

Multiple epistemologies in accountability and the role of Post Normal Science in shaping co-accountability

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Abstract

This paper addresses the need of finding a renewed understanding of accounting and accountability in the perspective of the epistemic approach that they adopt. For this purpose, the study explores the neo-positivism and the constructionism, which are the most used epistemologies in accounting and accountability, then it introduces the Post Normal Science (PNS) epistemology. Various definitions of accounting and accountability are deepened by linking them with different epistemic paradigms. In this vein, accountability models related to the dominant neo-positivistic approach develop informative systems that tend to describe reality in axiomatic, normative and static way. As opposed to those grounded on the constructionist paradigm, that describe reality coming from a knowledge that is shared and stratified, thus producing a common view on what reality is. The epistemic paradigms underpinning the previously described notions of accountability are not static, but they evolve developing slowly, through frameworks, axioms and rules to be tested or stratified in order to reach an improved knowledge. The aim of this study is to inquire theoretically on the potential of a further epistemic paradigm, PNS, to guide the development of co-accountability. Co-accountability attempts to be able of shaping a knowledge rapidly evolving and aiming at satisfying informative needs connected with dynamic and multi-stakeholders' environments. This framework is not considered in opposition to other possible accountability frameworks, derived by other paradigms, but it is considered an alternative framework able to satisfy different informative needs.

The contribution of this paper is twofold: (a) to introduce different concepts of accountability and relate these concepts to the most used epistemic paradigms. (b) To explore the potential of PNS epistemic position to develop co-accountability and suggest a set of empirical steps to co-define co-accountability. The paper contends that co-accountability could help to only better understand and measure the multi-dimensional impact of organizations but also able to become a potential strategic tool to improve a sustainability performance in the long term.

Keywords: accountability; post-normal science; epistemological approaches.

1 Introduction

A science is a 'knowledge arranged in an orderly manner' (Hornby, 1987). Each science is connected with an epistemic position which determines its feature and purpose. Accounting and accountability are sciences and are related to epistemic positions. The starting point of this paper is the exploration

of different epistemic paradigms (Frame and Brown, 2008; Brown, 2009) and their linkage with definitions of accounting and accountability (Roberts, 1985; Gray et al., 1996; Walker, 2006; Russel, 2015; Mashaw, 2006; Rached, 2016). Then, the paper offers a definition of co-accountability by developing the post normal science (PNS) epistemology (Funtowicz and Ravetz, 1993; 2003) applied to accounting and accountability.

The assumption of discriminating among different notions of accountability by addressing the problem of epistemology is based on the fact that the nature of sciences depends on their cognitive purposes. Consequently, the type of knowledge that accounting and accountability can generate determines their nature in terms of features and purposes. The basic role of epistemology has been previously recognised by Frame and Brown (2008) and Brown (2009), who differentiated between 'monologic' and 'dialogic' accounting and accountability by also introducing the epistemic issue. Frame and Brown (2008) and Brown (2009) recognised the role of epistemology as issue able of differentiate between two different typologies of accounting and accountability. But, in those work (Frame and Brown, 2008; Brown, 2009) neo-positivism (Popper, 1962) and socio-constructionism (Berger & Luckmann, 1966) have been considered epistemic paradigms, while PNS (Funtowicz and Ravetz, 1993) a method operating under the socio-constructionism umbrella. In this paper we argue that PNS is an evolution of the socio-constructionist paradigm able of shaping science differently because of its specificity. In particular, the difference between socio-constructionism and PNS originates by their different ontological positions. The socio-constructionist paradigm, indeed, does not neglect the possibility of achieving an understanding of 'the' institutionalised reality, while PNS is not interested in arriving to 'the' reality, but in solving new and rapidly changing real problems (Funtowicz and Ravetz, 2003).

This paper strongly promotes a vision of multiple approaches on accounting and accountability, that, in being based on different epistemic paradigms, can turn into different typologies of sciences. The idea of a dominant paradigm is advanced by proposing the possible coexistence of multiple approaches. Different paradigms, indeed, can coexist because they depend on different needs of knowledge and in particular on the typology of knowledge to which they tend to. The knowledge that sciences can produce depends on the epistemic issue, consequently the epistemic paradigm adopted can shape different notions of accounting and accountability.

Brown (2009) recognises the necessity of referring to different notions of accounting and accountability building 'on the work of accounting writers who have located their work in pluralist traditions' by mentioning Boyce (2000), Dillard (2003), Dillard and Ruchala (2005), Gray (2002), Morgan (1988), Mouck (1995), O'Dwyer (2005) and O'Learly (1985). In particular the author advocates for the intervention of PNS, which is considered able of allowing for 'ideological diversity' and legitimating plural perspectives (Brown, 2009, p. 318). The notion of PNS, anyway, is merely mentioned by Brown (2009), but it is not explored as an alternative epistemic paradigm able of shaping different notions of accounting and accountability. While, in this paper, the authors contend that PNS in being an epistemic paradigm, can shape accounting and accountability sciences differently, when compared to sciences that refer to neo-positivist and socio-constructionist paradigms.

Accounting and accountability sciences are often related to the dominant neo-positivistic approach that develops informative systems that describe reality in axiomatic terms (Dillard and Ruchala, 2005) and which informative value can be improved only by testing that axioms and rules (Popper, 1962). When accounting and accountability are grounded on the socio-constructionist paradigm (Berger & Luckmann, 1966), they are considered able of generating a type of knowledge that develops by institutionalising insights valid within a social community. In this approach, knowledge is shared and stratified producing a common view on what reality is. Both the abovementioned paradigms, however, from an ontological perspective, produce a type of knowledge which scope is to arrive to describe (a more or less) objective reality.

The epistemic paradigms underpinning the notions of accounting and accountability are not static, but they evolve developing slowly, through frameworks, axioms and rules to be tested or to be stratified in order to reach an improved knowledge. PNS, conversely, is an epistemic paradigm able of shaping a knowledge rapidly evolving and aiming at satisfying informative needs connected with dynamic environments (Funtowicz and Ravetz, 1993; 2003). This epistemic position is helpful for developing and understanding accounting and accountability when they do not aim at describing reality in absolute terms, but when they are catching that part of reality (or simply information) useful for stakeholders in a certain moment for obtaining knowledge on topics considered of interest for certain purposes. This epistemic paradigm is continuously evolving and subject to constant *negotiation* among the parties interested to retrieve new dynamic knowledge. In ontological terms, PNS does not aim to arrive to ‘the’ truth, to understand ‘the’ reality, but to produce useful knowledge, which can be considered real or true until it is useful to the stakeholders. Adopting a PNS approach, accountability becomes a matter of continuous deliberations and *negotiations* mainly for two intimately linked issues: democracy and the quality and effectiveness of information (Strand, 2017).

