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UNIVERSITY OF LEEDS
University of Sheffield
UNIVERSITY of York

The prospects for environmental accounting and accountability in China

Author names and affiliations

Given name: **John** Family name: **Margerison**
De Montfort University
Department of Accounting and Finance
Faculty of Business and Law
The Gateway
Leicester
LE1 9BH
UK
jpmargerison@dmu.ac.uk
Given name: **Mingyue** Family name: **Fan**
Jiangsu University
School of Management
Zhenjiang 212013
China
fanmy@ujs.edu.cn
Given name: **Frank** Family name: **Birkin**
University of Sheffield
Sheffield University Management School ,
Conduit Road
Sheffield
S10 1FL
UK.
f.birkin@sheffield.ac.uk

Corresponding author:
John Margerison

Present / permanent address: Not applicable as no changes

Abstract

Foucault's ideas on *episteme* change are used to help understand change taking place in China from the "industrial civilization" to an "ecological civilization." If *episteme* change is taking place this could be reflected in the philosophies and attitudes of Chinese accountants and their environmental accounting work will be developing. The conclusions are that: China is slowly moving towards an ecological civilization; based around the thinking of Chinese accountants an epistemic change is in evidence in tandem with emerging interest in ancient Chinese philosophy; Chinese accountants' engagement with environmental accounting and accountability is evidence of reduced *specialization*.

Keywords: Sustainability. Environmental accounting. Episteme change. Ecological civilization. China. Accountability.

1. Introduction

This paper considers that the responses that have arisen in China around environmental sustainability are unique for a major emerging economy. The environmental sustainability network is dominated by government, not corporations, and links to ancient Chinese philosophy, whilst not immediately apparent, do persist. Furthermore, China is the first major emerging economy to commit to a new developmental direction, to become an "ecological civilization".

To study this situation, this paper focuses on providing both theoretical insight and empirical findings to answer the question – "What are the prospects for changes in environmental accounting and accountability in China as it moves towards ecological civilization?" Foucault's ideas on episteme change are used to help understand change taking place in China - the transition from the Modern episteme to an emerging episteme as represented in this case by the "ecological civilization" policy adopted by the Chinese government since 2007. Kendall and Wickham (1999) have interpreted Foucault in suggesting that such discontinuities only come about where a set of consequences mesh together in a unique way and thus allow the actants to change their thinking. Foucault (2002) correlates episteme change in European history with significant changes in the *a priori* foundation of knowledge which in turn has many consequences. In this study it is the thinking of Chinese accountants that is examined using interviews and surveys. The extent to which this changed thinking affects their environmental accounting work is also examined by looking at changing accounting responses using evidence gathered during interview visits. Because of the high profile of the Chinese government, this study also gathers evidence

of environmental accountability of Provincial Environmental Protection Agencies based on interviews and documentary evidence.

For the purposes of this paper the following definition of environmental accounting (and accountability) is used: the measurement of and reporting on an organization's interactions with the natural environment in order to assist in its discharge of responsibility. Organizations in this study include companies and government as represented by Provincial Environmental Protection Agencies.

The paper first provides background and a brief review of literature and previous research on: 1) the concept of accountability (Gray, Owen, & Adams, 1996); 2) the Chinese government policy on ecological civilization (Tu, 2013; Wang, He, & Fan, 2014) including its links to ancient philosophy; 3) social and environmental accounting and accountability in China. The research philosophy is discussed and the methods employed are described and justified. It then outlines the theory used: Foucault's ideas on episteme change (Foucault, 2002) and the identification of a further, recent episteme change that became evident after Foucault's death (Birkin & Polesie, 2012). The findings and discussion use an analytical method based on Foucault's epistemic analysis which looks for: 1) a change in *a priori* knowledge and consequential recognition or re-evaluation of problems with the existing dominant episteme; and 2) evidence of the consequences of an emerging episteme. The conclusion summarizes the paper, answers the research question, and makes suggestions for further research.

The contributions of this research are: 1) the use of Foucault's ideas on episteme change to examine the changes taking place in the environmental sustainability sphere in China; 2) the focus on Chinese accountants' philosophies and attitudes to the environment and the links to ancient Chinese philosophy; and, 3) the examination of environmental accountability responses by the Chinese government through Provincial Environmental Protection Agencies. It is hoped that this research will 1) empower Chinese accountants in their environmental accounting work; 2) counter the sometimes negative impressions about emerging economies such as China and their environmental accountability record; 3) provide some theoretical understanding of the major transformations taking place with regard to the Chinese civilization.

1.1 Background and review of literature

"Accountability" is used to describe all techniques, including accounting and reporting in both calculative and narrative forms, by which an organization gives an account of its activities to those people and groups that have a right to that information (both internal and external). This definition is based on work by Gray, Dey, Owen, Evans, and Zadek (1997); Kamuf (2007); Roberts and Scapens (1985); Staubus (2003). Typically accountability information in the environmental accountability area has comprised both calculative and narrative (Kamuf, 2007). Calculative information is interpreted to mean information using accounting numbers including techniques, such as Full Cost Accounting (Bebbington,

Gray, Hibbitt, & Kirk, 2001) and Ecological Foot-Printing (Wackernagel & Rees, 1996); whilst narrative information is based on words, such as reporting on environmental aspects and impacts and the measures in place to manage the environmental aspects.

Existing research and scholarship has identified that the central strands of Chinese philosophy (Confucianism, Taoism[1] and Buddhism) have strong links to ecology in their ideas, for example: Confucianism argues that human flourishing can only take place within nature (Berthrong, 2003); Taoism recognises the need for harmony between heaven, earth and humans (Miller, 2003); and Buddhism teaches humans as aspiring to oneness with the natural environment (Sponsel & Natadecha-Sponsel, 2003). These three ancient philosophies, it has been argued (Pan, 2011), have created an ecological wisdom of the ages based around ideas of harmony between heaven, man and the earth; reciprocity; an "all under heaven" empiricism (or *Tianxia* in Chinese); and an active self-regulating nature. This study shows that these philosophies are still influential in China today.

