all real knowledge comes from action) and Lewin (who is widely accredited as coining the term action research and for stating that the best way to understand something is to try and change it) are cited and brought to the fore¹⁵. Greenwood and Levin also link action research to Freire’s work on dialogics, and to general systems theory (‘GST’) (they argue that the notion in GST of the world as a complex web of constantly changing interacting systems that needs to be examined holistically underlies action research).

Coghlan and Brannick (2005) align action research with critical realism (an approach related to scientific enquiry). They argue that the approach has a subjectivist epistemology (i.e. knowledge is context-driven, there is no single reality, the social world is complex, and the researcher is close to the data and cannot measure it without changing it) but an objectivist ontology (social and natural reality have an independent existence prior to human cognition). They argue that the “basis for validation is the conscious and deliberate enactment of the action research cycle”. They also describe the researcher as both a detached observer and agent of change (per Evered and Louise, 1981). Riorden (1995) is quoted as defining action research as “a kind of approach to studying social reality without separating (while distinguishing) fact from value; they require a practitioner of science who is not only an engaged participant, but also incorporates the perspective of the critical and analytical observer, not as a validating instance but as integral to the practice”.

(iii) A brief critique of action research

Newton (2006) argues that action research might appear to be unscientific (if judged by standards of conventional academic research), as: (i) the close and collaborative relationship between the researcher and the researched is a source of bias as the researcher is no longer independent; and (ii) it is flexible in its design (it advocates a fluid and ongoing process of formulation, implementation, adaptation and evaluation not specified beforehand in a research protocol). Action research narrative has also been dismissed as storytelling (Greenwood and Levin, 1998). However, Newton states that given the marked differences with conventional research, it maybe better to judge action research on its own terms. Outcomes are not necessarily ‘findings’ in the conventional

¹⁵ For example, see Lewin (1935, 1943 & 1948) and Dewey (1900 & 1991).

sense of theoretical progress, but changed behaviour, practices etc. Newton concludes that action research has a considerable contribution to make in the management of change.

Greenwood and Levin argue that action research is more scientific than traditional social science, because it continually links theory and action and judges theory by whether or not it can resolve real-world problems. If extant theory does not work in a particular case, then it will have to be altered. The so-called 'objectivity' of traditional social science is rejected as being false and simplistic. Greenwood and Levin also cite Argyris et al (1985)'s defence of their strand of action research, 'action science'. Action science is based on the premise that social actors defensively react to proposals for change, and that these reactions ('defensive routines') inhibit the solving of problems. Argyris et al argue that to understand the reasons for the maintenance of defensive routines, they must be confronted by intervention in the situation. Without this intervention, it is not possible to obtain a valid understanding – and therefore traditional 'objective' social science research is inadequate.

(iv) Soft Systems Methodology

Soft Systems Methodology ('SSM') was developed from a systems engineering approach by Peter Checkland, using action research (Checkland and Poulter, 2006; this provides a comprehensive overview of SSM, and forms the basis of the discussion below). SSM offers a structured means of undertaking action research as it casts the process of inquiry as a system (although it does not subscribe to the belief that organisations are systems – a common misconception in the literature according to Checkland and Poulter). It therefore addresses the criticism levelled at action research highlighted above – that it is unscientific due to a fluid and flexible design.