This paper differs from previous works which posit accounting and accountability, even when based on the notion of PNS, under the umbrella of the socio-constructionism (Brown, 2009), because it considers PNS an alternative epistemic position which is worth of further exploration and development in practical terms.

In addition, the paper answers to the call for more democratic, participatory and pluralistic forms of decision-making in these sciences (O’Dwyer; 2005; O’Learly; 1985; Frame and Brown, 2008; Brown, 2009, Brown and Dillard, 2015) by proposing an application of PNS epistemology to accounting and accountability. In this regard, the paper provides a logical path for implementing accounting and accountability when based on PNS epistemology: the co-accountability framework.

The paper is organized as follows: it is firstly discussed the idea that the epistemic approach adopted can shape differently sciences and by introducing the neo-positivist, the socio-constructionist and PNS paradigms is presented the possibility that they can coexist in accounting and accountability for satisfying different knowledge needs; then the notion of accountability is discussed by evidencing its main features and the linkages with the adopted epistemologies; subsequently the PNS paradigm is explored in connection with the main accountability features in order to develop the co-accountability framework. Finally, the conclusion summarizes the argumentation in favour of multiple epistemic paradigms in accounting and accountability and the role of PNS in developing the co-accountability for satisfying new and dynamic stakeholders’ needs.

2 Multiple epistemologies in developing the sciences of accounting and accountability

2.1 The Neo-positivist and the socio-constructionist paradigms

Epistemology is the “philosophical study of the nature, origin, and limits of human knowledge” (Martinich & Stroll, 2005). Epistemology is the main object of the philosophy of science that seeks to define the boundaries of what can be considered as science or scientific and what cannot be, by shaping different epistemic positions or paradigms. In different scientific discipline different and sometimes multiple epistemic paradigms can coexist. The debate on which epistemic position should be the most suitable (if any) in accounting and accountability, anyway, is still ongoing (Burrell and Morgan, 1979; Hopper and Powell, 1985; Thompson, 2011). Different epistemic paradigms own different ontological positions because of their different interpretations of the nature of reality.

The potential coexistence of different epistemic approaches does not neglect the dominance of one paradigm over another. Focusing on accounting and accountability, it seems that these disciplines are

dominated by a mainstream approach based on strong quantitative data and analysis (Aherns et al., 2008; Cooper, 2008). In many accounting frameworks, studies and papers, this approach is applied by following a tradition which has mainly originated in the Anglo-Saxon world (Watts & Zimmerman, 1986; Barth et al., 2000), and which seems to ignore or marginalise the definition of social science (Weber, 1949) and instead it privileges natural scientific methodologies in accounting.

This epistemic position of mainstream accounting thinkers and scholars can be placed under the umbrella of the neo-positivism. Many mainstream scholars seeking to defend a rigorous deductive method use the thoughts of a philosopher often considered as *sui generis* neo-positivist: Karl Popper (1902-1994).

In Popper's epistemology described in 'Conjectures and refutations' (1962) the philosopher introduces a concept called the 'falsification principle'. Popper (1962) claims that each scientific theory is valid until or unless it can be falsified by new experiments and new findings that are able to falsify the previous conclusions. The resulting idea is that scientific knowledge comes from (testable) hypothesis resulting from experience or rigorous theories that can be submitted to the falsification principle. This epistemic view is connected with the development of testable theories for achieving knowledge. Axioms, definitions and theories should be developed and tested and until remain valid they can be part of the current shared scientific knowledge. Consequently, even the tendency to develop stable sets of testable rules for defining sciences such as accounting and accountability, can be considered as an effort to develop these disciplines in conformity with the neo-positivist idea of science (Brown, 2009). The existence of Conceptual Frameworks mainly based on 'true and fair' views in accounting and accountability shows the development of rules and axioms able of a priori defining these sciences (Brown, 2009). Definitions, rules and axioms are not static, but constantly object of changes addressed at improving the systems. Accounting and accountability in this view can be considered developing sciences that meet the epistemic position of neo-positivism in which scientists are building testable theories which improvement depends by the possibility of their falsification. Each falsified axiom or rule should be re-thought and re-shaped, for overtaking the falsification tests. Accounting and accountability in this perspective can maintain their status of sciences until the content of their Frameworks can be improved by continuous conjectures and refutations. In this philosophical understanding, sciences are subject to the process of conjectures and refutations in order to evolve and to fit the reality they want to describe. The abovementioned neo-positivistic approach is considered the mainstream approach in accounting and accountability, but also in science in general. Kuhn (1962) explains the dominance of this paradigm by arguing that revolution in sciences determines the rise of new paradigms. The dominance of neo-positivistic stance follows the scientific revolution occurred in natural sciences during 20th century (Kuhn, 1962). The ontological idea connected with this epistemic position is that the scientist is searching for 'the' truth, by testing rules or theories supposed to be connected with explanations of 'the' reality. In this position 'truth' or 'reality' is supposed to be something objective existing outside of the individual, that individuals can experience in their everyday life. The focus is on how to detect reality searching for general rules explaining phenomena occurring in its flowing.