However, the industrial model of development used in modern China has created unprecedented levels of material wealth based on use of resources and energy consumption but at the same time this has brought serious pollution and ecological destruction (Ma, 2007). It has been further noted that global capitalism had transferred the most polluting, resource-intensive and high-risk manufacturing industries to developing countries such as China (Ma, 2007). This allowed developed countries to alleviate the pressure on their own environments without making any changes to their model of growth (Ma, 2007). In this context China developed its industrial economy at the expense of heavy environmental degradation which has been seen to be unsustainable (Ma, 2007).

Senior Chinese government figures (Pan, 2011) from 2007 outlined the concept of ecological civilization (sometimes called eco-civilisation) with ancient understandings of an harmonious society being incorporated into the rhetoric. Oswald (2014) reported that in 2007 at the Seventeenth National Congress of the Communist Party of China, Party General Secretary Hu Jintao announced a new model of growth incorporating "ecological civilization" to replace the old unsustainable industrial model "industrial civilization". In 2013 the official organ of the Central Committee of the Communist Party of China (CCCPC) outlined the following seven basic features of ecological civilization (Jiang, 2013): (1) Human beings are a part of nature; (2) Since it is nature that has given us life, we should feel gratitude towards nature, repay nature, and treat nature well; (3) Humans are entitled to exploit natural resources, but we must take the tolerance of ecosystems and the environment into account when doing so in order to avoid overexploitation; (4) Human beings must follow the moral principles of ensuring equity between people, between countries and between generations in resource exploitation; (5) We should advocate conservation, efficiency, and recycling in the utilization of resources so as to maximize

[1] Taoism may also be spelt as Daoism.

efficiency whilst keeping consumption and the impact on nature to a minimum; (6) We should view sustainable development as our highest goal; (7) The fruits of development must be enjoyed by all members of society and not monopolized by a small minority. Oswald (2014) concluded that eco-civilization was more than a rhetorical slogan as it was attached to specific actions and goals that represented a positive move towards environmental sustainability in China.

This paper argues that from 2007, when the ecological civilization policy was embraced by the Chinese Communist Party, a change took place – an episteme change. In our research this change is evidenced by an upsurge of environmental accounting. As a starting point, research prior to 2007 on environmental accounting in China provided little evidence of the use of modern environmental accounting techniques (Rowe & Guthrie, 2009) and concluded that environmental accounting was rare and that environmental awareness was generally low (Xiao, 2006).

Research on environmental accounting and reporting in China since 2007 has been tackled by a number of contributions (some focusing more on the more general area of corporate social responsibility). The emphasis in this body of research has been the increase in reporting by Chinese listed companies on environmental matters as well as the drivers for this reporting (Hofman, Moon, & Wu, 2017; Lee, Walker, & Zeng, 2017). Most commonly these papers have used an institutional theory lens (Luo, Wang, & Zhang, 2017; Yin, 2017) and have identified government as the key pressure using coercive mechanisms (Marquis & Qian, 2014; Marquis, Yin, & Yang, 2017), with to a lesser extent mimetic pressures from peers (Zhao & Patten, 2016). So, in terms of this paper, although there is evidence of an increased engagement in reporting on environmental matters as part of CSR reporting by Chinese companies, the existing research has tended to focus on CSR reporting and has thus far provided evidence mainly of Chinese listed companies. The majority of the existing research has looked at reporting whereas this research has looked at the accountants and the internal accounting mechanisms in companies of varying sizes – from listed companies through to smaller companies, state-owned and non-state-owned. This suggests three gaps in that: 1) the accountants themselves have not been questioned; 2) a variety of company types have not been sampled; 3) accountants' philosophical views have not been solicited. In that this research seeks to address these gaps it is in this sense completely novel.

With regard to the theoretical foundation of this paper and the use of Foucault's ideas in earlier accounting research, Armstrong (1994) summarised two sets of Foucauldian ideas, disciplinary power and governmentality based on the overall theme of power, used most often in research. In particular: "the influence of Foucault has lent weight to the movement amongst accounting researchers to question the facility and neutrality of accounting information and investigate its implications in power relationships" (Armstrong, 1994, p. 50). These themes have been used continuously over the period since Armstrong's article. Our article does not seek to review all these contributions (Armstrong has been cited in at least 260 articles) but there have been important contributions by Roslender (1996),

Broadbent and Laughlin (2002), Bebbington and Gray (2000) and Gallhofer and Haslam (1997). These and many others have been cited in V.E. (2012) who reviewed Foucault's influence on accounting research and concentrated on the disciplinary power ideas and their use.

With regard to Foucauldian episteme change, Armstrong (1994) referred to the use of discursive "conditions of possibility" in research in an attempt to periodize accounting innovation, but he was sceptical of its use. Recent use of Foucault's episteme change ideas by accounting academics has been published in the ethics (Birkin & Polesie, 2011) and ecological economics (Birkin & Polesie, 2013) literature.

Moving away from corporate responses, there has been little or no research on environmental reporting by government in China. This article seeks to address this in an exploratory fashion using reporting by Provincial Environmental Protection Agencies (PEPAs). Further, research which looks at the philosophies and attitudes of Chinese accountants – particularly their relationship to the natural environment and to philosophical influences – is also largely absent. Hence this article, with its linkage of episteme change to ecological civilization and with its focus on accountants and environmental accountability of both companies and government, represents a novel approach in the accounting literature.

1.2 Philosophy of this research and methods

This study uses an interpretivist approach to examine signs from a variety of sources (mainly surveys and interviews) in China to answer the research question. Myers (2013) argued that an interpretivist approach involved gaining access to reality through social constructions such as language, shared meanings, and instruments. In effect it involves integrating human interest into the study (Dudovsky, 2015). Chowdhury (2014) developed this understanding of an interpretivist approach to mean the study of the world through subjective thoughts and ideas; seeing the world through the eyes of the people being studied and therefore allowing multiple perspectives of reality (rather than the "one reality" of positivism). Hence, he argued that value-free data cannot be obtained – since the researcher uses his/her own preconceptions in order to guide the process of enquiry (Chowdhury, 2014). In that this research does not seek universal truths or causality between variables and is guided by the researchers' interpretation first of textual sources and then the attitudes of Chinese accountants, it is an interpretivist approach.

