

Actor-Network Theory's contribution to the accounting literature: A critical appraisal

Abstract

Actor-Network Theory (ANT) (Latour, 1987; Callon, 1986 and Law, 1986) has been borrowed by a number of researchers to guide their inquiry (see, Robson, 1991; Chua, 1995; Lowe, 2004). The purpose of this paper is to provide a critical appraisal of the use of ANT in the accounting literature. Through a comprehensive literature review, we examine those influential articles that use ANT in an accounting context. In doing so, we critically appraise these articles with the aim of providing some clarity in guiding the endeavours of future researchers' who may want to use ANT as their theoretical foundation.

Our investigation revealed a range of limitations in the accounting research application of ANT from which we can deduce lessons for future research. Firstly, there has been a tendency for some studies to overemphasise the human/social element and to downplay the role of nonhuman actors in the network. Secondly, there has also been a lack of detail provided in some studies about how actors were selected for the study or the basis on which they were omitted from it.

The findings of this study demonstrate the influence of ANT within the accounting literature together with the limitations of studies to date. Specifically, it shows how ANT can serve a theoretical grounding for those who seek to explain the role accounting and the process of change in a broader social context and how to apply this theory to future studies.

Key Words

Actor-Network Theory, Latour, Actors, Accounting Literature

Introduction

[Researchers] of accounting may wish to build on the studies of the use and modification of ... accounting systems, paying attention to the interconnections between the technology and social factors, examining the networks of use, elaboration and modification of accounting (Preston et al, 1992, p. 590).

If accounting is a social construction, then it is important to investigate accounting in local settings, to uncover the nature of that practice (Lowe, 2004). According to Chua (2004), ANT enables researchers to focus on relationships and explore how accounting inscriptions are produced by and mediate local actions. The application of ANT by researchers in accounting has led to some differences in opinion (see for instance: Chua, 2004, Mclean and Hassard, 2004, Collins and Yearly, 1992). The purpose of this paper is twofold, first it aims to provide a critical appraisal of the most cited articles using ANT in the accounting literature. The second aim of this paper is to identify the lessons to be learned from previous research so as to inform future studies using this theoretical framework.

Actor-network theory (hereafter referred to as “ANT”) has been used by accounting researchers to provide insights into the organic nature of change (see for example: Jones and Dugdale; Briers and Chua, 2001; Lowe, 2001c; Ezzamel, 1994;). ANT specifically examines how networks are developed and maintained and the interacting role of the various actors (human and non-human) within these changing accounting processes. This paper examines the influence of ANT on accounting research. ANT was originally developed by Bruno Latour, Michael Callon and John Law in the mid to late 1970’s as a means to understand the social construction of science¹. Essentially, it is an analytical framework, a “tool box” (Law, 2007), used to study the roles of humans and non-humans in the structuring of networks between people, their ideas and technology (Latour, 2005; Callon, 1986 and Law, 1986) for the purpose of creating new knowledge. ANT can be more technically described as a material-semiotic method, mapping relations that are simultaneously material (between things) and semiotic (between concepts). Everything in the social and natural worlds does not exist separately, but is being constantly generated

by relationships between actors in networks (Law, 2007). It is through a series of complex interactions between humans and non-humans and the ways in which they interlock within networks of construction and reconstruction which allow the production of accepted facts or knowledge (McNamara, Baxter & Chua, 2004, p. 57). As Latour (2005) himself stated:

What I want to do is to redefine the notion of social by going back to its original meaning and making it able to trace connections again. Then it will be possible to resume the traditional goal of the social science but with tools better adjusted to the task (Latour, 2005, p. 1).

ANT has since been influential in a wide range of disciplines² from economics (see, for example, Bledin & Shewmake, 2004) to geography (see, for example, Rutherford & Holmes, 2008). Organizational studies have used this framework to examine phenomena such as knowledge management (Hull, 1999), communities of practice (Fox, 2000) and economic markets (as in Callon and Muniesa, 2005). Accounting researchers have used it as a lens to explain accounting in an organisational context (see, for example, Chua, 1995; Lowe, 2001a; b; c) the implementation of information technology (for example Boomfield and Vurdubakis, 1994; Quattrone and Hopper, 2006), and accounting as practice (Robson, 1991; 1992).

This paper contributes to the literature in four ways. First, it identifies accounting articles that use ANT as their theoretical foundation and conducts a critical appraisal of the literature through a discussion of the contribution and limitations of these articles. Second, to highlight the impact of these articles on the research community, a citational analysis is used; a method recommended by McRae (1974) and Brown (1996) and others. Third, the paper contributes by analysing the application of ANT in accounting research through the various critical notes on ANT such as those identified by McLean and Hassard (2004) and Collins and Yearly (1992). Finally, using the insights provided by the critical analysis, guidance is provided about issues to consider for future accounting inquiry based on ANT.

This paper is structured as follows. The following section gives a brief description of actor-network theory and includes some references in accounting literature that have explored case studies in these areas. The paper will then describe the method that was used to identify the major works in the accounting literature that are conceptually grounded on ANT and to gauge their respective impacts through citational analysis. Having identified the influential articles, the paper then analyses their major contributions and limitations. The next section provides a critique of the accounting research to date informed by some critiques in the literature such as McLean and Hassard (2004) and Latour (2005). In doing so, it is hoped that this will provide clarity on a range of issues/concerns with the application thus far of ANT in accounting research. The final part of the paper seeks to inform future researchers by drawing on some lessons identified from the issues/concerns identified in the previous section.

An overview of Actor Network Theory³

ANT, as proposed by Callon (1986), Latour (1986) and Law (1986), is a social theory which originated in the field of science and technology. Accounting is used by differing stakeholders to support the decision-making process. ANT explains how, over time, networks of actors are built to support claims to specific knowledge by those who use accounting numbers and reports in an effort to persuade and influence (Mouritsen, Larsen and Bukh, 2001). This specific knowledge is referred to as a 'claim' (Latour 1987) because it may or may not be accepted by others outside the network as a 'fact' (Gendron and Barret, 2004; Miller, 1991) Using this framework, actors considered within the network may be human or non-human (such as technology or animals) which act, or make a difference within the network (Lowe, 2001a, 2001b). These networks change in an ongoing process of making and remaking (Pipin and Czarniawska, 2010; Callon, 1986).