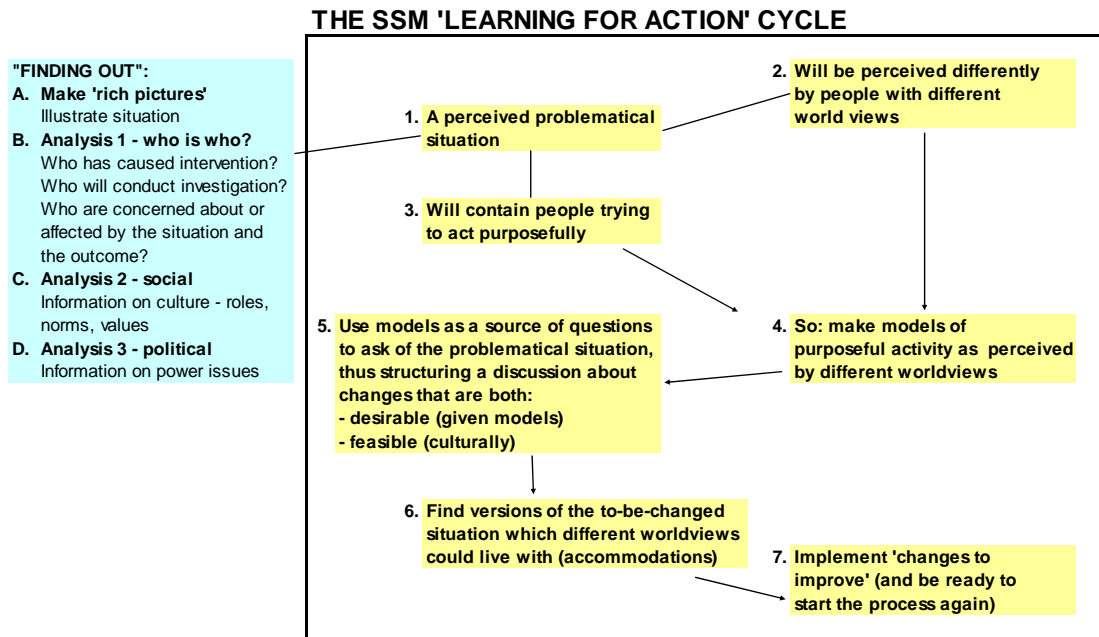
SSM has been defined as: "an action-orientated process of inquiry into problematical situations in the everyday world; users learn their way from finding out about the situation to defining/taking action to improve it. The learning emerges via an organized process in which the real situation is explored, using intellectual devices – which serve to provide structure to discussion – models of purposeful activity built to encapsulate pure, stated worldviews." (Checkland and Poulter, 2006, p. 22). SSM contains the standard action research motifs – dialogic and democratic participation in cyclical learning processes by the researched and the researcher (incorporating a framing of the research problem), planning for action, the action itself, reflection, and further action. Its major strength is that it adopts a structured task approach to each of these stages that utilises carefully defined language. (For example, the initial identification of a problem involves information gathering and the sorting of information under three pre-set headings.) According to Checkland and Poulter this allows SSM to satisfy the criteria of 'recoverability', whereby the researcher explicitly records the process in such a way that an outside observer can understand it and the outcomes. It also makes it possible to set out in advance of a study what will count as knowledge generated from that study. Further, SSM has the advantage of being a well-used, 'mature' methodology (a label afforded by Checkland and Poulter).¹⁶

The SSM process is set out in diagrammatical form in Figure 2 below. Although not repeated here (for technological reasons!), SSM utilises many hand-drawn diagrams.

¹⁶ Given the number of applications that Checkland & Poulter describe, over a considerable period of time, this claim appears to be reasonable.

According to Checkland and Poulter, this illustrates the ‘work-in-progress’ and educational nature of a typical SSM exercise. The diagram clearly illustrates the standard action research ‘motifs’ – problematizing, dialogue, action, and reflection – and the structured and systemic nature of the process.

Figure 2 – The SSM ‘learning for action’ cycle



(Source: Adapted from Checkland & Poulter, 2006, preamble xix & p. 170).

(v) Conclusions

The above discussion illustrates that action research and its soft systems methodology variant links very closely with the dialogic discussions in Section 3. Therefore, such a methodology should allow FCA applications to be undertaken in a dialogic and participatory manner. The discussion will now turn to justifying the application of a revised FCA model within the UK Higher Education (‘HE’) sector, and demonstrating the use of a soft systems methodology ‘learning for action’ cycle.

5. A new application of FCA in a HE setting

There have been significant recent calls by government bodies and pressure groups for the UK HE sector to improve its sustainability performance and demonstrate its sustainability credentials¹⁷. Further, formal exploratory interviews with the management of one UK university, and a review of relevant literature¹⁸ has revealed that (a) UK HE

¹⁷ Note for example the Higher Education Funding Council for England report ‘Sustainable Development in Higher Education’ (see HEFCE, 2008), the People and Planet ‘Green League’ (a performance table produced by a student pressure group that ranks UK universities according to their environmental performance – see People & Planet, 2008), the Universities UK (2008) ‘Greening Spires’ report and SD group, and the Welsh Assembly Government Education for Sustainable Development and Global Citizenship (‘ESDGC’) initiative (see WAG, 2008).