This study has a basic qualitative research design (Bryman & Bell, 2011) with thematic analysis performed around Foucault's ideas on episteme change (Foucault 2002). This is achieved by looking for signs that the modern episteme is no longer viable. This viability is questioned using four sets of questions that are developed in the Theoretical Framework section summarized as – 1) right and proper conduct; 2) specialization; 3) anthropologization; and, 4) mathematization. Then evidence is presented of the possibility of an emerging episteme with its consequences reflected in the philosophies and

thinking of Chinese accountants and the accounting and reporting practices of Chinese companies and government. For this paper Chinese accountants were researched as they have been seen to hold the key to changing environmental accountability (Bebbington et al., 1994).

Data collection

The methods of data gathering used in this research were interviews with Chinese accountants, together with additional evidence gathered during the interview visits; surveys of Chinese accountants; and, a visit to a PEPA (involving interviews and documents provided), together with a survey of PEPA reporting coverage across all provinces in China.

The interviews took place in 2010 and 2011 and on average took 30/40 minutes. They covered: interviewee – background information; information about the company and its engagement with environmental accounting; and, information about the interviewee's involvement in the environmental accounting and their personal philosophy on the environment (a summary of the interview schedule can be found in Appendix 1). Each interview was attended by one of our team and a local Chinese academic who acted as interpreter, although in most cases the interviews were conducted in English with some help from the interpreter. Not all the interviews were recorded because some interviewees objected to recordings taking place. The transcripts of the recordings or the notes of the interviews were reviewed by the local academic for accuracy and revised accordingly. Where possible the accountants' statements have been used to support the research question and in particular to identify relevant consequences.

The surveys were carried out in English over late 2014 and early 2015 (first requests then follow up requests) using a web based survey engine (https://www.surveymonkey.com/) and email requests to sampled accountants. The surveys differed slightly according to the group but the two key common questions (Q1 and Q2) are detailed in Tables 2 and 3 below. A five point Likert scale was used with the score for each response in brackets: Q1 - Strongly agree (1), Agree (2), Neither Agree nor Disagree (3), Disagree (4) and Strongly Disagree (5); Q2 - Very strong value or significance (1), Strong value or significance (2), Some value or significance (3), Very limited value or significance (4), No value or significance (5).

The visit to the Liaoning PEPA involved two interviews with the PEPA officials (in Shenyang and Fushun) that were quite unstructured, starting with an opening question asking the official to tell us about their work and the work of their office. There were additional questions about visits to companies, reporting to the PEPA by companies and the sanctions available to PEPA in cases of non-compliance with environmental regulations by companies. The main documentary evidence from the PEPAs was their public reporting on environmental matters.

The sample group for the interviews (sixteen in total) was made up primarily of Chinese company accountants together with two interviews with officials from a provincial environmental protection

agency and an interview with an accountant official of the Chinese Institute of Certified Public Accountants. The sample was selected by two Chinese academics who were briefed on the aims and objectives of the research. Based on the brief, the two academics selected accountants and officials in their region (Liaoning Province and Shanghai) who were known to them and who would most likely be involved in environmental accounting initiatives. See Table 1 that outlines the background of the interviewees and the nature of their organizations:

Table 1 – Interviewees and their organizations

Interviewee job description	Interview Date	Location	Organization	Industry	Employees in China
I1. Senior Finance Manager	15 April 2010	Shenyang	C1.Chinese company – part of German multinational	Engineering	200
I2. Financial Accountant	17 April 2010	Shenyang	C2. Chinese owned company	Automobile parts	65
I3. Finance Director	19 April 2010	Shenyang	C3 Chinese owned company	Animal feedstuffs	5,000
I4. Director of financial department	21 April 2010	Shanghai	C4. Chinese owned company	Building and waste management	500
I5. Financial controller	21 April 2010	Shanghai	C5. American owned company	Electronic tools and machinery spare parts	100
I6. Asset and investment manager	22 April 2010 and 18 April 2011	Shanghai	C6. Chinese quoted company	Dairy products	20,000
I7. Deputy Manager, Accounting and Tax Department	22 April 2010	Shanghai	C7. Chinese quoted company	Electronics	4,000
I8. Deputy Secretary General	11 April 2011	Beijing	Professional body	CICPA	250,000 members
I9. Local junior official	13 April 2011	Shenyang	Chinese government	Environmental protection bureau	1,200
I10. Chief Accountant	14 April 2011	Shenyang (Fushun district)	C8. State Owned company	Mining safety	1,200
I11. Vice Director of the Accounting Department	14 April 2011	Shenyang (Fushun district)	C8. State Owned company	Mining safety	1,200
I12. Junior Accountant	14 April 2011	Shenyang (Fushun district)	C8. State Owned company	Mining safety	1,200
I13. Local senior official	14 April 2011	Shenyang (Fushun district)	Chinese government	Environmental protection bureau	Not given
I14. Chief Accountant	15 April 2011	Shenyang	C9. State owned company	Engineering materials	300

I15. Junior Accountant	15 April 2011	Shenyang	C9. State owned company	Engineering materials	300
I16. Director of Sustainable Development Research Division	19 April 2011	Shanghai	C10. Chinese quoted company	Steel	130,000

The three sample groups for the 2014 and 2015 surveys were again selected in a purposive way: Chinese accounting academics who were members of the Chinese Committee of the Centre for Social and Environmental Accounting Research (https://www.st-andrews.ac.uk/csear/) (sample size 57, responses 13); Chinese accountants in a variety of positions in China and overseas based on our professional network (sample size 47 responses 10); and, Chinese undergraduate accounting students at De Montfort University and the University of Sheffield, UK (sample size 171 responses 81).[2] These three groups are different, but common to all the respondents was that they were Chinese and from an accounting background. The response rates were poor (overall 38%) but the aim of the research was not to gain representative findings when, for example, the Chinese Institute of Certified Public Accountants has 250,000 qualified members and estimates that at least 300,000 others are working in the accountancy profession in China (CICPA, 2014).

The Liaoning PEPA was selected because in the interviews with accountants a common theme was the importance of and dependence on government in the environmental area during the current phase in China's development. As a result the assisting academic organized interviews and visits to two Liaoning PEPA local offices in 2010 and 2011 and the environmental reporting by the PEPA was furnished to the researchers at the time. The survey of all PEPAs in China and their reporting was carried out in 2015 using their Chinese language websites.