Accounting and accountability dominant epistemology (neo-positivist) is not shared by all the scholars, in particular in the arena of critical accounting thinkers. In this literature, indeed, an increasing tension exists between the neo-positivist approach – that is the most widespread in the realm of natural science – and an opposite school of thought which see the development and the feature of these disciplines closer to social sciences (Laughlin, 1995; Burrell & Morgan, 1979; Morgan, 1983; Chua, 1986). In this scenario Laughlin (1995) work, among others, is particularly worth of attention because it introduces the epistemic issue and proposes a range of alternative approaches available based on the thoughts of some key philosophers who have generated these alternatives. Laughlin's (1995) paper has the merit of opening a debate among management and accounting scholars. In particular Lowe (2004a), by basing his arguments on Bruno Latour's (de)-

constructionist ideas, distinguished three paths within the sociology of scientific science: the empirical relativist program (Collins, 1981; 1983; Pinch, 1986); the constructionist program (Knorr Cetina, 1981, 1996; Latour and Woolgar, 1979); and the theory of social interest (Barnes, 1977, 1982; Bloor, 1982, 1991; Shapin and Schaffer, 1995). The socio-constructionist program appears to be the most used epistemic approach in accounting and management after the neo-positivistic one and many contributions defend its application and use in these disciplines (Quattrone, 2004; Frame and Brown, 2008; Brown, 2009).

Socio-constructionism is an epistemic position coming from sociology and it is based on *constructivism*, which is a theory of learning (Piaget, 1937; Kelly, 1955). In this regard, Berger & Luckmann (1966) explain that every action that is frequently repeated it is crystallized according to a fixed scheme, which can therefore be reproduced and perceived objectivized and institutionalized. Habituation also implies that the action can still be performed in the future and knowledge can be transmitted to the next generations. Institutionalized knowledge is learned as an objective truth in the course of socialization and then internalized as subjective reality. The institutional world, therefore, own a specific ontology because it appears to be an objective reality that can be known and spread through in the form of socially shared culture (Berger & Luckmann, 1966). In this understanding, accounting and accountability are socially constructed disciplines which are generally accepted and the knowledge of reality that they can produce is derived by a cumulative and collaborative process of previously accepted and institutionalized notions.

The underpinned ontological idea of these paradigms is that science should be an instrument for achieving a better understanding of reality. Both neo-positivism and socio-constructionism, indeed, stretch asymptotically to describe reality; which in the first case is external to the individual, while in the second is socially constructed. Accounting and accountability when understood within these paradigms develop frameworks for better achieving the scope of describing and measuring the impacts of the existence of different types of organizations.

The so-called normal sciences (Kuhn, 1962) and the connected epistemic approaches, anyhow, develop in contexts characterized by a certain degree of stability, with the aim of achieving a shared and as much as possible stable knowledge. Even if the socio-constructionist paradigm can be placed outside of the normal sciences because it does not necessarily originates from scientific revolutions, it requires knowledge to be institutionalised, therefore the scientific knowledge needs time to be developed and accepted. Different dynamic contexts, in which a stable, cumulative and universally shared knowledge is not so useful, require a different epistemic paradigm. PSN (Funtowicz and Ravetz, 1991; 1993; 1994, 2003) offers insight on this type of knowledge and on its usefulness in dynamic and pluralistic environments.

2.2 *The Post Normal Science (PNS)*

The PNS approach was first introduced by Funtowicz and Ravetz (1991) as an alternative epistemic approach for generating knowledge, shifting from the traditional individual agency, top-down approach of science to more participatory forms of research governance. PNS epistemic paradigm is able of shaping a rapidly evolving knowledge and it is aimed at satisfying informative needs that keep changing over time (Funtowicz and Ravetz, 1991; 1993; 1994; 2003).

This epistemic position is helpful for developing an understanding of sciences such as accounting and accountability when they do not aim at describing reality in absolute terms. In particular, accounting and accountability under PNS can develop for the specific purposes of achieving an understanding of a focused and necessarily partial reality, useful for stakeholders in a certain moment for obtaining

knowledge on topics considered of interest for certain purposes. This epistemic paradigm is continuously evolving and subject to constant negotiation among the parties interested to retrieve new dynamic knowledge (Strand, 2017). PNS does not aim to arrive to ‘the truth’, to understand ‘the’ reality, but it is aimed at producing knowledge, which can be considered real until it is useful to the interested actors (Funtowicz and Ravetz, 1993).

The approach of PNS proposes three core and interrelated elements: (i) the plurality of perspectives and commitments, (ii) the scientific management of uncertainty and of quality, and (iii) the intellectual and social structures that reflect problem-solving activities (Funtowicz and Ravetz, 1994).

The *plurality of perspectives and commitments* in PNS refers to the fact that the scientific truth per se is no longer attainable, desirable nor relevant (Funtowicz and Ravetz, 1994). Thus, it is indispensable to engage a diversity of participants in the dialogue for solving specific issues and for negotiating useful solutions, which is the real aim of science when based on PNS. For example, if accounting and accountability develop under a plurality of perspectives, they should go beyond individual perspectives to negotiate and mediate the issues at stake. Under this perspective, these sciences should engage stakeholders in the process of designing and continuously updating knowledge and processes through time. This perspective moves from the lowest level of stakeholder engagement, informing and consulting stakeholders to the highest level of delegating power and control to them (Friedman and Miles, 2006).

In addition, multi-stakeholder perspectives become crucial when dealing with complex issues. If one seeks to understand these issues in a particular context, those directly affected by the issue are more likely to have an in-depth insight of the problem and alternatives to address it (Jasanoff, 2007; Gallotti and Frith, 2013; Janssen and Ostrom, 2006). Therefore, the participatory and democratic nature of PNS is essential to assess the robustness of the accountability framework that in this epistemic paradigm is co-generated (Bebbington and Larrinaga, 2014; Funtowicz & Ravetz, 1993; Funtowicz & Ravetz, 1999; Gold and Sudgen, 2007).

The *scientific management of uncertainty and of quality* is focused on the fact that the high level of uncertainty related with some issues forces PNS to take at least three considerations. First, to take a more cautious approach regarding arguments based in quantitative analysis. There is no empirical science completely free from uncertainty (Funtowicz and Ravetz, 1990), thus, the challenging task is to manage uncertainty in a way to maximize simultaneously the quantity and quality of information. Maximizing quantity refers to avoid duplication, redundancy and/or overload of information, while maximizing quality refers to get the most out of the information obtained. In other words, to improve the relationship between quantity and quality of information obtained for decision-making (Funtowicz and Ravetz, 1994). Second, to recognize the presence and legitimacy of value commitments. Ethical complexities are central to the resolution of problems and the proper management of uncertainty and quality. Third, to recognize and respect that every stakeholder has a relevant contribution to the solution. Considering multiple perspectives is not merely a moral and/or ethical exercise of democratic justice but also a recognition that multiple perspectives contribute to understand better the problem and, therefore, finding faster and more effective solution.