ANT is ontologically relativist (Lee and Hassard, 1999), it has a view that "the empirical would not be a passive collection of 'raw materials' silently awaiting for the researcher's gift of intelligibility, form and voice" (p. 399). Society is not deemed to exist out there as some sort of scaffold (Law, 1992) or with a precise domain and properties (Latour,

2005). There is no overarching context in which actors can be framed or embedded, for instance there are no organisations or levels of management. Society is made up of associations between actors who are defined by their place within the network and their relationship with other actors. This assumption enables the researcher to ignore divisions that are considered to be foundational and explore how the networks grow and what material practices are brought to bear (Law,2007) Organisations are seen as a number of networks (McNamara, Baxter and Chua, 2004) of heterogeneous actors in more or less stable associations (Law, 1991), however ANT recognises external actors can be influences on the organisation and allows for the network/s to expand beyond the “boundary” of the organisation (Pipin and Czarniawska, 2010; Lee and Hassard, 1999). Quattrone (2004) points out that when one discusses change, it implies that there is something “out there” that requires changing, the antithesis of ANT ontological underpinnings. To uncover movements towards changing accounting practices implies a norm, an accounting that is already accepted. This previous “reality” is in essence another construction, another network of humans and non-humans that can be made into something else (p 236). ANT will assist in uncover the test of wills, the controversies between what is perceived to be “reality” and the movement towards a differing way of doing things, promoted by a different network. This constitutes organisational change.

All elements of the networks need to play their part at the appropriate time for the networks to remain stable, they need to cooperate (Law, 2007), since the elements depend on each other, regardless of whether they are human or non-human. To understand how these networks are built, it is important that no assumptions are made by the researcher regarding the positions or beliefs of the actors within the network, including how the actor defines and associates with other actors, (Latour, 1987; 2005; Callon, 1986). Since an actor can be human, technology or animal, to maintain generalised symmetry, it is important to use the same vocabulary and repertoire for all actors (see especially Callon, 1986). The accounting function is a result of a range of activities that are performed by people and technology, which measures and calculates phenomena. Accounting solutions can be influenced by the kinds of technology available which are available and, in this

way, computing can control the human actors (Gendron and Barrett, 2004). Researchers using ANT pay attention to all ‘actants¹’ within the network.

According to Callon (1986) a network is built through a four step process: problematization, interessement, enrolment and mobilization. During the first phase, problematization, the primary actor attempts to identify the problem, what is the knowledge claim that is required, and what actors are required within the network. As the primary actor works to build the network, negotiations will take place with other actors regarding the roles they may play within the network. The primary actor will need to convince others that they will achieve their own goals when they join the network. Ezzamel (1994) discovered two opposing networks, built by actors to combat the each other in an effort to achieve their goal regarding budgetary changes. Building the network may involve some compromise from both sides. Negotiation leads to interessement, actors accept the roles they have been given and enrol in the network. Mobilization then occurs as others external to the network (allies) move to support it. This process is not unproblematic. Controversy may unenrol the actors or remove the support of the external allies. Gendron and Barrett (2002) discovered that professional accounting bodies in North America were unable to enrol external actors to ensure the success of their web based assurance product. The principle actor may then attempt to revisit the building process, or the network simply falls apart. This process of transformation of the network is translation.

If the actor-network is successful the knowledge claim is accepted as fact by those outside, controversies regarding its ‘truth’ are settled and it becomes ‘fact’ (Latour, 1987). In time, the ‘fact’ can be separated from the network that built it and it becomes a “black-box”. Because of this separation, knowledge regarding how the ‘fact’ was built, and the networks that built it, becomes unknown and it is difficult to question the validity of the fact, by re-opening the black-box and recreating the network (Latour, 2005). Robson (1991) considered the “black-boxing” of accounting standards as they moved

¹ Actants may be specific actors or a group of actors with a common role in the network, a network within a network.

towards acceptance and the network which built them “disappeared”. This black-boxing can be problematic, because accounting facts are then accepted as “truth”. As Savaranamuthu (2004) noted, this gives the numbers greater power to influence and weakens the ability to acknowledge other needs such as the environment and society.

ANT can be used to examine how networks are built to produce accounting facts (Latour, 2005), such as financial statements or the accounting information that will be produced from new systems. This paper seeks to discuss the most cited articles which have used ANT that occur in the accounting literature. The next section describes the method that was used to identify the major works in the accounting literature that are conceptually grounded on ANT.

Method for Selection of ANT Literature

Data, in the form of journal articles, were sourced via a comprehensive literature review. The articles were selected on the basis of those which used ANT as the theoretical underpinning for their investigation. For the purpose of scope, only those articles that addressed problems within an accounting context were examined, concentrating on how networks are built to produce accounting knowledge objects rather than information systems or markets, hence papers in the information technology, economic and finance literature were not included. The result of this investigation revealed there are a total of 27 articles in the accounting literature utilising ANT that we use to develop our discussion (see Table 1 for details). A two step approach was employed to locate relevant articles. The *ABI/Inform Global (Proquest)* database was searched using the key words including “actor network theory” (and its associated terms including, but not limited to, “obligatory passage points”, “actants” and “enrolment”) and “accounting” under scholarly journals. This process yielded some 21 articles. Second, the reference list of these articles were subsequently examined to identify any others that did not show up in stage one. An additional 8 articles were found through the latter approach.

INSERT TABLE 1 ABOUT HERE

As a measure of impact we subsequently traced them through citation analysis. The citational analyses were undertaken through ‘Google Scholar’ and the ‘Social Science Research Index (SSRI)’ and are reported in the first two columns of Table 1. These columns in the table are followed by the author(s) name along with year of publication and Journal. The final column indicates whether the article was used in our discussion. The basis of this decision was essentially citation numbers, the use of ANT as the primary theoretical foundation for empirical case analysis and the practicalities of not being able to critique every published paper. Examination of the table shows that of the 27 articles sourced, 13 formed the basis of this examination. An explanation of those not included is shown in the notes accompanying the table.

The method adopted in this study is similar to that articulated by McRae’s (1974) and Brown’s (1996) citational analysis of influential accounting articles. In doing so we acknowledge that no method is perfect and as such is subject to certain limitations. For example, numbers of citations are somewhat misleading as self citations and negative citations all contribute to the total citations, also citation counts tend to favour older articles. Also ‘halo effects’ will generate additional citations as a result of hot topics linked to well known authors. Finally while we attempted to make our search as comprehensive as possible, we may not have uncovered all of the influential studies in accounting that use ANT as their theoretical foundation. As an example, some studies may have been published in languages other than English, may have been published in book form and be unavailable to electronic data bases and our search procedures failed to locate these studies. Given that Latour and Callon are French this is a real possibility. Moreover, the *ABI/Inform Global (Proquest)* database does not cover all accounting journals. These limitations should be taken into account when analysing the findings reported in this study (Brown, 1996).

It can be observed from our analysis that ANT was first introduced to the accounting literature in 1991 by Robson in *Accounting Organisations and Society (AOS)*, closely followed by Miller (1991). In addition to AOS, most of the articles which contain empirical data have been published in a small number of quality journals including

Management Accounting Research (MAR), *Contemporary Accounting Research* (CAR) and the *Accounting Auditing & Accountability Journal* (AAAJ). *Critical Perspectives on Accounting* (CPA) has published some articles which discuss ANT as a methodological framework (Lowe, 2004, Quattrone, 2004) and later articles which include empirical data such as Lowe and Koh (2006) and Pipan and Czarniawska (2010). While the notion of ‘quality’ is debatable and open to interpretation (see, Hopwood, 2007), all of these journals have an SSRI designation which is an implied measure of quality. The next section will explore the use of ANT in the accounting literature.