Data analysis

The analysis is based mainly on qualitative research method, with some limited quantitative analysis of responses from the interviews and surveys. The quantitative analysis is not to arrive at statistical relationships – rather using descriptive statistics so as to summarize modes within survey responses and to assist in interpretation of themes using qualitative analysis as discussed below. The findings and the discussion are linked together in Section 3.

The qualitative analysis of themes is based on Foucauldian episteme change as discussed below in the Theoretical Framework - Section 2. In summary, Foucault's examination of historical episteme change leads to four sets of questions by which the viability of the existing episteme may be questioned and four main types of consequences indicating that a new episteme is emerging. These questions and consequences form the basis of the analysis. For example, does the evidence from this research indicate

[2] The results for the three sample groups are aggregated in the Results section below and in this paper no attempt is made to compare their responses.

that viability of the existing dominant episteme is in question and is there evidence of episteme change taking place in China? If the answer to these questions is yes on both counts, then it should be possible to identify consequential evidence to support an episteme change in the thinking of Chinese accountants and in the engagement in environmental accounting practices by Chinese accountants. This evidence is mainly in the form of the answers to the philosophical and attitudinal questions asked in interviews and surveys; in the practices reported by the accountants and PEPA officials in the interviews; and in reports and other evidence of developing environmental accounting practices.

2. Theoretical Framework

This paper argues, based on empirical evidence and government policies, that change is taking place in China away from the growth at all costs of an "industrial civilization" towards an "ecological civilization". Further, that changes are taking place in Chinese accountants' environmental accounting responses. This change is explained using ideas on episteme change from Foucault (2002). These ideas are discussed below together with a justification for their use and application in this paper.

Foucault (2002 p183) explained an *episteme* as: "In any given culture and at any given moment, there is always one *episteme* that defines the conditions of possibility of all knowledge, whether expressed in a theory or silently invested in a practice." Birkin and Polesie (2011) interpreted Foucault's notion of an *episteme* as what knowledge makes possible, the consequences of which define the formal knowledge an age. Foucault (2002) was able to identify different epistemes and the consequences that could be attributed to episteme change. He anticipated that a new possibility of knowledge would undermine the existing Modern episteme with his comment that it would be erased effectively as epistemological man (see below) would be erased "...like a face drawn in sand at the edge of the sea" (Foucault, 2002).

Birkin and Polesie (2011) made the following substantive points in support of Foucault's ideas on episteme change: 1) Foucault's ideas apply to the human sciences (notably economics, sociology and psychology) and as such are not limited to the social sciences and this allows for a wider view than that taken using Bhaskar's (1978, 1979, 1986) notions of realism; 2) Foucault's epistemic analysis can be used to reveal a now emerging possibility of knowledge that derives from explanations of human origins; 3) This epistemic analysis hence goes beyond structuration theory (Giddens, 1991) within which origins are not considered and consequently the status quo is not challenged; 4) Since the way this study uses Foucault deals with the *a priori* of knowledge it underpins or sets the operating arena for the more common uses of Foucault, such as critical discourse theory, since a new episteme would radically change any consequential discourse 5) Even theories similar to episteme change such as Gramsci's (1982) Cultural Hegemony and Institutional Logics (Friedland & Alford, 1991) are dependent upon the

a priori knowledge of the society in which they operate so too are consequential – not formative – with regard to a change of episteme.

Birkin and Polesie (2012) argued that there is now a new possibility of knowledge, of an *a priori* epistemic change, from Modern to what they called Primal. The Modern episteme since around 1800 was based around abstract, anthropocentric, logical belief systems and this, they have argued, has led to unsustainable development (Birkin & Polesie, 2012). The emerging "Primal episteme" based on the knowledge of origins within the human sciences provided by scientific studies which thereby removes Foucault's epistemological man (Foucault 2002) and circular, self-referencing Modern knowledge of man, created by man for man (Birkin & Polesie, 2012). In Foucault's analysis (2002), the Modern episteme was distinguished by a search for origins prompted by the questioning of the extent of God's creativity. Throughout the nineteenth century to the present day, origins have been found or approached in many disciplines from quantum physics, evolutionary theory, genetics and on to cosmology. But crucially for Foucault, origins had not been found in the human sciences including economics (and traditional accounting although this discipline was not part of Foucault's analysis). In the absence of origins, Foucault (2002) argues that an "epistemic or epistemological man" had to be created to provide an *a priori* foundation for the human sciences. This means that when the origins of human sciences were sought all that was found was man's image looking back, which created a Modern human knowledge that is made by man to serve man. This circular, self-reflecting and self-absorbed knowledge in the Modern episteme is high-lighted by Rational Choice theory (Coleman & Fararo, 1992). The problems with this approach to knowledge are now becoming increasingly evident as un-sustainable development.

Consequently, broad evidence for the emerging Primal episteme lies in the empirically grounded science that provides evidence for the origins of man lying outside the trap of narrow self-reflection. This "washes away" epistemological man. The new disciplines of ecological economics, environmental and social accounting are distinct because their *a priori* foundations reach out beyond the abstractions of self-serving logical belief system of epistemological man to draw on empirical evidence. Such evidence for a new episteme is not limited to the human sciences but draws on other new disciplines supportive of knowledge of a wider world out of which mankind arise such as: thermodynamic dissipative structures (Hammond, 2004), Chaos theory (Gleick, 1988), genetics, evolutionary science, evolutionary psychology, ecological principles and the ever extending raft of relations revealed by empirical science which reveal the complexity and interdependence of the innumerable relations that constitute ourselves, our industries, our societies and ourselves. This is a new episteme which, not incidentally, finds support in China in her ancient ideas and philosophies (Birkin & Polesie, 2012).