¹⁸ For example, Lozano (2005) cites and summarises prior reviews of both generic sustainability assessment tools and tools developed/adapted for HE, many of which are found to be deficient. He concludes that the

institutions do not appear to be measuring their sustainability impacts in a holistic way; and that (b) no HE institution has yet sought to apply FCA (and hence monetise its impacts to correct prices)¹⁹. All of these facts provide the first plank in an argument to justify the application of FCA in a new, HE setting – there is a knowledge gap in the sector (i.e., a lack of information on the true cost of the activities of institutions) that FCA could fill. Secondly, HE institutions are in a unique position to disseminate the benefits of FCA to a wider audience, and how better to argue for the take-up of a sustainability accounting technique than to demonstrate its use in a real setting?

Thirdly, this author has the worldview that if an organisation is underperforming in terms of its sustainability impacts, an attempt should be made to intervene to alter behaviour. A case study has therefore been selected (involving a new campus development at a University that shall hereafter be called 'UniGreen'), where sustainability has not yet been holistically measured, but where sustainability improvements are almost certainly required. There is hence scope to provide significant information and educational benefits to the organisation by undertaking a FCA exercise in relation to the new campus development. UniGreen's plans involve the university closing an out of town campus in a residential area and building a new campus in the city centre. A 'BREEAM' assessment²⁰ has been undertaken on the new building, which is required to achieve an 'excellent' rating to secure grant funding.

Sections 6 and 7 below illustrate how soft systems methodology is being used to develop and apply a revised FCA model to UniGreen's new campus. While the research project is still relatively in its early stages, a FCA model has already been developed within a project group and the first iteration of FCA calculations are about to commence. Section 6 demonstrates how the stages of the methodology are being applied; Section 7 then describes how a 'FCA for HE' model has been developed to date.

6. Using the methodology

Figure 3 takes the original soft systems methodology learning for action cycle proposed by Checkland & Poulter (as illustrated in Figure 2), and annotates on to it the particular characteristics of the UniGreen case study. The perceived problematical situation in the case study (stage 1 in the Figure 3 cycle) was initially defined as: "UniGreen is not holistically measuring and monetizing its sustainability impacts in relation to new campus developments". This prognosis was reached by the author based on knowledge gathered during initial interview discussions with university management and consultants, and a desk review of published policies and procedures. While the new campus assessment process has involved a BREEAM assessment, a holistic assessment of sustainability has not been made. Further, the university has a fairly rudimentary environmental policy and strategy, but no sustainability policy or strategy.

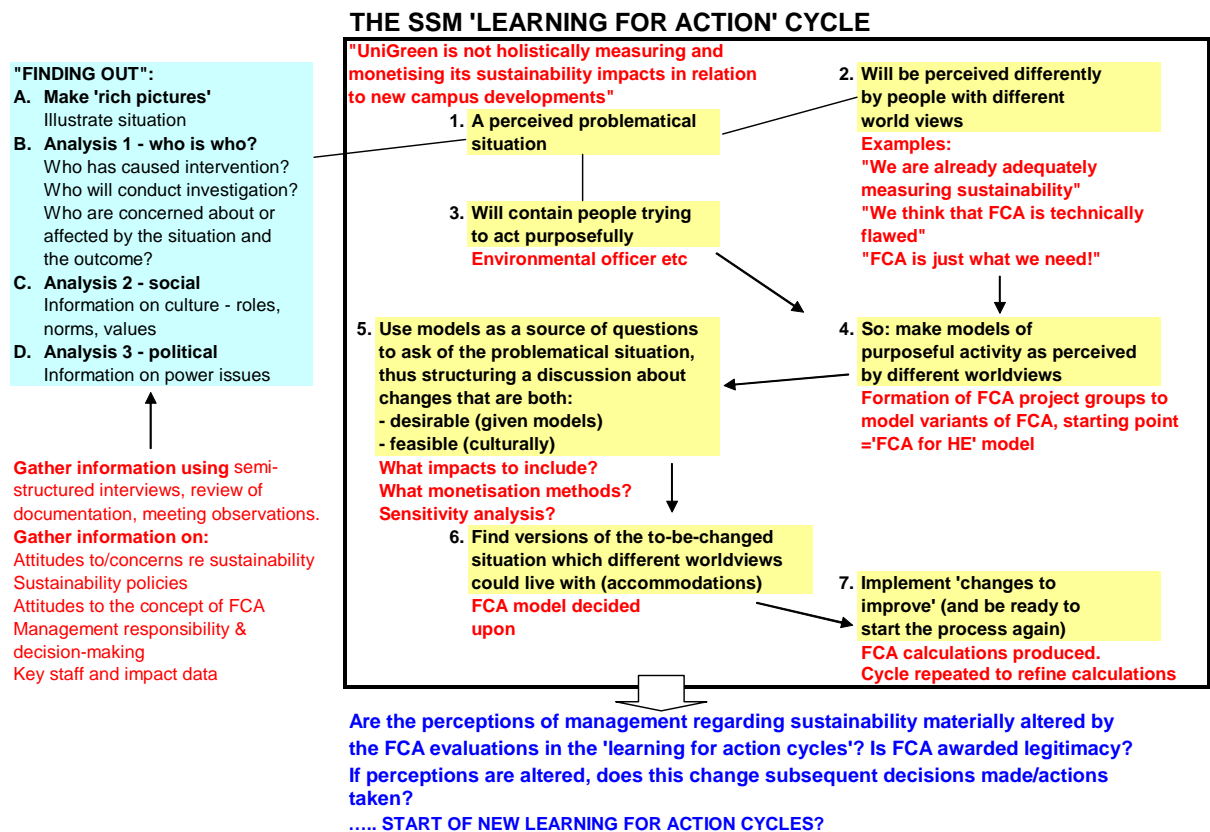
most suitable tool for HE use would be a version of the Global Reporting Initiative's Sustainability Reporting Guidelines that incorporate educational performance indicators to cover curricula, research, and community engagement, as developed by a number of universities in the United States. The main problem with the GRI, however, is that it promotes the creation of a large list of indicators, very few of which tend to be monetary.