ANT and Accounting Research

The results of our investigation show a willingness on behalf of accounting researchers to use ANT (Callon, 1986; Latour, 1986; Law, 1986) in their investigations. ANT has been highly influential in studies of the discursive processes of accounting change across the past 20 years. Indeed, ANT has been applied to a variety of accounting issues and settings. The most common application is to the study of changes in management accounting practices such as the introduction of new costing systems within public sector organizations, especially, hospitals (see, for example, Preston, Cooper & Coombs, 1992; Chua, 1995; Lowe, 2001a; b; c). These studies have used as their case setting a specific organisation (or section of an organisation). However, this theory has also been applied to wider controversies in the accounting world that transcend a specific institutional setting. For example, analysis of the study of the genesis of accounting standard setting in the UK (Robson, 1991), the dominance of quantification in accounting (Robson, 1992), the embedding of activity-based costing in practice (Jones and Dugdale, 2002) and the development of intellectual capital statements (Mouritsen, Larsen & Bukh, 2001) to name just a few.

In essence, it would seem that ANT is suitable as a theoretical framework within the accounting area where a group of actors, human and non-human, are seeking to collectively establish a “truth” which is yet to be widely accepted through the exploitation of accounting as a tool. ANT provides a framework for studying and understanding the fabrication of a specific phenomenon through a process of “debate,

dialogue and struggle” (Mouritsen et al., 2001, p. 736). As noted by Lowe (2001b), “It is only after all these resources: the computer software; the accountants; the IT people; the computers, have been successfully brought to bear that controversies are settled and black boxes are produced” (p. 330).

An overview of the 13 papers highlighted in Table 1 on which this paper will focus is provided in Appendix 1. The reader is provided with a short overview of the subject of the paper. The data for Callon’s (1986) study of scallops and Latour’s (1987) study of science in action were collected in real time (in situ), while Law’s (1987) study of Portuguese sailing vessels and Latour’s (1988) study of Pasteur used historical (post hoc) material. How accounting researchers have collected their data is indicated. The papers’ contribution to the application of the framework is followed by a column that suggests some possible limitations of the papers. These limitations are covered in the next section,

The papers have been placed into two sections in Appendix 1. In the first section, we consider those studies that have applied ANT to controversies/phenomena in the accounting world that transcend a specific institutional setting. In the second section, we will evaluate those studies that focus on a specific organisational setting (or section of an organisation). The basis of this separation is that ANT has been criticised (see McLean & Hassard, 2004) for emphasising the micro over the macro. Yet, a reading of the accounting literature suggests that a number of researchers have employed ANT to study accounting phenomena across both specific organisations and broad institutional settings. A discussion regarding the roles of macro and micro actors in accounting networks is included in the next section.

This paper will now examine what insights have been provided by ANT within accounting studies to date.

A Critique of Accounting Research to Date

We will examine the accounting research papers in light of critical notes on the production of actor-network accounts as identified in the literature such as McLean and

Hassard (2004) and Collins and Yearley (1992). These critical notes are then used as a framework to consider why ANT may have been and could be useful in providing theoretical insights into how accounting artefacts are produced.

Issues of Inclusion and Exclusion

This criticism (see, for example, Miller, 1996; Strathern, 1996; Bloomfield & Vurdubakis, 1999) relates to the decision about which actors to include and to exclude in ANT studies. An analysis of many accounting studies to date using ANT suggests that the process of identification of actors to be included or excluded in the process is not elucidated in any detail. The result is that this process may, perhaps unjustly, appear to be somewhat arbitrary. In many cases there is little discussion of the basis on which actors were included or excluded or even specific identification of who the key actors appear to be.

An example of this would be Robson (1991). This paper made a major contribution by introducing the accounting literature to Latour's work. His analysis of the origins of the standard setting programme in the UK in the 1960s did not explain how actors were included or excluded in the network described. Similarly, Preston, Cooper and Coombs (1992) in their fascinating account of reforms to the hospital budgeting systems of the British National Health Service provided little insight into their processes of actor identification other than to say "we mapped networks of resource, support and use, both historically and across conventional boundaries, in order to examine the multiplicity of people involved in the fabrication process" (p. 567). While the authors made a major contribution to the accounting literature through their account of fabrication and how interests may shift through this process, their conclusions are understandably limited by the difficulty in identifying and studying the numerous actors involved, "we can reasonably argue that many sceptics are won over" (p. 575) and "Despite all the elaborate fabrications, in this case management budgeting does not become an established fact" (p. 589).

A related issue from Preston, Cooper and Coombs (1992) is that their analysis is based on published materials from a previous time:

Our outline of the production of management budgeting covers a fairly distinct episode, and is for the most part restricted to debates, statements and specific initiatives within the NHS. The analysis begins with the publication of the Griffiths Report in 1983 which proposed the initiative, and ends with the publication of a Department of Health and Social Security (DHSS) Health Notice in November 1986 (DHSS HN(86) 34) (p. 564)

In such circumstances, how can one be confident that all actors and all influences have been considered when analysis is necessarily restricted to known and published sources?

Despite the tendency for studies in accounting to provide a cursory explanation of the actor selection process, there are some notable exceptions. For example, Briers and Chua (2001) directly identified in detail who the actors were in their case analysis of the implementation of activity based costing by the manufacturing strategic business unit of a large Australian mining company. They even demarcated between so-called cosmopolitan and local actors. Similarly, Lowe noted in his study of the application of a casemix accounting system in a large regional New Zealand health provider (2001b):

A critical aspect of the research process involved the imperative to follow the actors and identify the extent of the networks built up ... The researcher tried to carry this off by “making the list” of actors, however long and heterogeneous (p. 346).

The above analysis points to key application issues with ANT, namely, that the boundaries of the project are rarely given and knowable. It is thus left to the discretion of the researcher to select the paths he/she wishes to follow (including which actors) and to choose those that will be ignored. As an example of this dilemma in the accounting literature, Chua (1995) chose a specific date as the cut-off point for her hospital case study because this represented the point where a first run of the costing model had occurred while acknowledging that “...at this point, the results produced were still regarded as preliminary” (p. 118). The implication of this limitation is that it is possible (without casting any aspersions on the studies referred to above) that the investigator may

not succeed in comprehending the network and may thus produce “...an incomplete or misleading research story” (Lowe, 2001b, p. 346).