Birkin and Polesie (2011) proposed four sets of questions, derived from Foucault, by which the viability of the waning Modern episteme could be questioned: The first set of questions is about right and proper conduct – that is morality. Foucault (2002 p357) argued convincingly that Modern thought has

never been able to propose a morality. In essence Foucault's argument was that due to the centrality and format of epistemological man in the Modern episteme, that distorts and twists all relations to the utility of man, morality is not possible under these circumstances. The second set of questions is around *specialization*. Birkin and Polesie (2011) noted that specialization is an inevitable consequence of the creation of fragmented, self-reflecting, abstract origins. For the purposes of this paper, the most relevant reductionism is "economism" – for example in the enormous weight that anthropocentric economic considerations can bring to bear upon sustainable development debates. Such as the notion that supply and demand and market forces are the key to all decision making and thereby ignoring biological, ethical, cultural and empirical scientific dimensions. The third set of questions is around *anthropologization*[3]. Foucault (2002 pp379-380) argued that *anthropologization* was the greatest internal threat to knowledge in his day (in his case the 1960s) and was the source of the precariousness in the human sciences. In Birkin and Polesie's (2011) terms *anthropologization* is a consequence of epistemological man and the centring of everything around man. Birkin and Polesie (2011) noted that this powerful self-centring tendency of man has led to ideas of "extreme narcissism[4]" in accounting (Amernic & Craig, 2010). The fourth set of questions is around *mathematization*, interpreted to mean the ordering of knowledge reduced down to mathematical relationships. Here Birkin and Polesie (2011) argued that there has been an unjustified over-application of mathematics in economics, accounting and finance models that simply excludes many of the relations that are constitutive of the world we occupy. Such over reliance on mathematical descriptions of the world may be attributed in part to: 1) the enormous success of mathematics in physics and other sciences in the nineteenth century; 2) the need to bolster the shaky, totally subjective "epistemological man" foundations of Modern human knowledge with precise and substantial mathematics (a tendency still glaringly apparent in economics, accounting and financial analyses).

Birkin and Polesie (2011) summarise the ongoing epistemic change as going from the abstract, logical belief systems of Modern thought to the empirically grounded wealth of relations revealed by a range of sciences. The significance of China is that she has set herself on a path to develop a civilization – an Ecological Civilization - based on recognising and living within these relations. Furthermore that China has been influenced by her ancient philosophies to live in a world of balanced, complex and uncertain relations with concepts such as Harmonious Development (some 3,000 years old). As examples: Taoism and its recognition of the Way of nature as something outside of mankind yet determinative of mankind; and the emperor's "mandate from heaven" and consequential responsibility – and moral bearing – with regard to the empirics of Tien Xia or "all under heaven". Traditional Chinese thought hence contrasts strongly with Modern thought by having an open and inclusive understanding of mankind living as part

[3] Humans seen as the central or most important element of existence.

[4] Self-obsession leading to unethical behaviour

of a dynamic and uncertain world as opposed to a narrow reduction of a world provided entirely to serve man's utility.

Finally Foucault's epistemic analysis is not determinative or prescriptive for it is potentially open to inputs from all disciplines and cross-disciplinary analyses, because of the fundamental, unrestrained nature of the questions he allows to be asked. Furthermore, Foucault's approach has the promise not only of explaining the processes of epistemological change but also the consequences of such change.

3. Findings and discussion

Foucault's ideas on episteme change have been used to help understand change taking place in China - the transition from the modern episteme or "industrial civilization" to an emerging episteme as represented by the "ecological civilization" policy adopted by the Chinese government since 2007. The key viability problems identified with the modern episteme are around right and proper conduct (the lack of a morality), specialization, anthropologization and mathematization. Using interviews with and surveys of Chinese accountants we have also examined the influence of ancient philosophy in the working lives of Chinese accountants.

It was the surveys of Chinese accountants that looked at viability issues (see Table 2 below):

Table 2 - Summary of responses to survey question: Please indicate the extent to which you agree or disagree with each statement about your attitude towards sustainability and the natural environment

Statement	Strongly agree	Agree	Neither agree not disagree	Disagree	Strongly disagree	Rating Average	Response Count
(1) Humans should be one with the natural environment (Buddhist philosophy) (Sponsel & Natadecha-Sponsel, 2003)	37	52	11	0	2	1.80	102
(2) There should be harmony between heaven, earth and humans (Taoist philosophy) (Miller, 2003)	39	43	18	1	1	1.84	102
(3) Human flourishing can only take place within the larger matrix of nature (Confucian philosophy) (Berthrong, 2003)	19	45	34	3	2	2.26	103
(4) Human technological ingenuity will find the solution to all environmental problems (Homer-Dixon, 2001)	9	17	32	37	8	3.17	103

(5) Careful use of natural resources will enable future generations to enjoy the same benefits from the earth that we have enjoyed (Solow, 1992)	42	44	11	5	2	1.86	104
(6) Current patterns of consumption, economic growth and population growth are unsustainable (Meadows, 1991)	26	49	22	3	2	2.08	102
(7) Radical change is needed to avoid severe, negative effects on future generations (Stern, 2007)	24	46	23	8	2	2.20	103
(8)Attitudes in society are changing that could lead to a sustainable future (Bonnett, 2002)	26	54	20	1	2	2.02	103

The respondents tended to disagree with Statement (4) Human technological ingenuity will find the solution to all environmental problems and the rating average of 3.17 supports this. This is considered to be a typical "modern" anthropocentric statement – the notion that humans can control nature - and has been largely rejected by the respondents. Statements 5, 6, 7 and 8 all gained high levels of agreement represented by the rating averages of 1.86, 2.08, 2.20, 2.02 suggesting that behaviours characterizing the existing episteme have been questioned – overall amongst the respondents there was a serious questioning of viability of the modern episteme and acknowledgement of the need for change.

Interpretations of Foucault's thinking have suggested that a consequence of a new episteme is a metaphysics based around a life-centred morality that would replace the lack of morality, anthropologization and mathematization of the modern episteme. In China, although ancient philosophies were suppressed in the period from 1949, a metaphysics is evidenced based on ancient philosophy and reflected in the philosophies and attitudes of Chinese accountants.