¹⁹ The 'Strategy for Action – Updates' document of the Welsh Assembly Government ESDGC initiative has called for the "use of life cycle costings for major build and refurbishment projects to be reviewed" (WAG, 2008, p. 67), and has indicated that more work is needed to achieve this commitment. Life cycle costing could be viewed as a technique akin to FCA, although it is unclear whether the Assembly intends institutions to include holistic sustainability indicators in their costings.

²⁰ 'BREEAM' – the Building Research Establishment Ltd Environmental Assessment Method.

The 'finding out' process has aimed to verify that the problematical situation is accurate, and has also attempted to measure a 'baseline' regarding management activities and attitudes towards (and perceptions of) sustainability prior to the intervention of the action research facilitator (i.e. the author). This has been necessary to allow a comparison to be made with the post-intervention situation (to ascertain the impact of the intervention). The 'finding out' process has thus involved the gathering of data by the author using semi-structured interviews with key management of UniGreen, other university staff, and consultants/advisors/contractors involved in the new campus project. Data has been gathered on management attitudes towards, and perceptions of, sustainability (both generically, applied to the HE sector, and applied to the current operations of the university and the new campus development), university management structures and decision-making processes, current monitoring and reporting of environmental (and wider sustainability) information, current perceptions of sustainability performance and perceived gaps in current knowledge. The interviews have been supplanted by observations made at meetings to discuss the new campus, and a review of relevant further documentation (both relating to existing university environmental and sustainability practices and the new campus project specifically). The interview process has also allowed the perceived problematical situation to be discussed and agreed with management, FCA to be introduced as a solution (and initial feedback on it to be obtained), people to be co-opted onto a project group (to develop an appropriate FCA model), and an initial 'FCA for HE' model developed by the author to be critiqued. The model was developed to provide a starting point for discussions in the project group; it is discussed in Section 6 along with an illustration of how it has been developed further by the project group.