The *intellectual and social structures that reflect problem-solving activities* represent another of the specific features of PNS. Under a PNS approach, ethical concerns must be central to the science and based on the respect and tolerance of multiple perspectives (O’Connor, 1999; Gluckman, 1972). As a consequence, researchers engage in practical issues and policy making as much as in theoretical development. Traditionally, scientists claim credit for all the benefits from the research and blame society for any harm made with the application of their findings, thus, separating research from policy issues, ethic concerns and advocacy. Ethical commitment should not be constricted to the mere process and/or product development but expanded to its use or abuse (Funtowicz and Ravetz, 1994).

PNS paradigm differs from neo-positivism and constructionism in ontological terms. PNS is not

searching for an absolute scientific truth to be tested or resulting by cumulative institutionalized knowledge. PNS disregard the ontological issue because it replaces ‘truth’ by ‘quality’ as its core (Funtowicz and Ravetz, 2003, p. 4). Furthermore, PNS requires the involvement of multiple stakeholders in a process of *negotiation* regarding the knowledge they need to obtain, consequently it deeply differs from the mainly adopted accounting and accountability epistemic positions (neo-positivism and constructionism).

The following table summarizes the different notions of knowledge and sciences derived by the epistemic paradigms previously described.

Table 1 Epistemic paradigms and the connected typology of science

Epistemic Paradigm	Notion of knowledge	Typology of Science and connected ontology
Neo-positivist	Set of <i>axioms</i> and <i>rules</i> defined and tested, which improvement is due to the possibility of passing falsification tests.	Science is derived by frameworks containing axioms considered able of properly describing ‘the’ reality until falsification tests are passed
Socio-Constructionist	<i>Institutionalized</i> knowledge that can be improved by further concepts that become generally accepted and consequently institutionalized	Science is based upon evolving frameworks which improvement is due to new cumulative institutionalized knowledge that forms a social constructed reality
PNS	Knowledge is the result of <i>negotiation</i> between different involved parties for solving specific issues and obtaining the related solutions	Science uses flexible frameworks useful in a certain context for negotiating the needed knowledge for certain purposes: it does not aim to arrive to ‘the truth’ or to ‘the’ knowledge

Depending on the epistemic paradigms used, it is possible to arrive to different notions of science connected with the notions of knowledge on which they are based upon. Consequently, accounting and accountability can shape differently depending on the epistemic paradigm to which they refer to. None of these notions should be considered superior to the other, but instead when developing a certain type of accounting and accountability the scholars and the interested stakeholders should have in mind the typology of knowledge they need to retrieve.

3 Accounting, accountability and the issue of epistemology

3.1 Accounting and accountability

Even though the definitions of accounting and accountability seem to be shared by scholars and taught within accounting many classes by referring to precise and well-known references (Roberts and Scapens, 1985, Mashaw, 2006; Brown, 2008; Rached, 2016); scholars are still far from adopting a unique definition of accounting and accountability (Walker, 2006; Russel, 2015).

In general, accounting theory argues that collected information need to be punctual, accurate and

timing in order to make informed decisions and hold companies accountable. The discussion about “what kind of information” is pertaining to accounting and “which stakeholders” are touched by the accounting information can vary considerable. Conventional accounting argues that the accounting information is primarily addressed to the shareholders (or owners) which are rational economic actors who are interested in the economic and financial dimension of the transactions among the organization and the society. Social and environmental accounting enlarges these perspectives and it considers a plurality of dimensions, i.e. economic, financial, social, environmental, political and cultural (Gray, 2002) to multiple- stakeholders, not only the owners, but also the customers, the employees, the suppliers, the funders and in general all the society at large. According to this broader view, accountability is considered as the duty of being accountable for organizational actions and impacts to different typologies of stakeholders (Gray et al., 1996).

The multiple definitions of accountability are sometimes confused because “authors are talking about different methods and questions of accountability without specifying with any precision either the particular accountability problem that engages their attention or the choices that they are making implicitly among different accountability regimes” (Mashaw, 2006, p. 117). The different definitions of accountability agree upon the idea that accountability is a relational concept (O’Dwyer et al., 2005; Costa and Pesci, 2016); however, the actors of this relationship are unknown or vague. In order to unpack the accountability complexities, Mashaw (2006) proposes an analytical definition of accountability based on six crucial “building blocks” or questions (Rached, 2016), as follows:

1. *who* is accountable?
2. to *whom*?
3. *what* they have to be account for?
4. *what process* need accountability to follow?
5. *by what standards* need the accountability behaviour be judged?
6. *what effects/consequences* produce a breach of these standard?

These questions are the key analytical prisms to understand the disputes and arguments about accountability. Accordingly, any attempt to contribute to the debate around the accountability notion will revolve around this fundamental formal pattern (Rached, 2016).

The *first and second questions* brings forward the subjects of an accountability relation, where the accountee (or power-holder) and the account-holder are involved. The relationship between these two agents is inherently normative, it is related with the responsibility that arises within the power-holder (i.e. an individual or an organization) from the rights and power to fulfil a promise to the account-holder (i.e. different sets of multiple stakeholders). The relationship among power-holder and account-holder is based on two important aspects: first, there is not a single specification of these variables, who is accountable to whom depends on different individual perspectives, and different needs of multiple stakeholders (O’Dwyer et al., 2005; Bebbington et al, 2007; Costa and Pesci, 2016); account-holder and power holder has not been conceived as individual intention (the power-holder is accounting to the account-holder and the account-holder is demanding accounting to the power-holder) but more explanations in terms of “collective intentions” – those associated with joint actions – is needed (Funtowicz and Ravetz, 1993, 1993; Gold and Sugden, 2007).

The *third question* specifies the object of accountability, that is, “for what” the power-holder needs to provide an account to the account-holder. It refers to dimensions, aspects to be measured and indicators able to assess performance. In the literature, the “for what” accountability debate has mainly be addressed by considering advantages and limitation of adopting a strong focus on monetary performance measurement *versus* a more holistic view which is able to include social and environmental performances (Brown, 2009; Bebbington et al, 2007; Larrinaga and Bebbington 2014; Costa an Pesci, 2016). The risk of monetization of non-economic values is that monetization will lead to all activities becoming socially constructed as “economic” (Bebbinton et al., 2007; Brown, 2009).