In terms of evidence of the new episteme with consequences around metaphysics and the disappearance of anthropologization, here both the surveys and the interviews have been analysed. In the interviews the accountants were questioned about philosophical influences and four out of fourteen interviewees named ancient philosophies such as Taoism, Feng Shui, and Confucianism. However when asked about their personal philosophies on the environment, six more of the interviewees described them in a way which resonated with the ancient philosophies reviewed in the literature review, for example: I7 "From ancient times – harmony between humans and Nature" emphasises the importance of harmony; and is supported by I4 "Humans and Nature depend on one another; yin and yang in Chinese culture give ideas of harmony". Such ideas are central to Taoist philosophy and their emphasis by the accountants, without naming the philosophy, implicitly shows evidence of thinking

influenced by ancient philosophy. Many of the other interviewees expressed similar sentiments and if these statements are compared with Pan (2011)[5] the recurrent themes are of harmony and oneness with Nature which resonate with all three of the ancient philosophies.

Also in the surveys (see Table 2 above) the accountants were presented with attitudes on the environment taken directly from the current interpretations of the ancient philosophies and the level of agreement was high as represented by the rating averages of 1.80 (Buddhist), 1.84 (Taoist) and 2.26 (Confucian) respectively. This indicates broad agreement with the attitudes espoused in the ancient philosophies.

Further to this in Table 3 below was the question on religions and political philosophies:

Table 3 - Summary of responses to survey question: Do any of the following religions and political philosophies have any value or significance to you personally in your attitude to sustainability and the natural environment?

Religion or political philosophy	Very strong value or significance (sig.)	Strong value or sig.	Some value or sig.	Very limited value or sig.	No value or sig.	Rating average	Response Count
Buddhism	10	31	35	9	11	2.79	96
Taoism	12	27	27	14	13	2.88	93
Confucianism	7	31	33	11	10	2.85	92
Feng Shui	7	11	38	21	18	3.34	95
Christianity	5	16	24	24	21	3.44	90
Islam	3	5	28	22	33	3.85	91
Judaism	1	8	25	18	38	3.93	90
Capitalism	6	13	30	22	17	3.35	88
Communism	3	16	30	20	21	3.44	90
Socialism	10	20	33	17	15	3.07	95

In this table the lower the rating average and the greater is the value or significance of the religion or philosophy. Hence, the three traditional religions and philosophies (Buddhism, Taoism and Confucianism) had greater significance than the other religions and philosophies listed, each with a rating average below three. This would support again evidence of possibilities around metaphysics (in

[5] The ecological wisdom of the ages based around ideas of: the harmony between heaven, man and nature (the earth); reciprocity; all under heaven (Tianxia in Chinese); and, an active self-regulating nature.

that the ancient philosophies were largely outlawed during the post 1949 period). These results indicate that the ancient philosophies resonated with the respondents when they were considering their attitude to sustainability and the natural environment.

These findings, although limited due to the size of the samples, support the contributions in the literature about episteme change – that it is taking place now; that it is happening because of viability problems with the modern episteme and that a new episteme requires a set of possibilities to be in place (Birkin & Polesie, 2012).

The findings below are used to support the possibility of the disappearance of specialization in that if accountants and their organizations are embracing environmental accounting this shows a broadening away from traditional accounting based around financial statements and management accounting information. The findings are from two sources – the accountant interviewee companies (both in the interviews and in the documents furnished to the researchers by the companies) and from the PEPAs (during visits and interviews in Liaoning Province and a survey of all PEPA reporting in China).

The companies[6]

Table 4 Environmental accounting and accountability responses taking place in the interviewees' companies

Company	Environmental accounting and accountability responses
C1	Project appraisal – information provided on waste water treatment plant. Annual review on environmental matters for government – particularly on waste materials.
C2	Accounting and reporting on environmental matters to the PEPA for the calculation of the annual levy.
C3	Environmental management accounting (costing and budgeting). Accounting and reporting to the PEPA for levy purposes (as above). Project appraisal – includes measures of pollution (in cubic metres) in business planning for government approval of new factory developments and for Dutch shareholders.
C4	Accounting and reporting to the PEPA – in particular data on air pollution. Accounting for pollution liabilities and provisions for remediation. Use of external auditors to ensure environmental criteria are met.
C5	Environmental management accounting on water pollution and electricity savings.
C6	Investment appraisal with reductions in energy use and pollution as important criteria. Environmental key performance indicators in the CSR report including measurable

[6] See Table 1 on the companies where the interviews carried out (designated C1-C10).

	targets for energy usage (savings of coal in tonnes converted into savings of carbon dioxide), waste reduction and emissions.
C7	Environmental management accounting around cost reduction through recycling initiatives and energy management.
C8	Investment appraisal of a thermal pumping project with associated reductions in coal previously used for heating. Cost reduction data on water usage and energy saving. Environmental accounting providing assistance in decision-making and allowing spending to be monitored and controlled.
C9	Accounting and reporting to the PEPA. Environmental management accounting of costs of reduction in dust pollution.
C10	Public reporting on environmental matters – since 2005 as part of a sustainability report in both English and Chinese - a comprehensive account of the company's interactions with environment - green products, green manufacturing and green supply chain. Measurement and monitoring environmental impacts. Lifecycle Assessment (LCA) (Finnveden et al., 2009) of steel is included in the reporting.

To summarize the key responses: Five of the interviewees stressed the accounting and reporting to government by their companies; all of the companies were engaged in some form of environmental management accounting; only the two large quoted companies were engaged in external reporting on environmental matters (of these two only C10 was reporting in a manner similar to Western competitors and in English as well as Chinese). Apart from the use of LCA by C10 there was no evidence of the use of innovative environmental accounting methods. This does not present a problem as the episteme change we are examining does not call for new acccountings for the environment – rather changed thinking by the accountants. This changed thinking could be implied to have led to a decrease in specialization as evidenced by the engagement with environmental accounting.

It should also be noted that in all but one of the interviews the company accountants said that they had an involvement in environmental accounting in their organization. To illustrate this point the following two quotes are typical: I3: "I oversee the production of environmental management accounting figures and environmental aspects of project appraisal." I4: "I am involved in all aspects of environmental accounting – environmental management accounting, environmental project appraisal, calculation of pollution liabilities and remediation costs." The evidence above does not show any revolutionary environmental accounting in effect in the companies sampled. However compared with the existing EA research in the literature review the key finding is the breadth and depth of take-up. This shows accountants who are broadening their role away from the narrow specialisms of traditional accounting and finance and incorporating environmental accounting and its accountability. If one harks back to Bebbington, Gray, Thomson, and Walters (1994) the key finding was that UK accountants felt

they should be involved in EA but that there was a gap between attitudes and actions. This gap appears to be closing in the new episteme in China as our sample has become involved in EA.