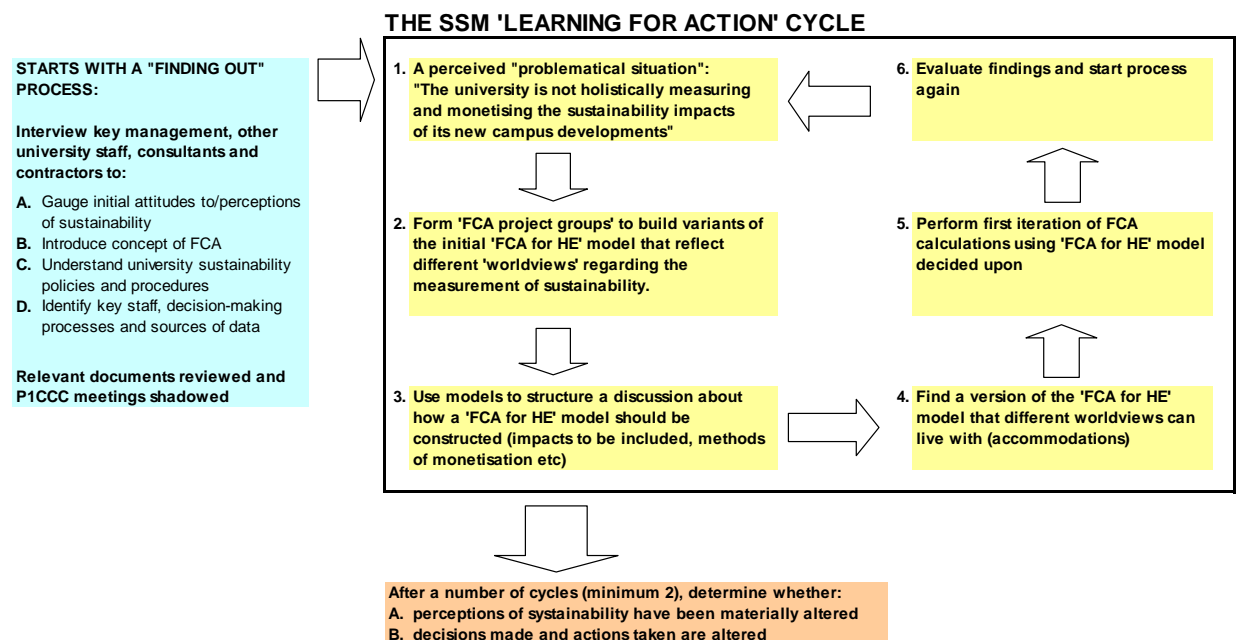
Figure 3 – An amended SSM 'learning for action' cycle for 'UniGreen'.



Differing worldviews (2) have been captured by the 'finding out' interview process (although the worldviews that appear on Figure 3 were written before the interviews were undertaken and have been inserted as an illustration). People that have been trying to act purposefully (3) in this situation include the campus development project committee, the environmental officer of the university, various members of the management board (and numerous other university employees), sustainability consultants and architects. A project group has been formed from volunteers who participated in the initial interviews to construct models of purposeful activity based on different worldviews (4). This has involved members of the group being asked to review and critique the initial 'FCA for HE' model developed by the author, and to construct their own models. During the process, participants have been asked to review the initial impacts identified by the author (and consider whether it is feasible and/or appropriate to monetize such impacts), identify additional impacts, and consider the possible methods of monetization available. A model that accommodates worldviews (6) has been developed following discussions within the group (5). The project group are crucial in ensuring that the FCA development process is participatory and democratic. The FCA calculations will take place at stage (7) (and will be conducted by the author with review at various stages by the project group), with the results presented to the group at the end of the first cycle. A second cycle will then take place where the FCA process is refined further through model re-building, dialogue, and the building of accommodations. It is hoped that the final FCA figures will be presented to the university management board and the board of governors. Management who were interviewed at the start of the process will be re-interviewed at the end, to ascertain whether the whole process has changed attitudes and behaviour.

Figure 4 below attempts to summarise Figure 3 and illustrate the cyclical nature of the process.

Figure 4 – An amended SSM 'learning for action' cycle (simplified)



The research objectives noted in the conclusions to Section 3 can therefore be mapped against various stages in Figure 4. Objectives (a) and (b) will be answered by

performance of stages 4 – 6 in the cycle, and objectives (c) and (d) by analyzing all evidence gathered prior to, during and after at least two full cycles have been completed.

7. Development and application of a 'FCA for HE' model

Table 2 below shows the initial 'FCA for HE' model that was produced by the author as an aid to discussion in the interviews and the first project group meeting. This initial model revised the construction/property development Sustainability Assessment Model ('SAM') framework proposed by Bebbington & MacGregor (2005), to analyse the impacts of UniGreen's new campus development. The SAM was chosen as it is the most complete FCA methodology demonstrated in practice to date, and it has been highlighted as a form of FCA suitable for a dialogic application. However, the shortcomings of the SAM (as discussed in Section 2) have been recognized – and will continue to be recognized – during the dialogic process, and the final model developed and used may bear little resemblance to the SAM. The construction/property development version of the SAM also provides a relevant framework for a new campus development. It was chosen in preference to the more recently developed Urban Development ('UD') SAM due to its relatively small number of headings, and hence its simplicity, which was seen as important by this author given the intention that the model should be an initial starting point to stimulate discussion and should hence not be over-prescriptive or complicated.²¹

The project group (consisting of a Dean of a School moving to the new campus, the University Environmental Officer, the Director of Estates, the University Deputy Vice Chancellor Teaching & Learning with special responsibility for the new campus, the University Director of Strategic Planning, a University Professor with a research background in sustainability and the University Director of Academic Development) has been formed, as noted above, from people who volunteered during interviews conducted at the 'finding out' stage. All volunteers were given details of FCA (and introduced to the initial 'FCA for HE' model) during the interviews.