The above discussion also raises the question of how one selects objects, machines or artefacts to be included in the network. Bloomfield and Vurdubakis (1999, p. 7) suggested that while the researcher must attempt to remain impartial and to consider all possible actors, ultimately the process of selecting appropriate actors to study is dependent on suppositions about what actors exist and their relative positions within possible networks. As Preston, Cooper and Coombs (1992) pointed out; there are numerous heterogeneous actors that affect accounting choices. Lowe (2001b) considered it important to reflect upon all who may be involved. Also it should be noted that networks continue to evolve and translate as some actors join and others leave. ANT, because it requires the researcher to begin without preconceived notions of roles, responsibilities and boundaries, allows the him or her to include actors within the study without any predetermined criteria, such as employment within an organisation.

It follows from the above dialogue that future accounting studies applying ANT need to ensure that the boundaries are explicitly defined and justified and the actors identified and justified. However, it must be conceded that as one cannot follow actors everywhere (Latour, 2005), he/she ultimately engages in a “practice of ordering, sorting and selection” (McLean & Hassard, 2004, p. 500). *Treatment of Humans and Non-Humans* Perhaps the most controversial aspect of Latour’s framework is the “symmetrical treatment of such seemingly dichotomous factors as humans and non-humans, society and nature, and the social and the technical” (McLean & Hassard, 2004, p. 502). Collins and Yearley (1992) were especially critical of this aspect of ANT and cited as an example, Callon’s (1986) use of ANT to study scallop farming in France where the scallops are treated as equal actors with the fishermen and scientists:

Would not complete symmetry require an account from the point of view of the scallops? Would it be sensible to think of scallops enrolling the scallop researchers so as to give themselves a better home and to protect their species from the ravages of the fishermen? (Collins & Yearley, 1992, p. 313 as cited in McLean & Hassard, 2004, p. 502).

The point of this sarcastic observation is that Callon (1986) is viewed as providing a predominantly human-focused account of the scallop fishing case and that this can be a flaw with many ANT-inspired studies. All non-human actors require a spokesman, a human, to speak on their behalf. This introduces questions regarding the ability of that spokesman (frequently the researcher) to interpret the interests of the non-human actor (Collins and Yearly, 1992). How can a researcher with a lack of expertise discuss the non-human in a meaningful way? Collins and Yearly suggest that Callon should be an expert on scallops before he can do so in his work on scallops and Latour should obtain technical knowledge before he can discuss door openers (Latour and Johnson, 1988). In response to Collins and Yearly it should be noted that accounting researchers will frequently have an understanding of the systems which are the subject of their investigations and may have the expertise to speak for them within the investigation.

Callon, requires the researcher to agnosticism in order to produce accounts that ensure relevant actors are represented within the study, concentrating on their impact within the network (McLean and Hassard, 2004).

As Lowe (2001b) cautioned:

A balance must be struck between the attention that is given to social interaction and behaviour (what we might call people's interests) and the part played by machines and systems to effect and channel the social (p. 341).

Proponents of ANT such as Lee and Brown (1994) counter this perceived weakness by contending that ANT is centred on the way in which actors, machines etc. rely on spokespersons and "how the delegation of authority to speak on behalf of others is both an epistemological and political process" (McLean & Hassard, 2004, p. 503). Researchers follow the actors through their work, they do not wish to replace the actors themselves, rather describe how those actors cope with controversies and alternatives (McLean and Hassard, 2004).

Callon (1986), in his work on scallops, indicated that the goal of the researcher is *methodological* symmetry, recommending that researchers acknowledge the uncertainties

of the natural, technical and social world as actors deal with the building of knowledge. Researchers should allow the actors to explain their world and the identities that make up their networks, describing their relationships with both the natural and the social world. The researcher can then identify those relationships, choices and negotiations and then describe both “the technical and the social aspects of the problem studied” (p. 4) using the same vocabulary, chosen by the researcher. It is the use of the vocabulary, the same words for both the human and the non-human that produces the methodological symmetry required (Callon, 1986, p.4).

As noted previously the process of “accounting” utilises technology to calculate, measure and control numerical information. It is arguably ANT’s acknowledgement of the non-human and the ability of the researcher to include technology as a part of the network that is being examined that enables a more thorough understanding of the varying forces which facilitate change as a network is built to produce the new “accounting”. Accounting networks, highly dependent on technology, may not survive because that same technology is resistant to enrolment in the network: it may not exist; be too expensive or too hard to use.

Privileging and Status Issue

In accounting which is more important, the accountant who speaks for his network, or the computers and other measuring devices on which he relies? Critics of ANT (see, for example, Collins & Yearley, 1992) suggested that on occasions ANT seems to provide objects, machines etc. with a higher status in terms of their relation to humans than may be warranted given the reality of the situation. Callon and Latour (1992) agreed that they had granted “to nature and to artefacts the same ontological status that realists and technical determinists are used to granting to them” (p. 347). Latour (2005) stated that he was not interested in status issues but rather the roles that given actors within the network play:

“If action is limited a priori to what ‘intentional’, meaningful’ humans do it is hard to see how a hammer... could act. They might exist in the domain of ‘material’, ‘causal’ relations but not in the ‘reflexive’

‘symbolic’ domain of social relations. By contrast, if we stick to our decision to start from the controversies about actors and agencies then *any thing* that does modify a state of affairs by making a difference is an actor” (Latour, 2005, p 70, emphasis in the original)

and

“This of course does not mean that these participants ‘determine’ the action, that baskets ‘cause’ the fetching of provisions or what hammers ‘impose’ the hitting of the nail... ANT is not the empty claim that objects do things ‘instead’ of human actors: it simply says that no science of the social can ever begin if the question of who and what participates in the action is not first of all thoroughly explored” Latour, 2005; p 71-72)

Put another way, ANT traces the actors, both human and non-human within the network, without considering who or what they are in order to understand what is happening. Not surprisingly, this symmetry of status has been contested. For example, Pels (1995) argued for weaker asymmetries that enable one to maintain some of the crucial features of modernity such as political, social or cultural distinctions. A counter argument is that these differences should be understood as effects or outcomes rather than as an accepted order of things (McLean & Hassard, 2004).

While the temptation for researchers is to highlight humans and their actions, society as it is today cannot exist without the non-human – all the technology, buildings, texts we use daily – and therefore the latter cannot be ignored. As Law (2003) succinctly stated: “If these materials were to disappear then so too would what we sometimes call the social order” (p. 3). Faithfulness to symmetry is arguably a central tenant to ANT and any possible departure from this requires a strong rationale but it is important to understand the concept of symmetry as conceived by Latour. In recent times, Latour (2005) has attempted to directly address the symmetry debate in ANT:

ANT is not, I repeat is not, the establishment of some absurd ‘symmetry between humans and non-humans’. To be symmetric, for us, simply means *not* to impose a priori some spurious *asymmetry* among human intentional action and a material world of causal relations. There are divisions one should never try to bypass, to go beyond, to try to overcome dialectically. They should rather be ignored and left to their own devices, like a once formidable castle now in ruins (p. 76) [emphasis in the original].