Another common theme in the interviews was the importance attached to government and its role in environmental accounting. The question that prompted these responses was – "Should Chinese companies do more in the environmental accounting area?" I8 outlined a whole raft of government organizations that currently regulate environmental accounting and its reporting and audit – National Audit Office, Ministry of Environmental Protection, National Asset Supervisory Committee, Ministry of Finance and I4 when discussing the environmental policy of the company said: "We follow standards set by government on water and waste pollution – we contract with government." Recent research on ecological governance by Jennings (2016) has proposed models of governance including "ecological authoritarianism." He interprets this to mean that: "successful governance in an ecological era will require centralized, elitist, and technocratic management at least in the areas of economic and environmental policy (Jennings 2016 p 182)". It is possible that the current model of governance in China fits this variety of governance and this is supported by recent research by Hofman et al. (2017) and their notion of authoritarian capitalism in China. A recurrent theme in the interviews was the extent to which companies waited for guidance from government. With this in mind the role and reporting of Provincial Environmental Protection Agencies are reviewed below.

The provincial environmental protection agencies (PEPAs)

There are 31 provinces and autonomous regions (AR) in mainland China. In 2015 a review of all these provinces and ARs was carried out and it was found that they all produced an annual report on the environmental situation of the province and in most cases had been doing so for many years. The earliest reports were for 1995 and all had produced a report for 2014. These reports were in Chinese with no English translations provided.

The Liaoning PEPA reports from the five years to 2014 were translated into English by the Chinese member of our research team. In translation the Liaoning reports have been titled: "Environmental Situation of Liaoning Province." Of particular interest in the context of this paper's focus on ecological civilization: 1) for each of 2013 and 2014 the report was subtitled: "Strengthen the construction of ecological civilization"; 2) the 2013 report specifically referred to the fact that ecological civilization reform had started, leading to the setting up of an ecological province.

For all the reports from 2010 to 2014 statistics were provided on the following areas: ambient air; precipitation; urban centralized drinking water source areas; reservoirs; offshore sea area; noise pollution of road traffic; ecosystems; emissions status. The range of statistics provided was very wide and for the purposes of this paper the important thing to note is that they represented the results for the whole province – state, companies and domestic households. In terms of environmental accountability, the following matters were disclosed together with performance against a 2010 base: 1) assessing the number of cities and towns with nitrogen dioxide conforming to a Ministry of Environmental Protection

standard; 2) acid rain frequency in cities; 3) water quality in reservoirs and in offshore sea area; 4) decibel levels of road traffic; 5) percentage of the province area of excellent, good or standard ecological quality; and, 6) carbon-dioxide emissions in tonnes and reductions each year.

Much of the additional content of the reports was a review of the work of the local Environmental Protection Bureaux (EPB): environmental monitoring; complaints handling; law and policy; public participation; global cooperation; technology and service; supervision management; information publications and petition acceptance; environmental publicity and education; environmental development; environmental industry; special treatment; environmental inspection; environmental safety; environmental plan; environmental legislation construction; environmental policy; and, environmental management. The wide range of activities being reported on give the impression of a PEPA that seeks to be accountable for all the activities in the province and has moved towards this in the depth of its disclosures.

In the interviews that were carried out with officials in two local offices of the Liaoning PEPA (I9 and I13) they outlined the systems for monitoring and, where appropriate, reprimanding and penalizing companies that were operating outside acceptable limits. Particular points raised were: I9 – "Only 60% of company reporting to the PEPA is reliable and so we back this up with random checks at least once a year". I13 – "All factories have to report to the PEPA each year through the local bureau". I13 – "Companies don't want to tell the truth, so it is the function of the local bureau to monitor them". Overall the picture presented was of the PEPA local offices struggling to monitor all the companies in their area, with reporting by companies unreliable. Also that the sanctions available to the PEPA were generally inadequate with fines at such low levels as to make it more economic for companies to pay the fines than to clean up their activities. One observation by I9: "I know of a pollution incident involving China Petroleum Company at Dalian Petroleum Pipelines where the company shared responsibility with the PEPA" was not backed up with any further explanation in spite of keen questioning! However it does offer a model of accountability that would merit further research to find out if there is a similar approach elsewhere in China.

Based on Jennings (2016) ideas of "ecological authoritarianism" there is evidence above that local government in the form of the PEPAs exercises an authoritarian administration of environmental matters and also appears to be publicly accountable for its activities.

As mentioned earlier, this research on the PEPAs is exploratory and, although the findings are interesting and perhaps the most original in this paper, they offer grounds for further research rather than definitive conclusions.

To summarize: on the other viability problem with the modern episteme – increased specialization – and its corresponding possibility of the disappearance of specialization, it is interesting to note the high proportion of the interviewees who were involved in environmental accounting at some level. This indicates a widening of their role away from the narrow traditional accounting role and therefore an

easing of specialization. Literature looking at the period before 2007 found very little engagement with environmental accounting by Chinese companies. More recent research has looked at the growth of CSR reporting by Chinese companies and explained it mainly using institutional theory. Our findings from the companies visited were on one level unexciting in that no new accountings were in evidence. Rather the environmental accounting and accountability was dominated by reporting to government – mainly on discharges and emissions – for the purposes of the annual levy by the PEPA. Most of the rest of the responses were of the internal environmental management accounting type. Only two of the companies visited were reporting externally with some evidence of footprint type measures and lifecycle analysis. So there is evidence of the development of environmental accountability by Chinese companies since 2007. So, on an easing of specialization level this paper offers new evidence that Chinese accountants are broadening their role and becoming less specialized as they embrace environmental accounting into their portfolio of skills.

What is interesting in terms of possible episteme change is the role of government in environmental accountability. The constant referral to the importance of government by the accountant interviewees led this research to examine government responses and here an opportunity for further research was established. It was found that: the systems of accountability by companies to the PEPA; the environmental and ecological reporting by the PEPAs (across all provinces in China); and, the notion of shared responsibility for environmental matters between the PEPA and companies presented a system of environmental accountability that is very different to Western models dominated by corporate responses. Although only on a preliminary level, we evidenced innovative environmental accounting practices that could be part of the move towards ecological civilization in China.