Indeed, as O’Conner (2000) explains, individuals and groups with different orientations will conceive their “frontiers of monetization” differently, therefore a reasoning on the kinds of values (monetary and/or non-monetary) involved the accountability question is required (Brown, 2009)

The *fourth question* specifies processes and procedures that put accountability in place and the specific time in which the accountability is carried on. According to Rached (2016) procedures can range from a variety of balances between transparency and confidentiality. A minimum of transparency is though required because accountability with no transparency at all is ineffective given that do not provide information to place (or not) trust (O’Neill, 2002). Related with the process is the temporal perspective that reflects the moment in which accountability takes place. Accountability ex post is carried after the organization’s decision making. In this case, stakeholders are only informed about decisions that have already taken place, participating thus, only in the lower steps of the accountability ladder: manipulation, therapy and informing (Rixon, 2010). On the contrary, accountability ex ante considers mechanisms of preventive control and it should be done before the decision-making process (Mashaw, 2006).

The *fifth question* refers to the benchmark of judgment to which the power holder is held (Rached, 2016). After the standards are set, the power holder provides information and justification allowing the account holder to assess the decision/actions relative to the standards. These standards are considered such as other evaluative criteria, i.e. laws, regulations, shared codes and they can considerable vary in terms of degree of flexibility. In order to define accountability standard and benchmarks, many scholars have discussed regarding the role of experts and non-experts in providing and contributing to its definition (Brown, 2009; Jasanoff, 2003; Frame and Brown, 2008). Brown (2009), for instance, considers the possibility to introduce peer communities in order to accommodate the opinions of stakeholders not previously recognised as “experts”. This approach not only offers new resources for thinking about the relationship between “experts” and “non-technical experts” but it also provides reasons for more active public involvement in domains of technical decision-making in an open discursive community (Jasanoff, 2003).

Finally, the *sixth question* represents the consequences that the accountee or power-holder has to face after the performance evaluation. Consequences could be sanctions in case of not delivering appropriately its responsibilities, rewards in case of good performance or redefinition of roles and responsibilities in case of strategy redefinition (Andreoni et al, 2003). The idea of the consequences or effects about accountabilities which do not respect the benchmarks relates to two main issues: i) the first one concerns the adoption of reinforcing mechanisms that can foster the power-holder to meet the standard (Andreoni et al., 2003), ii) the second one reflect on the role of responsibilities (Schlenker et al., 1994). In terms of reinforcing mechanisms, Andreoni et al. (2003) argue that the combination of rewards and punishments had a very strong effect in terms of cooperation among the stakeholders; indeed, in a “Carrot-Stick” approach rewards and punishments act to complement one another. In terms of responsibility, Schlenker et al, (1994) proposes a “triangle model of responsibility” according to which different elements may define diverse driver in responsibility within accountability. In their view responsibility is “the adhesive that connects an actor to an event and to relevant prescriptions that should govern conduct” (p. 635) and it therefore represents basis for judgment and sanctioning.

3.2 *Pluralistic accountability: monologic versus dialogic and the epistemic issue*

From the definitions and questions provided in this paper, it emerges that accountability implies a relationship between two or more stakeholders who are required to give an account for their actions (Roberts and Scapens, 1985). This relationship highlights that information is crucial for accountability not only as a right of the person who receives the information (power-holder) but also as a duty of the person that provides the account (account-holder).

The relational dimension of accounting and accountability is at the centre of the academic debate. Indeed, in recent years, there has been an increased need of “new form of accounting” and accountability that promote and facilitate more participatory forms of decision-making (Boyce, 2000; Gray, 2002; Gray et al., 1997; Morgan, 1988; Mouck, 1995; O’Dwyer, 2005; O’Leary, 1985). This is particularly evident in the social and environmental accounting stream of research, where various scholars have promoted new attempts of explicitly dialogic accounting and forms of engagement which are able to foster democracy (Bebbington et al., 2007a, 2007b; Frame and Brown, 2008; Thomson and Bebbington, 2005; Brown, 2009, Brown and Dillard, 2015). Starting from the early work of Gray et al. (1997) in which the authors claimed that accountability is “related to the rights to information of a participatory democratic society” (Gray et al., 1997, p. 329), a more pluralistic and participatory form of accounting and accountability is nowadays required (Brown and Dillard, 2015). A more participative accounting and accountability systems can foster democracy and facilitate social change, thus questioning that accountability regimes reinforce the status quo (Celerier and Cuenca, 2015).

In order to become participatory and democratic, accounting and accountability should consider different stakeholders’ perspectives by facilitating a “better conversation” (Morgan, 1988) and different forms of engagement (Bebbington et al., 2007). However, the engagement and involvement of stakeholder is not guarantee of a more democratic form of accounting and accountability, indeed the corporate practices has often presented very under-developed ability to empower marginalized voices and really engage different and often contrasting perspectives (Bebbington et al., 2007; Gray et al., 1997; Brown, 2009).

An interesting distinction within this realm, is proposed by Brown (2009) who discussed two different approaches between monologic and dialogic accountability. In detail, the discussion of Brown (2009) on monologic and dialogic accountability starts from different epistemic views. According to the monologic form of accounting, it is possible to reach a “true and fair view” of the reality through the adoption of well-defined technical instruments (i.e., bookkeeping, budgeting, performance measurement, reporting and auditing, standard-setting, cost-benefit analysis) which are also hardwired institutionally (Brown and Dillard, 2015). Indeed, Brown (2009) considers monologic accountability mainly pertains to the neo-classical view of the businessman and business organisations, in which the rational economic agent develops economic and financial transactions in order to maximize profit return for shareholders/owners (Jensen, 2002). Within the monologic accountability approach, technical experts provide scientific knowledge to decision-makers in order to produce technical answers to pre-given goals (Brown, 2009). The role of stakeholder engagement and democratic participation of stakeholders is limited to confirm knowledge to the pre-existing “truth” that has been built by the expert and the competing views are limited in order to reduce managerial complexity. As such, they delimit the spaces for debate and refuse voice to alternative perspectives. Therefore, the stakeholder engagement is still relatively linear and unidirectional in the monologic approach (Stirling, 2008; Brown and Dillard 2015), and the adoption of terms such as “bottom-up participation” or “downward accountability” risk reinforcing hierarchies among organizations and stakeholders.