And

This is the reason why I have abandoned most of the geometrical metaphor about the principle of symmetry when I realized that readers concluded from it that nature and society had to be ‘maintained together’ so as to study ‘symmetrically’, ‘objects’ *and* subjects, ‘non-humans’ *and* ‘humans’. But what I had in mind was not *and*, but *neither*: a joint *dissolution of both collectors*. The last thing I wanted was to give nature and society a new lease on life through symmetry (p. 76) [emphasis in the original].

Latour (2005) cautions against endeavouring to create a picture that does not reflect the realities of nature by concentrating so heavily on non-humans that the study no longer reflects reality. It is due consideration and recognition of the non-human and human actors in networks and their inter-connectedness that he appears to be seeking in future ANT-inspired research

In the accounting literature, there seems to have been divergent emphases on the role of machines and other non-human actors. Many of the accounting studies to date using ANT appear to have emphasised the social over the machine in studying networks. Mouritsen, Larsen and Bukh (2001) in examining so-called Intellectual Capital Statements focused heavily on managers’ manipulation of these statements for their personal gain: “...knowledge and power are related and the interest in knowledge derives from managers’ interest in controlling organisational arrangements” (p. 759) and “the intellectual capital statement allows managers to ask such questions [as whether organisational activities are sensible or on the correct track etc.] about the resource base of the firm” (p. 759). It follows from the above discussion that future accounting research using actor-network theory needs to be careful not to devalue the non-human elements relative to the human.

An example of a study that granted a high status to machines was Lowe (2001b):

The researcher examined reports; on nursing wards; the biochemistry laboratory and radiology as part of a research process designed to unravel the workings of these systems. Some of this meant *going beyond the reports by building spreadsheet models* of the costing and patient data in order to understand how the data were being manipulated to produce the inscriptions of patient costs (p. 343).

Similarly, Robson (1992) with his focus on accounting inscriptions as “writing, recording, drawing, tabulating” (p. 689) placed the non-human factor at the forefront. Cuganesan and Lee (2006) also stressed the technological aspects of a procurement network. Conversely, studies such as Chua (1995), as previously noted, also had a sociological emphasis.

Given the seemingly contrasting emphases evident in the accounting literature, a key consideration is whether we can assume a priori that the human drives the non-human to build society as it is today, or is it the non-human that drives and compiles society (Law, 1992, p. 3)? Has our social life been changed because we choose to use technology more, or has technology forced a change in the way we construct our social world? Law (2003) argued that “to say that there is no fundamental difference between people and objects is an analytical stance” (p. 4), not an ethical or moral stance. People are influenced and shaped by their interaction with the non-human; their social world shaped by a heterogeneous network of tools and other materials. Latour (2005) provided an example of how the introduction of the television remote control fundamentally altered the viewing habits of consumers. Suddenly, they were far more likely to change channels than previously and advertisers and television networks had to change the way they scheduled programs and advertisements. An inanimate object drastically changed everything in the television world and its presence and impact could not be ignored. It follows that ANT should not grant privilege to either the human or the non-human, it requires an open mind and that no assumptions be made by the researcher regarding who or what is the driver, analysing the network as it exists. By admitting the non-human to the network as an actor, the researcher is able to expose the effect that each actor has on another, without making preconceived assumptions as to their relationship.

Modern accounting is heavily reliant on the availability of technology, especially in the form of computer hardware and software. Jones and Dugdale (2002) noted the importance of available software solutions when management made decisions in regard to activity based software. Lowe (2001b) stressed the role of non-human actors: “What ANT offers is a different view of social reality in which nonhuman actants are of

particular significance” (p. 344). Chua’s (1995) study of a hospital case mix system does not mention whether how difficult it was to collect the data the system required for its reports, nor the possible costs of such a system, and how that may have affected possible controversies. It seems sensible to note that the availability, cost and comprehensibility of computer reporting processes are important aspects of the decision making processes within the organisational context, and should be included in research in this area.

Agency and structure of the social

This criticism relates to the claim that ANT emphasises the micro over the macro and therefore does not consider the “broader social issues that influence the local” (McLean & Hassard, 2004, p. 507). Habers and Koenis (1996) commented that ANT focuses excessively on the input of non-human items to social processes. Similarly, Reed (1995) argued that ANT tends to:

concentrate on how things get done, to the virtual exclusion of the various ways in which institutionalized structures shape and modify the process of social interaction and the socio-material practices through which it is accomplished (p. 332, as cited in McLean & Hassard, 2004, p. 508).

Latour (1991, p. 118) countered this criticism by contending that the 'macro-structure' of society is made up of the same basic connections as the 'micro-structure', and thus can be examined in much the same way (Latour, 1991, p. 118):

It’s not that there are a macro-sociology and a micro-sociology, but that there are two different ways of envisaging the macro-micro relationship: the first one builds a series of Russian Matryoshka dolls – the small is being enclosed, the big is enclosing; and the second deploys connections – the small is being unconnected, the big one is to be attached (Latour, 2005, p. 180).

Latour (2005) also contended that the 'macro-structure' is a larger network that can be connected to the actor in the same way as other networks and actors. He explained that this is why the term “actor-network” is hyphenated, actors are not only actors as individuals, but also represent the larger networks behind them.

Law (2003) also refused to make any distinction between the macro and the micro-social. If the wider networks of the macro-social are unproblematic at any time, they are

perceived to be much simpler by actors outside that network. It is not obvious to those outside the network of the macro-social who or what constitutes that network, nor is it relevant at that time to the actor. Whilst in the longer term the larger network may be made visible by degeneration⁴, its stability renders it invisible.

Certainly in much of the accounting research to date there has been a heavy focus on the activities *within* an organisation (see, for example, McNamara, Baxter & Chua, 2004). How does the organisation exist and how can the researcher conceptualise it if, according to Latour (2005), society does not exist “out there”? The organisation cannot exist, according to Latour’s concept of the social separate to the actors within it. The organisation can be seen as a heterogeneous actor-network, like any other, formed over time through problematisation, interestment, enrolment and mobilisation. For many actors within that organisation, its existence is unproblematic, represented by spokespersons at a higher management level, its stability rendering the network invisible as such to the actors.

However, researchers have also often sought to contextualise the exogenous environment, when the wider network of the macro-social is perceived to be failing and, therefore, visible⁵. For example, Preston, Cooper and Coombs (1992) in their case study of potential accounting reforms to the British National Health System (NHS) stated.

There are a number of discursive conditions out of which emerged the possibility of management budgeting. Two sets of discourses seem to have been particularly significant. Firstly, beginning in the 1970s, and intensified after the election of the Thatcher government in 1979, influential diagnoses of the relative underperformance of the British economy were associated with a concern about the level of state expenditures and doubts about the feasibility and/or desirability of satisfying the demands for welfare (including health and education) through public funding ... The NHS was increasingly characterized as being a major contributor to this growing burden despite its "sacred cow" status. Secondly, there has been considerable debate, almost throughout the history of the NHS, about mechanisms to "improve efficiency" through reorganizations and changed managerial practices (p. 568).