In conclusion relating to the viability problems with the previous episteme in this discussion, the four sets of questions on viability are looked at in outline and the relevant evidence matched to each question. 1) Right and proper conduct – lack of morality - the surveys in particular highlighted a lack of agreement with "modern" thinking by the Chinese accountants. 2) Specialization - the interviews revealed Chinese accountants engaging with environmental accounting showing a broadening away from narrow specialization. 3) Anthropologization – again in the survey evidence showed a rejection of anthropocentric statements and an agreement with more ecocentric statements. 4) Mathematization – the evidence for this reduced reliance on traditional accounting numbers came from the interviews and the surveys, where the accountants were found to have an interest in environmental accounting and accountability with the bottom line number being less important and sustainability taking on greater significance.

Finally in this discussion the key resonances of the new episteme – ecological civilization – were categorised into two elements – 1) the influence of ancient philosophy; and, 2) the influence of government - so as to form a way of thinking that replaces the modern anthropocentric thinking. These influences have been evidenced by the accountants and their responses to the survey and interviews

where they connected with ancient philosophy and constantly referred to the role of government. This role of government has been further examined in the reporting and work of the PEPAs.

4. Conclusions

The research question for this research was: "What are the prospects for changes in environmental accounting in China as it moves towards ecological civilization?" The question has been answered using Foucault's thinking on episteme change. In particular the possibilities necessary to effect such change – in this case a metaphysics and a reduction in specialization - have been the focus. The metaphysics is reflected in the philosophies and attitudes of Chinese accountants which have been found to be based on ancient Chinese philosophy and current thinking on ecology. Evidence of a reduction in specialization is seen in the embracing of environmental accounting by accountants interviewed and other documentary evidence of developments.

The evidence from the interviews and surveys supports the theoretical contributions on episteme change taking place now in China with its moves towards an ecological civilization. Chinese accountants, in their interview responses, with notions of harmony between humans and Nature show a move towards a new episteme with a new ontology and a rejection of strong anthropocentric thinking. In the survey responses the attitudes that resonated strongly were those around the ancient philosophies – and the rejection of modern anthropocentric ideas of human's domination over nature. Foucault's insights into episteme change help to understand the changes taking place in China, as, in itself, a policy by government will never signal real change unless that change is an inevitable result of the loss of viability of the old episteme and a change in ontology in the minds of the population – here represented by accountants.

Developments in environmental accountability since 2007 have been identified in this research in both companies and by government - big companies with international aspirations; small and medium-sized companies; government as represented by PEPAs. Based on the organizations examined the big companies have tended to follow international best practice and have reported on environmental matters; the small and medium-sized companies have engaged in particular with environmental management accounting (EMA) internally and for reporting to their local PEPA; the PEPAs have reported comprehensively on environmental and ecological matters at provincial level and there is a limited evidence that they have developed a notion of shared responsibility with companies on environmental incidents.

It is generally accepted by the more critical academic community that corporate responses to environmental sustainability are highly unlikely to contribute to the sustaining of the Earth's ecology (Milne & Gray, 2013). So, in a Chinese context the work and reporting by PEPAs as part of government presents a different model of accountability that is more likely to lead to changes towards environmental

sustainability. The focus on reporting by Provincial Environmental Protection Agencies of the Ministry of Environmental Protection presents an opportunity for further research. The reporting has been examined in a preliminary study to find out its extent across the 31 provinces and its content by reviewing the reports of one province over a five-year period (2010-2014), with the limited evidence of moves towards provincial ecological responsibility.

In terms of the prospects for environmental accounting and accountability, this research has identified many changes taking place – the attitudes of accountants; environmental management accounting and external environmental accounting and reporting by both companies and government. Companies have an opportunity to further develop their systems for environmental accounting and reporting but this development is strongly dependent on government according to our interviewees.

China, with its strong government has an opportunity to further develop shared accountability for sustainability between its provincial network of PEPAs and the companies working in those provinces. This shared responsibility for accountability provides an exciting opportunity for further research.

Also in terms of further research, our paper has concentrated on environmental sustainability when there are certainly many social sustainability issues in China – not least the working conditions of employees in the big manufacturing companies such as Foxconn (Dou, 2016) and the treatment of migrants from the country to the city, where such migrants are treated as illegals (Wong, Li, & Song, 2007). Social sustainability has been embraced by big Chinese companies, such as the major steel company visited, in reporting on employees and communities. As such there is an opportunity for further research in the accountability for social sustainability area in China.

Belal, Cooper, and Roberts (2013) stressed the problems of exploitability and vulnerability in emerging economies. China as the largest emerging economy has proved to be suffering from both of these things. As a result this has produced an environmental and social disaster (Economy, 2010) and thus an imperative for change that is moving the country away from the growth at all costs industrial civilization. The conclusions overall are that China is moving towards an ecological civilization based on a new ontology and this can be evidenced in the philosophies and attitudes of Chinese accountants; environmental accountability in China is changing; Chinese accountants as they reduce their traditional specialization, based on their philosophies and attitudes, can drive this change further.

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Appendix 1 Interview Schedule

Group 1 questions (the interviewee – background information)

Position held. How long in that position. Previous position. Qualifications. Date started work.

Group 2 questions (the company)

Industry in which company operates. Size of company (number of employees). Environmental policy of the company. Philosophy underlying environmental policy. What environmental accounting does the company do: management accounting (budgeting and costing); project appraisal; financial accounting and reporting; ecological accounting and reporting; others.

Group 3 questions (the interviewee's involvement and philosophy)

Are you involved in any of the environmental accounting? Are you a champion of environmental accounting or are you merely doing what you are told to do? Does your personal philosophy of life influence you in your environmental accounting work? What is your personal philosophy on the environment – Buddhism, Taoism, Confucianism, Feng Shui, Socialism/Communism, Western influences? What is your view on the position of humankind in relation to Nature? Are humans at the centre of the universe? Should Chinese companies do more in the environmental accounting area?