In contrast to monologic accountability which is positioned into the neo-positivist epistemic paradigm, dialogic accountability proposes a different socio-political perspective where the focus is both on individuals, collectivities and companies as multiple actors of the society. Within a socio-constructionist epistemic paradigm, dialogic accountability “is not concerned with discovery of an ‘infallible truth’, but rather with discussing actants’ values and priorities in ‘democratic’ processes of decision making” (Hillier and Healey (2010, p. 387). The accounting and accountability reality is positioned in the realm of social constructs.

In the dialogic accountability perspective the reality is not something static, absolute or unchangeable, but on the contrary, decision are shaped and negotiated by all the stakeholders/participants engaged

in the situated context (i.e. business, State, professional, civil society...) and in a very specific timeframe. This means that there is no “universal truth” that can be applied to other contexts or situations, because the knowledge that has been developed by those stakeholders in those situation is not replicable (Brown and Dillard, 2015).

Therefore, dialogic accountability differs from monologic accountability because it is more democratic and “multi-voiced” and attuned to a diversity of stakeholders’ value and interests. The “voice” of these different stakeholders form together a multiplicity of expert knowledge, which is thus oriented at supporting progressive change through the democratization of accounting (Brown and Dillard, 2015).

In recognizing heterogeneity and multiple perspectives, dialogic accounting and accountability refuses to privilege capital markets, thus allowing a more pluralist expression of public interest “mitigating the dominance of instrumental rationality” (Dillard and Ruchala, 2005, p. 621). Dialogic accounting and accountability reject the idea of a standardized and universal narrative, preferring “to think of societies as contests of narratives” (Addis, 1992, p. 649). These disciplines, thus become viewed as vehicles with the potential to foster democratic interaction rather than a set of techniques to maximize shareholder wealth and construct “governable” others (Miller and O’Leary, 1987).

With specific reference to the social and environmental literature, the dialogic perspective brings the idea to develop models based on a multi-dimensional and participative approach that is sensitive to power differentials in society (Bebbington et al., 2007; Frame and Brown, 2008; O’Dwyer, 2005; Thomson and Bebbington, 2004, 2005). Bebbington et al. (2007), for instance, advocate a social and environmental accounting that takes stakeholder engagement seriously, where the “usual” roles of principal and agent are more fluid and different stakeholders could have a greater voice in defining accountability. Dialogic accountability within the social and environmental accounting stream, it recognizes conflicts among stakeholders, engages multiple viewpoints and explicitly addresses power dynamics (Thomson and Bebbington, 2005). They call for the unitary lens of monologic accounting to be replaced with a polyvocal citizenship perspective (Gray et al., 1997). Dialogic thinking accepts the “messiness” and complexity of working with a multi-voiced process because it consider this an essential way of engaging with lived reality (Bebbigton et al., 2007).

In order to make dialogic accounting functioning, Brown (2009) proposes a set of key principles as the most relevant: i) the need to recognize a diversity of ideological orientations; ii) the importance of avoiding “monetary reductionism”; iii) being open about the inherent contestability of calculations; enabling access for “non-experts”; iv) ensuring effective participatory processes; v) being attentive to power relations; vi) recognizing the transformative potential of dialogic accounting; vii) and resisting new forms of monologism.

Those principles have helped in distinguishing dialogic accountability from monologic one, both based on two different epistemic approaches, i.e. neo-positivism and socio-constructionism.

In order to understand how these two different epistemic paradigms can (or can not) fulfil the 6-accountability questions addressed in the previous section, we propose Table 2, which presents the relationship among dialogic/monologic accountability and the 6-accountabiity questions, based on the work of Brown (2009).

Table 2 – The 6-accountability questions into the monologic and dialogic accountability

6-accountability questions	Monologic accounting	Dialogic accounting
<i>who</i> is accountable?	Recognize single ideological orientations Monologic accounting assumes that rational economic man, which is a self-interested utility maximizers, will direct and guide the accountability process	Recognize multiple ideological orientations Dialogic accounting recognizes that people with different values, perspectives and assumptions will seek to “account” differently—for different things and in different ways (Morgan, 1988). This view is based on a political economic perspective of person according to which individuals and collectivities as actors can have many roles and relations among them.
to <i>whom</i> ?	Focus on shareholders Monologic accountability is mainly oriented to satisfy the profit maximization need of shareholders	Recognize multiple ideological orientations Dialogic accountability is oriented to a broad set of stakeholders, including recognition of those less powerful in order to facilitate the expression of different perspectives and to encourage individuals and groups to engage in democratic interaction across perspectival borders.
<i>what</i> they have to be account for?	Focus on monetary performance According to some scholars, the focus on monetization is consistent with a neo-classical economic view of humans (Sagoff, 1998; Sinden, 2004). Within monologic view, accountability could refer exclusively to financial resources or, more precisely only to resources that can be measured in financial terms.	Avoid “monetary reductionism” Impacts should not be reduced into a single “bottom line”, rather it is important to adopt a plurality of perspectives able to encompass both quantitative and qualitative data.
<i>what process</i> need accountability to follow?	Limit participatory processes to unidirectional engagement Traditional accountability frameworks have a top-down perspective regarding procedures, as a consequence the level of transparency is decided by the power-holder and which traditionally ends in financially-centred frameworks.	Ensure effective participatory processes In dialogic accounting, the process is based on democratic participation. Following on participatory approach both inside and outside accounting, dialogic accountability suggests to involve stakeholders early in the process and to develop procedural rules to establish a more even playing field for the expression of diverse views (Owen et al., 2001).
<i>by what standards</i> need the accountability behaviour be judged?	Exclude accessibility for non-experts In monologic accounting, the adoption of universal standard is supported by the idea that “technical” information is helpful in excluding people from the political process. In this approach, experts themselves cultivate a great self-awareness of the values and assumptions underpinning their models and standards and the dialogue with other non-technical stakeholders become hard.	Enable accessibility for non-experts Dialogic accounting does not used universal standard and, on the contrary, it promotes the development of extended peer community quality assurance processes where scientists are expected to communicate epistemic and ethical uncertainties to stakeholder audiences. Information should be provided in multi-layered ways—in forms that are accessible to non-specialists and in more technical forms that enable independent testing
<i>what effects/consequences</i> produce a breach of these standard?	--	--