In a similar vein, Chua (1995) discussed in some detail “the antecedent world of sick governments and hospitals” (p. 118). Briers and Chua (2001) focused on a range of actors in their study of a manufacturing strategic business unit including so-called cosmopolitan actors which they defined as “global actors in the sense that they are adept at penetrating spatial and cultural boundaries” (p. 241). In placing a heavy emphasis on these global actors in their analysis, Briers and Chua (2001) not only extended the use of ANT within the accounting field but they considered the influence of the external environment to a much greater extent than had been achieved before.

As a final example, Jones and Dugdale (2002) went to considerable lengths to portray the dynamic international environment that resulted in the rising popularity of activity-based costing. They documented the Harvard list of allies that supported the new technology and the various companies globally (John Deere and Hewlett-Packard in the US, Siemens in Germany and Ericsson in Sweden to name a few) that helped champion its use. However, one needs to recognise that given the subject matter of Jones and Dugdale (2002) it would have been difficult if not impossible to have ignored the diverse forces contributing to the activity based accounting “bandwagon” (p. 121).

Overall, it would seem that due consideration of the exogenous environment and how it impacts on accounting controversies at an institutional level has been prevalent in some, but not all, studies to date. The lesson from this is that future researchers need to ensure that they appropriately contextualise their case studies so that the reader is in a better position to fully appreciate the overarching influences and countervailing forces behind the actions and processes being studied in a specific organisational situation.

Heterogeneous Engineering, Power and the Political Issue

A final criticism put forward by McLean and Hassard (2004) was that ANT neglects to evaluate the political and moral issues behind the technologies studied. Sturman (2006) highlighted that ANT does not address social issues including gender and race. The theory does not take into account the society that exists separately to the individual. It is the assumption of a separate ‘society’, that enables the researcher to divide that society

into strata such as ‘gender’ and ‘race’ according to previously established criteria, and then place members of society into one, or more, groupings, for instance an ‘indigenous, female accountant’: “[A]ctors are *made to fit* into a group – often more than one” (Latour, 2005, p 28, emphasis in the original). In other words, Latour (2005) is saying that actors or groups of actors can be pigeon-holed by the researcher:

Not that they are wrong since its perfectly true that older social relations have been packaged in such a way as to seem to provide a ready explanation for many puzzling subjects. But the time has come to have a much closer look at the type of aggregates thus assembled and at the ways they are connected to one another. (Latour, 2005, p. 22)

Using ANT as a framework, networks which form the social are only present as interaction takes place between actors. Put another way, it is the actors who form their own groups of heterogeneous elements, rather than the researcher. This approach contrasts with social scientists who place individuals into homogenous groupings based on some common characteristics as mentioned above. If there is no interaction, then there is no network in existence and no social context (Latour, 2005). It follows that this theory seeks to understand how or why these groups are formed and not to explore issues such as gender or race.

This absence of focus on homogeneity, helps explain why researchers such as Winner (1993, p. 370) stated, “they [ANT researchers] have little to say about the deep-seated political biases that can underlie the spectrum of choices that surface for relevant actors”. Fujimura (1992) put this assertion simply by posing that is important to endeavour to find the answer to such key questions as:

How and why some perspectives are more persuasive than others in the construction of truths? How and why some actors go along with the will of others? And how and why some resist being enrolled? (as cited in McLean & Hassard, 2004, p. 512).

In answer to these questions, the researcher should consider why actors enrol in networks. According to ANT, actors will become enrolled in the network because they perceive that their interests align with others within it, handing over the power to the principal actor to act, control and co-ordinate the actions of the network so that all may

achieve their goals (Latour, 1987). Some actors may not join a network, or may not remain in one which they have initially joined, refusing to allow the principal actor to control affairs. This resistance to cooperate, when explored by the researcher, can lead to an understanding of the issues of power and morality. Actors, in explaining their behaviour and resistance to the researcher, may voice concerns that indicate their problems in these areas.

Power, like society is the final result of a process and not a reservoir, a stock or a capital that will automatically provide an explanation. Power and domination have to be produced made up, composed. Asymmetries [such as hierarchies and inequalities] exist, yes, but where do they come from and what are they made out of? (Latour, 2005, p. 64).

While the accounting literature employing an ANT perspective does not appear to have pre-supposed any strata of the social world when conducting field studies, actors themselves may actually apply those strata when discussing their networks and the roles they play within them. For example, Chua (1995), in discussing the attitudes of two costing experts towards a proposed new case mix system for a hospital made the following observation:

As they saw it, present allocative mechanisms were overly influenced by interest group politics and in need of a rational, scientific basis. At the very least, a more objective formula would help identify when, how and whose politics influenced particular outcomes (p. 122).

An observation of this type would seem to be an attempt to answer the key question put forward by Fujimura (1992) of: Why some actors go along with the will of others? In this case study, the experts were keen to champion the new system and other actors supported it, because they viewed it as a mechanism to overcome politically influenced costing that did not reflect reality as they saw it.

Preston, Cooper and Coombes (1992) in their critical interpretation of attempts made to introduce a radical new responsibility accounting system to the British National Health Service, were highly cognisant of political processes and engineering behind this set of events:

... we have been able to more clearly see the nature of scepticism to systems of financial calculation and an articulation by the sceptics of the possible effects of such systems on the mode of operation of the hospital. Rather than reflecting an organizational reality, these sceptics recognize that organizations may themselves be transformed by accounting systems (p. 589).

and

Despite all the elaborate fabrications, in this case management budgeting does not become an established fact. Networks are not fully set in place, doctors are not fully convinced of the arguments, managers are faced with alternative demands on their time and resources, information systems do not necessarily connect to the proposed designs of the systems. Thus our account of the fabrication of management budgeting is also an illustration of the problems of fabrication and the difficulty of making budgeting systems appear as unexceptional facts of organizational life. (p. 589)

Indeed, the central tenant of their study is to examine “the *struggle* to fabricate an adequate budgeting technology” (p. 563) implying the significance of recognising the agendas behind the decisions and rhetoric of specific actors and in doing so they sought to examine why some actors were able to exert their influence more effectively than others.

Ezzamel combined ANT with Foucault’s Power/Knowledge to study the building of a network to resist accounting change in a university. Two networks of actors were in evidence in this study, those that attempted to push through redundancies that were perceived to be unfair others who built a network which successfully produced a report to counteract the arguments first put forward. This study is an example of how Foucault’s work can be combined with actor-network theory to explain why actors join networks in an effort to obtain their own goals.