The project group convened, chaired by the author, with the purpose of building a revised 'FCA for HE' model that accommodated a number of worldviews. They were first given a presentation that:

- (a) recapped on the concept of FCA, its main stages, and the action research (and soft systems methodology) being utilized;
- (b) talked through the initial 'FCA for HE' model discussed at the interviews (Table 2), plus amendments made reflecting comments received during the interview process (Table 3); and
- (c) critiqued alternative sustainability measurement approaches, including Forum's Sustainability Accounting and Lozano's 'GRI for Universities'.

It was then planned that the group would build alternative individual models before reconvening to discuss them. However, the allotted time was wholly taken up by the

²¹The model was only intended as a starting point for discussions, in both the interviews at the 'finding out' stage and the project group. It was decided by this author that, given the lack of knowledge of FCA that the project group parties would have, it would be necessary to start with a model rather than a blank piece of paper. It has been recognized, however, that the final model developed by the project group might differ significantly from the model started with.

group, together, debating various issues surrounding the 'FCA for HE' model presented. In order to round up what had been an open discussion, therefore, and to reach a conclusion on the way forward, the author asked individual participants to identify the five most important impacts that they would wish to see monetized, and encouraged the group to reach a consensus on boundaries and the method of monetization.

Table 2 – Initial 'FCA for HE' model

Summary of the possible impacts of the development and use of the new campus:				
	Economic	Resource	Environmental	Social
	Income from new campus over its life, split between:			
Construction	<ul style="list-style-type: none"> • Monies paid to contractors and professionals (architects, solicitors etc) • Purchase of raw materials & utilities • Returns to providers of finance 	<ul style="list-style-type: none"> • Materials used in construction • Consumption of utilities (water, energy etc) • Creation of intellectual capital and infrastructure resources 	<ul style="list-style-type: none"> • Pollution impacts from materials used in construction • Pollution impacts from consumption of utilities • Pollution impacts of waste 	<ul style="list-style-type: none"> • Provision of employment and employee training (multiplier effects) • Effect of building design on crime
Use	<ul style="list-style-type: none"> • Monies paid to employees (management, academic & research, technical & admin, manual) • Training and staff development • Capital and operating expenditure (incl. depreciation) • Re-investment of surpluses 	<ul style="list-style-type: none"> • Materials consumed in maintenance and refurbishment • Consumption of utilities (water, energy etc) • Creation of intellectual capital 	<ul style="list-style-type: none"> • Pollution impacts from materials consumed in maintenance and refurbishment • Pollution impacts from consumption of utilities (water, energy etc) • Pollution impacts of waste 	<ul style="list-style-type: none"> • Provision of employment and employee training (multiplier effects) • Capital and operating expenditure (multiplier effects) • Capital gains • Urban regeneration • Direct and indirect benefits of education provision • Provision of social facilities
Location		<ul style="list-style-type: none"> • Energy consumption by associated transport network 	<ul style="list-style-type: none"> • Pollution impacts from associated transport network • Brownfield site – minimal loss of habitat and environmental damage? • Brownfield site – existing environmental risks? • Risk of flooding 	<ul style="list-style-type: none"> • Scale and agglomeration economies • Accessibility and social exclusion