The contribution of Brown (2009) to the understanding of monologic versus dialogic accountability has been relevant in order to positioning these concepts within different epistemic positions. As previously said, monologic accountability pertains mainly to a neo-positivist view, while the dialogic accountability mainly belong to the social constructionism. In explaining the peculiarities of dialogic accountability through a set of specific principles, Brown (2009) also helped in better understanding the differences among the two extremes of accountability in producing two different knowledge. Moreover, she introduced the PNS approach in discussing some specific principles, i.e. “Avoid monetary reductionism” and “Enable accessibility for non-experts”. However, as shown in Table 2, it is quite difficult to provide an answer to the 6-accountability questions by adopting both monologic or dialogic accountability. Indeed, with both approaches it is not clear what are the effects/consequences after a breach of the standard. Moreover, Brown (2009) did not develop in full the role of epistemologies in shaping different notions of accounting and accountability and different role and scope of these disciplines. Indeed, a call for future investigation concerning the relationship between PNS and dialogic accountability is still open (Frame & Brown, 2008; Brown, 2009; Brown and Dillard, 2015). Admitting the possibility for different epistemologies in accounting and accountability allows for an understanding of the features and usefulness of different approaches to

these concepts. In opening toward the possibility for multiple accounting and accountability sciences aimed at different scopes, the role of PNS should be further explored as a *per se* epistemology which develops in a ‘protean’ (Mashaw, 2006) way in a certain period of time for fulfilling certain informative needs. The exploration of the role of PNS follows the need (Brown, 2009) of better investigate the role of democratisation and pluralistic form of accounting (Funtowicz and Ravetz, 1993; Haag and Kaupenjohann, 2001; Luks, 1998, 1999; O’Connor, 1999; Ravetz, 2006).

In contrast to “normal science” (Khun, 1962), PNS advocates for a plurality of legitimate perspectives which can work in a situated context (Funtowicz and Ravetz, 1993) and could therefore help us to address the 6 accountability questions, by designing a new co-accountability framework.

4 Applying PNS to accountability: the co-accountability framework

In order to fill the debate in the literature regarding: (i) the need of considering different epistemic paradigms as the starting point for developing accountability frameworks (Frame and Brwon, 2008; Brown, 2008; Bebbington et al., 2007), (ii) the exploration of PNS for the legitimation of knowledge in accountability (Brown, 2009; Brown and Dillard, 2015), this section engages with PNS as an alternative epistemic paradigm to shape co-accountability framework. In order to extend the Brown’s work (2009) which applies PNS to some of the specific principles proposed for the dialogic accountability framework, in this paper we are going to applies the three elements of PNS (i.e. plurality of perspectives and commitments, scientific management of uncertainty and of quality; intellectual and social structures that reflect problem-solving activities) to all the accountability questions in order to develop the co-accountability framework.

We consider a descriptive framework of accountability (adapted from Rached, 2016) to transform each accountability question (adapted from Mashaw, 2006; Rached, 2016) to a variable of accountability as follows: the first question “Who is accountable” is represented by variable *A*. The question: “To whom” is represented by *B*. The question: “What they have to account for” is represented by variable *C*. Subsequently, variable *D* represents “which standards and procedures needs to be followed. Finally, the question “What effects/consequences produce a breach of standards” is represented by *E*. Briefly, the accountability model can be described as: “*A*” accounts to “*B*”, for “*C*”, based on “*D*” standards and procedures, subject to “*E*” consequences.

Subsequently, we propose a co-accountability framework, that links each variable/question previously mentioned in the literature review section with the core elements of PNS (Funtowicz and Ravetz, 1994). More in detail: i) the plurality of perspectives and commitments, ii) the scientific management of uncertainty and of quality, iii) the intellectual and social structures that reflect problem-solving activities. Table 3 discloses in brief how each question/variable of co-accountability is influenced by each core element of PNS epistemology.

Table 3: The link between PNS and co-accountability questions

Co-accountability questions and variables	PNS core elements		
	<i>The plurality of perspectives and commitments</i>	<i>The scientific management of uncertainty and of quality</i>	<i>The intellectual and social structures that reflect problem-solving activities</i>
4.1 Who are the power-account holders? = AB	A: power-holder accountability to whom? + B: account holder accountability from whom? Becomes "AB" power/account holders.	AB is subject to changes. The group of relevant stakeholders can change over time.	AB share the whole process from co-selection of indicators to redefining strategies in the long term.
4.2 What they have to be account for? = C	Performance dimensions, aspects, and indicators become co-selected.	Indicators focus on AB's mission. It goes beyond quantitative indicators.	Indicators need to describe how problem-solving activities are performing.
4.3 Which process and standards need to follow? = D	The overall process of co-accountability is co-defined by AB stakeholders	The process is ongoing and dynamic. It evolves due to uncertainty and changes.	The process is a problem-solving toolkit of co-accountability.
4.4 Which effects/consequences produce a breach of these standards? = E	Responsibility and rights are shared according to the different levels of power.	Individual and collective responsibility co-exist and complement each other	The measurement of consequences becomes a guidance for reshaping strategies in the long term.

4.1 From the power-holder (A) and account-holder (B) to the "account-power holder" (AB)

The first and second questions of the traditional accountability model (see Mashaw, 2006 and Rached, 2016) regarding *who* is accountable to *whom*, represented by A and B correspondingly, become unique variable AB according to a PNS epistemic approach.

Firstly, by considering the first core element of PNS, *the plurality of perspectives and commitments*, the co-accountability framework proposes that all stakeholders become gradually both account and power holders. The redefinition of A and B (and the relationship in between) under a PNS epistemology would mean that not only A accounts to B but also the other way around. In other words, A and B become a single AB variable that represents all involved (engaged) stakeholders in co-accountability. In AB multiple stakeholders share rights and responsibilities, and ideally have a balanced distribution of power to exercise them. This plurality of perspectives improves the relationship between quantity and quality of information because the interaction among different stakeholders expands each individual's potential for social understanding and action and allows them to access to more information about partners' behaviour (Gallotti and Frith, 2013).