In sum, much of the accounting research appears to have been quite focussed on examining the agendas, the perspectives and the power plays behind the behaviours and the language of actors. While there does not seem to have been a focus on moral perspectives or on social groupings like gender or race, it would seem overall that the criticism that ANT neglects to evaluate the political issues behind the technologies studied is not prevalent within this body of literature.

Conclusion

This study sought to provide a critical appraisal of the applications of Latour's ANT in the accounting literature and how it enables researchers to understand how changing accounting practices take place. Our analysis documents what we feel are the significant studies (27 at least) since the early 1990's that have been motivated to use the lens of ANT. In doing so, it highlights the contribution of ANT's concepts of translation, intermediaries and mediators, and generalised symmetry amongst others which have been employed by accounting researchers. These concepts have been employed to explain a variety of accounting phenomena such as networks developed to: advocate new accounting systems (e.g., Chua, 1995; Lowe, 2001a; b; c); promote a novel approach to accounting (e.g., Jones & Dugdale, 2002); and, increase control (e.g., Robson, 1992; Ahrens & Mollona, 2007).

While the subject matter studied has been rather diverse, some common themes emerge that show how changing accounting practices can be used including: the potential for accounting to be an effective mechanism for achieving long-distance control (e.g., Robson, 1992; Mouritsen, Larsen & Bukh, 2001); the power of accounting to be used as a rationale for institutional or system change (e.g., Chua, 1995; Preston, Cooper & Coombs, 1992); the capacity of the accounting profession to adapt in ways that maintain both its legitimacy and relative levels of autonomy (e.g., Robson, 1991; Jones & Dugdale, 2002) and the inter-connectedness of a wide range of actors, human and nonhuman, in facilitating accounting reforms (e.g., Briers and Chua, 2001; Cuganesan & Lee, 2006).

This study also evaluated the accounting research to date in light of some critical arguments identified in the literature: problems of the inclusion and exclusion of actors; treatment of humans and non-humans; nature of privileging and status; the handling of agency and the structure of society; and, the process of heterogeneous engineering, notable in relation to concepts of power, ordering and distribution. This analysis was further informed by recent work by Latour (2005). Our investigation revealed a range of

limitations in the accounting research using ANT from which we can deduce lessons for future studies in the discipline.

There has been a tendency for some studies to overemphasise the human/social element and to downplay the role of non-human actors in the network. Due weight needs to be given to all actors and the inter-connectedness of each within networks needs to be recognised. An open mind is essential. The issue of symmetry has long been debated in the literature and is discussed in some detail in the present investigation.

There has also been a lack of detail provided in some studies about how actors were selected for the study or the basis on which they were omitted from it. Similarly, the rationale for the selection of commencement and finishing dates of case studies is often inadequate. Finally, adequate consideration of the exogenous environment is necessary. Too often the researcher is fixated on the particular organisation or grouping within the organisation that he/she is studying. The external environment is largely ignored.

The present study contributes to the literature in four ways. First, it provides a list of key accounting articles published to date on ANT and documents their level of impact as measured by citations. Second, it provides a critical review of the most cited studies. Third, it analyses the application of ANT in accounting research through the five critical notes on ANT identified by McLean and Hassard (2004). We have also considered Latour's (2005) comments on common criticisms of his work in addressing this section. To our knowledge this has not been attempted before in the accounting area. Fourth, using the lessons from our critical analysis we provide some recommendations for designing future accounting studies based on this significant body of theory.

The importance of change and understanding the organic nature of this change in organisations, how accounting networks are translated by actors with a view to producing new information, ANT can play an important role as a framework of understanding. It enables researchers to understand the dynamics of this change and which actors, both human and non-human, accountants and technology, play a significant role in the change

process. ANT was specifically helpful to accounting research in providing insights into how networks are developed, maintained and changed, to achieve the goals of those who join the network. By understanding how change takes place it is possible, in the future, to drive change more efficiently and effectively.

There are two limitations of the present study that need to be recognised. First, not all accounting studies were covered in detail and there may be some that we missed. However, it should be recognised that we attempted to cover all those that have been commonly cited. Second, some of the controversies in the ANT literature generally such as the symmetry of humans and nonhumans issue are yet to be resolved.

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**Table 1: Citational Analysis
(n = 29)**

No. of Citations		Authors' Names	Year/Journal	Analysed in This Study
Google	Social Science			Yes/No
150	15	Mouritsen, J.; Larsen, H. T. and Bukh, P. N. D.	2001 AOS	Yes
144	27	Chua, W. F.	1995 AOS	Yes
130 ³	39	Preston, A. M.; Cooper, D. J. & Coombs, R.W.	1992 AOS	Yes
117	48	Robson, K	1992 AOS	Yes
93	34	Briers, M. and Chua, W.F.	2001 AOS	Yes
90	13	Baxter, J., & Chua, W. F ¹	2003 AOS	No
87	29	Robson, K	1991 AOS	Yes
78	24	Ezzamel, M	1994 OS	
77	18	Jones, C. and Dugdale, D.	2002 AOS	Yes
55	25	Miller, P.	1991 AOS	Yes
27	5	Lowe, A	2001 MAR	Yes
25	7	Miller, P. ²	1997 AOS	No
19	2	McNamara, C., Baxter, J. and Chua	2004 MAR	Yes
16	6	Cooper, D. J., & Robson, K ⁴	2006 AOS	No
16	2	Gendron, Y., & Barrett, M	2004 CAR	Yes
15	1	Lowe, A	2001 AAAJ	Yes
10	1	Lowe, A ⁵	2004 AAAJ	No
5	1	Cuganesan, S. and Lee, R	2006 MAR	No
5	0	Lowe, A and Koh, B.	2006 CPA	No
4	0	Lounsbury, M.	2008 AOS	No
4	1	Lowe, A	2001 JOCM	No
3	0	Alcouffe, S. and Berland, N. and Levant, Y.	2008 MAR	No
0	0	Bukh, N and Jensen, I.K.	2008 HRCA	No
0	0	Cuganesan, S.	2008 AAAJ	No
0	0	Emsley, D.	2008 AAAJ	No
0	0	Hopper, T. and Major, M	2007 EAR	No
0	0	Hyvönen, T. and Järvinen, J and Pellinen, J.	2008 MAR	No
0	0	Quattrone, P	2009 AOS	No
0	0	Pipan, T., & Czarniawska, B.	2010 CPA	No

See Notes to this table on Next Page.

Table Notes:

- The bolded articles are discussed in the present investigation.
- Studies below the line were not cited due to lack of citations. In many cases this is due to their recent publication date.
- The full citations for each study are included in the Reference list.
- The above citation scores were obtained on January 12, 2009.