Table 3 – Revised model following interview feedback

Summary of the possible impacts of the development and use of the new campus:					
	Economic (narrow)		Social / Economic (wide)	Resource	Environmental
	Income from new campus over its life, split between:	Hypothetical income from existing sites if new campus not built, split between:			
Construction	<ul style="list-style-type: none"> • Monies paid to contractors and professionals (architects, solicitors etc) • Purchase of raw materials & utilities • Returns to providers of finance 		<ul style="list-style-type: none"> • Multiplier effects: • Provision of employment and employee training • Capital expenditure • Returns to providers of finance • Effect of building design on crime 	<ul style="list-style-type: none"> • Materials used in construction • Consumption of utilities (water, energy etc) • Creation of intellectual capital and infrastructure resources 	<ul style="list-style-type: none"> • Pollution impacts from materials used in construction • Pollution impacts from consumption of utilities • Pollution impacts of waste • Educational impact of 'BREEAM excellent' construction (ESDGC)
Use	<ul style="list-style-type: none"> • Monies paid to employees (management, academic & research, technical & admin, manual) • Training and staff development • Capital and operating expenditure (incl. depreciation) • Re-investment of surpluses 	<ul style="list-style-type: none"> • Monies paid to employees (management, academic & research, technical & admin, manual) • Training and staff development • Capital and operating expenditure (incl. depreciation) • Re-investment of surpluses 	<ul style="list-style-type: none"> • Multiplier effects: • Provision of employment and employee training * • Capital ex're (R&M and improvement ex're) and operating ex're * • Capital gains • Urban regeneration • Direct and indirect benefits of education provision * • Provision of social facilities * 	<ul style="list-style-type: none"> • Materials consumed in maintenance, refurbishment and improvement * • Consumption of utilities (water, energy etc) * • Creation of intellectual capital (e.g. research output, creative capital) * 	<ul style="list-style-type: none"> • Pollution impacts from materials consumed in maintenance and refurbishment * • Pollution impacts from consumption of utilities (water, energy etc) * • Pollution impacts of waste * • Educational impact of 'BREEAM excellent' construction (ESDGC)
Location			<ul style="list-style-type: none"> • Scale and agglomeration economies • Accessibility and social exclusion* • Effects of campus move on student & staff 	<ul style="list-style-type: none"> • Energy consumption by associated transport network * 	<ul style="list-style-type: none"> • Pollution impacts from associated transport network • Brownfield site developed vs greenfield site given up • Brownfield site – existing environmental risks? • Risk of flooding

* = based on incremental positive/negative impacts (over and above the impacts of the existing campus sites)

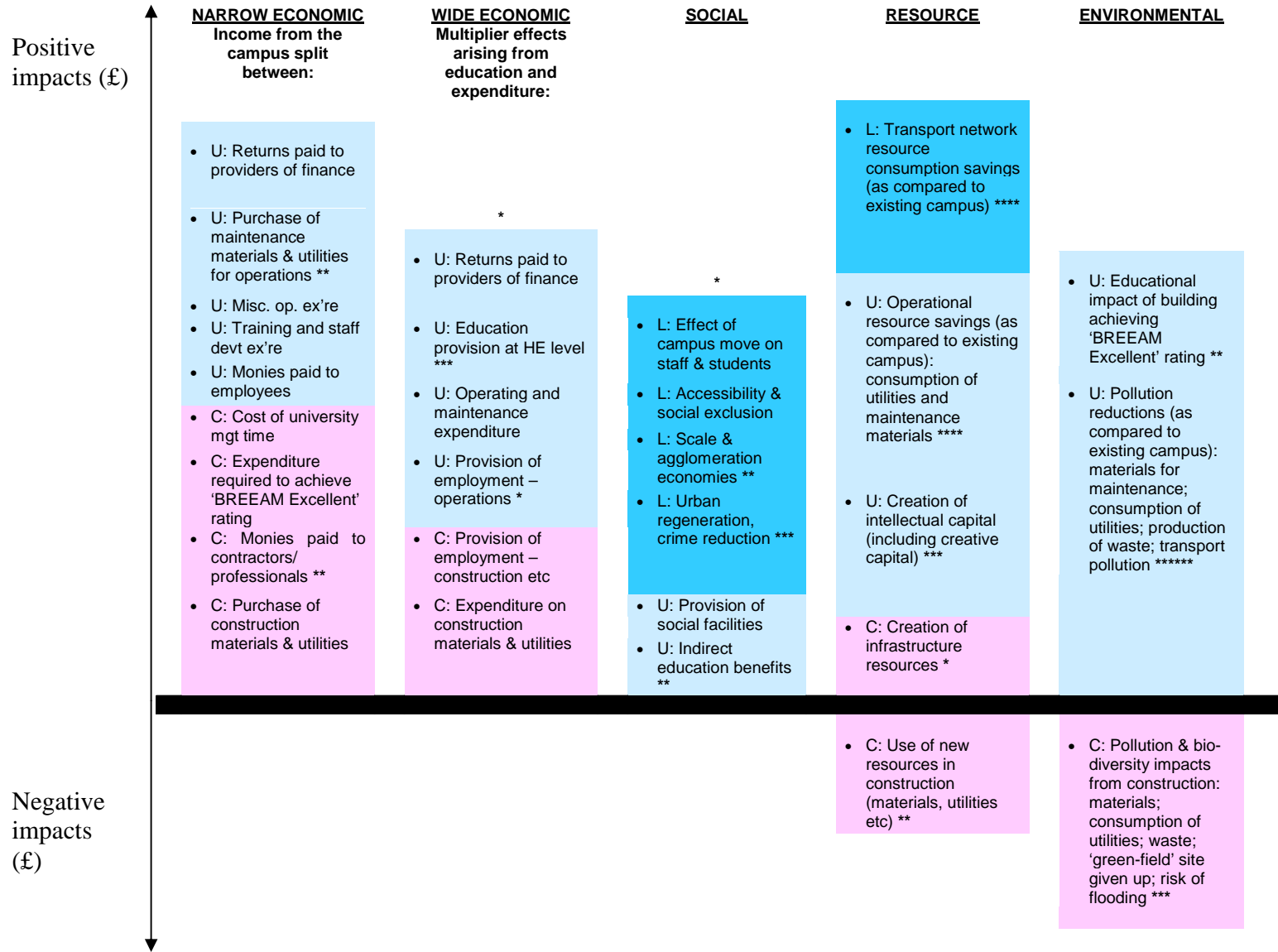
The overall conclusions drawn by the project group were as follows:

- Individual participants expressed an interest in monetising the vast majority of the impacts presented, although there was a bias towards measuring and monetising the social, resource and environmental impacts. The asterisked impacts in Figure 5 represent those that individual participants ranked in their 'top 5'; one asterisk was placed against an impact if it was chosen by an individual.
- It was felt that the impact of the new campus should be measured over as long a period as possible – at least 20 years and ideally over whole life cycle (although it was recognised that the accuracy of forecasts would diminish over time, and that they would be affected by unanticipated events outside of the control of the University).
- It was decided that the monetisation of negative impacts should be based on damage incurred, with a secondary avoidance or restoration cost measurement (if possible) based on the 'best remedy' available ('the best that we could have done if we'd done it differently').
- For clarity, it was thought that it might be wise to present two sets of calculations: the 'stand-alone' impacts of the new campus ('type (a)' calculations), and the incremental positive and negative impacts compared to the existing campus that would be demolished ('type (b)' calculations).
- It was felt that comparisons with the existing campus should be made wherever possible, with reductions in impacts such as pollution from energy usage, the associated transport network etc being seen as a positive benefit.
- It was felt that it might be difficult to highlight the incremental impact of the new campus on employment, education provision etc given that Schools (faculties) were being moved that already existed – therefore defer these calculations at present.
- It was decided overall that the project was worthwhile, but that it was over-ambitious; it was therefore recognised that measurement and monetisation of some impacts was not possible or practical at present.

The group then agreed to let the author begin to calculate FCA numbers, and to reconvene once a first iteration of the calculations were available.

Following the meeting, the author circulated the main conclusions drawn to the group via e-mail, and an action plan to measure and monetize impacts. Given that the group had also struggled to envisage the outputs of the whole project during the meeting, an illustrative output graph (that also highlighted the impacts deemed most important by the participants during the meeting) was also circulated (see Figure 5 below).

Figure 5 – illustrative FCA output (including impacts discussed and agreed at project group meeting)



KEY

- C** - Possible impacts during the **CONSTRUCTION** phase of the new campus
- U** - Possible impacts during the **USE** phase of the new campus
- L** - Possible impacts due to the **LOCATION** of the new campus

* = Impacts that project group participants ranked in their 'top 5' (one asterisk per person)

8. Conclusions

This paper has highlighted – and critiqued – the arguments that state that FCA is a potentially powerful tool to bridge the 'information gap' that prevents more sustainable behaviours, particularly when practiced in a dialogic and democratic form. It has argued that new applications of FCA in new contexts are required to further test these assertions, and it has proposed a new case study from within the HE sector in the UK that will give benefits to the organization chosen and the sector as a whole, in addition to testing these assertions. An action research methodology, based on soft systems methodology, has therefore been developed to analyse a new university campus development using FCA in a dialogic and democratic manner.

While it is too early to draw significant conclusions from the UniGreen case, it is encouraging that the management of the University have been very open to the idea of Full Cost Accounting, and the notion that it should be practiced in a dialogic and participative manner (as evidenced by their willingness to participate in the overall process and the project group in particular). It is the hope of the author that the 'learning for action' cycle that is currently in progress will generate both a meaningful FCA model (that succeeds in monetizing impacts, or at very least highlighting which impacts are important), and a change in worldviews regarding the sustainability performance of the University.

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