AOS = Accounting Organisations and Society

MAR = Management Accounting Research

CAR = Contemporary Accounting Research

AAAJ = Accounting Auditing and Accountability Journal

CPA = Critical Perspectives on Accounting

JOCM = Journal of Organizational Change Management

EAR = European Accounting Review

OS = Organizational Studies

Endnotes

1. Baxter and Chua (2003) was not covered in detail as ANT is not the only focus of this paper which puts forward a number of alternative theories.
2. Miller (1997) was not covered in detail as this paper was primarily a review of one of Latour's books.
3. This figure includes citations for a related book.
4. Cooper and Robson (2006) was not included as ANT was only a small part of their discussion.
5. Lowe (2004) was not included as ANT was one of several theories used and it did not empirically test ANT.

Appendix 1: Studies discussed in this paper that use ANT as a framework

Author/s Names	Year, Journal	Overview	Insitu/ Posthoc	Contribution	Possible Limitations
Studies that transcend a specific organisational setting					
Robson, K	1991 AOS	Studies the relationship between accounting and its social context, examining the genesis of accounting standards in the United Kingdom.	Post hoc	Introduced the accounting literature to ANT. Discussed in detail how the concepts of translation and problematization can explain the political, social and economic discursive processes of accounting change.	Inclusion/exclusion No non-human actors
Miller, P	1991 AOS	Investigates the adoption of discounted cash flow techniques as a tool for making investment decisions in the 1960s and the roles played by government, academics and enterprises.	Post hoc	Also used the concept of problematization and introduced the concept of action at a distance.	Inclusion/exclusion No non-human actors
Preston, A. M.; Cooper, D. J. & Coombs, R.W.	1992 AOS	Investigates efforts to introduce accounting reforms into the British National Health System in the 1980s.	In situ	Technologies are fabricated and can become taken for granted artefacts. Vested interests may alter throughout the fabrication process as the network is translated. Considers the impact of the external environment on accounting in organisations.	Inclusion/exclusion
Robson, K	1992 AOS	Theorises that the use of numbers in accounting practices enables the achievement of long-distance control.	N/A	Critically examines how accounting inscriptions possess great potential for “power” or action at a distance.	Essentially a theoretical piece that does not provide any empirical data.
Mouritsen, J.; Larsen, H. T. and Bukh, P. N. D.	2001 AOS	Considered the production of intellectual capital statements by managers of organisations to explain the differences between the market value of an organisation and its book value, in a cross-organisational setting. The statements are description devices that can be used by managers to control organisational arrangements, acting at a distance.	In situ	Demonstrated the power of inscription, narrative and translation and the ability for inscription to enrol external allies, as management use the statement as evidence.. Showed that differing organisational networks can be both the same and different by using multi organisation empirical evidence.	Inclusion/exclusion No non-human actors (Which networks and actors external to the organisational network might be activated by these statements?)

Jones, C. and Dugdale, D.	2002 AOS	Explored the rise of activity based costing across the period from 1984 – 1992	Post hoc	Shows how accounting expertise is being bought and sold outside the traditional networks such as the professional arena. Social networks have power to facilitate customer interest. Showed that management accounting practices can be affected by available software solutions.	Human/non-human (informal and undocumented machinations of the network were not taken into account)
Gendron, Y., & Barrett, M	2004 CAR	Studies the effort by two major North American professional accounting bodies to establish a market for an e-commerce assurance product “Webtrust”, providing interesting insights into an accounting innovation. Actors within the network consisted of a diverse range of consumers, managers of on-line organisations and the accounting profession.	Post hoc	Professional claims to expertise is transformed and adapted to enrol and maintain audiences.	Inclusion/exclusion No non-human actors (Actors in the network were diverse and it is problematic that all actors were sufficiently represented)

Studies that focus on a specific organisational setting.

Ezzamel, M	1994 OS	Represents a longitudinal case study of a university as management seek to change an incremental budgetary system to a comprehensive budgetary system and are thwarted.	In situ	Combined the work of Foucault (power/knowledge) and ANT, arguing that they are complementary. Showed how actor- networks can be built to resist changes in accounting routines using the specialised knowledge of accounting as a powerful tool.	Inclusion/exclusion No non-human actors
Chua, W. F.	1995 AOS	An ethnography of three Australian hospitals that were considering the implementation of a new case mix accounting system, which would measure the output of the hospitals in terms of the number and types of cases.	In situ	An example of the classic Latour premise of translation. Innovators come together in mutual interest to create a network that is worth building and defending	Inclusion/exclusion No non-human actors Privileging and status

Briers, M. and Chua, W.F.	2001 AOS	Studies the innovation of an organisation's accounting system through the development of a network of local and global actors.	In situ	Highlighted the importance of boundary objects in the process of stabilising and mediating diverse interests, and highlighted the fragile nature of success and failure when introducing new technologies into an organisation.	Inclusion/exclusion Privileging and status
Lowe, A	2001 AAAJ	Studies the introduction of a casemix accounting system into a New Zealand Health provider.	In situ	Applied Latour's Seven Rules of Method for studying "the fabrication of scientific facts and technical artefacts" as a methodological framework. Applied a greater weight to the non-human than previous researchers. Presented the accounting system as a central actor in organisational networks. Explores the concept of a "black-box".	Inclusion/exclusion
Lowe, A	2001 MAR				
McNamara, C., Baxter, J. and Chua	2004 MAR	Documented the diverse set of activities and actors that, together, helped it to achieve its management objectives. Noted that there were four kinds of knowledge networks within an organisation.	In situ	Looked at the holistic construction of knowledge across the organisation, rather than a single network built for an innovation such as activity-based-costing. This study also emphasised the heterogeneous nature of the networks.	It was difficult to observe the development of new knowledge using the paper's concept/definition of knowledge

¹ It should be noted that his colleague at the Centre de sociologie de l'Innovation at the Ecole nationale supérieure des mines in Paris, Michael Callon, and the British sociologist John Law were also early influences on the development of this theory (Vidmar-McEwen, 2008).

² The popularity and influence of ANT around the world may well be a product of the appeal and quality of its attributes (for example, the inclusion of broad networks in an attempt to explain transformation in society) but also a willingness by the co-founders to publish their findings widely including in various languages. These attributes combined with a willingness to conduct diverse field studies around the world (especially the U.S.) all have served to increase the legitimacy of ANT as a plausible conceptual framework for studying diverse phenomena (Law, 2002).

³ Some researchers such as McLean and Hassard (2004) and even Latour (1999) himself had argued that ANT is not a theory of the social, subject or nature but a "very crude method to learn from the actors without imposing on them an a priori definition of their world building capacities (Latour, 1999: 20). More recently, Latour (2005) acknowledged ANT as a theoretical framework (Latour, 2005).

⁴ The term was used by Law (2003) to describe how networks are not always stable, and over time can fall apart, the separate elements, previously taken for granted, becoming separate and visible to the observer. Law uses the example of a television – if it is in working order one sees simply a television. If it ceases to work one becomes aware of television repair men, circuits, spare parts and aerials; all of which make up a working television.

⁵ See previous note.