Secondly, AB, is influenced also by the second PNS core principle relates to the *management of uncertainty and of quality*. Attending to this principle, AB is subject to modifications and thus, can change over time. Under these conditions, complexity and uncertainty are central to the co-accountability framework and they represent the focal point for bringing different stakeholders (experts and non-experts, see also Brown, 2009) into the co-production of knowledge (Frame and Brown, 2008). According to co-accountability, uncertainty does not function as a source of unwelcome tension between different stakeholder and perspectives; rather it becomes a primary component of the process in order to interpret and managed messiness (Frame and Brown, 2008; Gold and Sugden, 2007).

Thirdly, the AB power-account holder is also consistent with the third core element of PNS regarding the *intellectual and social structures that reflect problem-solving activities*. Indeed, the proposed co-accountability framework recognizes and respects that every stakeholder has a relevant contribution to the solution. Considering multiple perspectives is not merely a moral and/or ethical exercise of democratic justice (O'Connor, 1999; Gluckman, 1972) but also a recognition that multiple perspectives contribute to understand better the problem and, therefore, finding faster and more effective solution. In other words, the recognition and respect of every stakeholders taught, provides a relevant contribution to the solution (Frame and Brown, 2008). Furthermore, from a pragmatic point of view, AB stakeholders are co-responsible of the whole process of co-accountability. Not only in the definition of metrics, but also in its following measurement (therefore in collecting together data

and estimating measurement) and along the overall continuous process or assessment and redefinition of strategies in the long term (Schlenker et al., 1994).

4.2 *From standardized financial information to customized qualitative and quantitative performance indicators*

The third question of the co-accountability frameworks relates to the different dimensions (*for what?*) the AB power-account holder need to agree upon the definition of performance information. In the co-accountability framework the variable *C* represents performance dimensions and indicators that are relevant for all engaged stakeholders.

Firstly, by considering the first core element of PNS, *the plurality of perspectives and commitments* *C* is co-specified by *AB* as a customized set of customized qualitative and quantitative set of indicators. Given that there is not one single stakeholder perspective it is not possible to offer one single metric able to reply to all possible stakeholders' demands (Costa and Pesci, 2016). Therefore, in co-accountability performance dimensions, aspects to be measures and indicators are co-selected (Jasanoff, 2003), thus customized for each organization and group of engaged stakeholders.

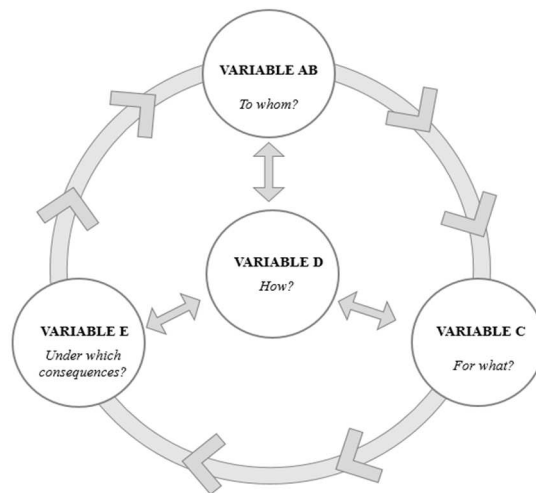
Secondly, *C*, is influenced also by the second PNS core principle relates to the *management of uncertainty and of quality*. Similarly, to the dialogic accountability framework, co-accountability neglects and refutes the focus on monetary information (Brown, 2009) and it considers a broader and holist perspective. More in detail, by following a PNS epistemic view, the co-accountability framework considers that although quantitative and financial indicators may provide useful information about economic performance, however, it is no longer possible to reduce co-accountability to financial measures and quantitative arguments (Brown, 2009; Bebbington et al, 2007; Larrinaga and Bebbington 2014; Costa an Pesci, 2016). Instead, indicators go beyond quantitative indicators and focus on measuring the accomplishment of *AB*'s specified priorities. Additionally, the set of indicators is not static but subject to change across time.

Thirdly, by addressing the third PNS core element, the customized qualitative and quantitative indicators need to be problem-solving oriented and, offer a clear view on the performance towards the solution, therefore it considers the inclusion of expert and non-expert view into the definition of quantitative and qualitative performance indicators (Brown, 2009; Jasanoff, 2003; Frame and Brown, 2008).

4.3 *The co-production of co-accountability*

The *fourth and fifth questions* of the traditional accountability model (see Mashaw, 2006 and Rached, 2016) regarding *what process need accountability to follow and by what standards correspondingly*, is unified in this paper in one single question and variable *D*. Variable *D* thus, represents the process and standards of co-accountability. The co-accountability framework suggests that the process might be carried by a focal organization – which is the organization or group of stakeholders that need to activate the whole co-accountability process as showed in Figure 1.

Figure 1: Proposed process of co-accountability framework



A focal organization in this context is the organization that starts with the process and therefore takes the lead engaging its most relevant stakeholders at the beginning of the process. *D* describes the process needed to specify co-accountability around a focal organization. The process starts specifying variable *AB* with the identification and categorization of stakeholders. Second, the process specifies variable *C*, therefore it engages with multiple (*AB*) stakeholders to identify together its interests, main dimensions of performance, aspects to be measured and relevant indicators. Third, variable *E* is specified with the co-design of system for performance evaluation and possible consequences.

Overall, co-accountability does not represent a linear process but instead variables are specified as part of a chain that forms a loop in which each variable is fed and feeds back into each other. The impact of one variable into another indirectly influences the ongoing process of co-accountability. For example *AB* influences the specification of *C* but nevertheless, *C* also influences the specification of *AB*. More in detail, the specification of *C* influences the ongoing process of co-accountability because depending on which dimensions and metrics are selected different stakeholders will be more or less relevant. In order to ensure the representation of stakeholders in all dimension, changing dimensions could change the specification of *AB*. This means that the co-accountability process implies the interaction and interdependence of variables.

By reading this *D* variable through the three core elements of PNS (the plurality of perspectives and commitments), co-accountability framework advocates a co-definition and co-production by all *AB* engaged stakeholders. By following Gold and Sudgen (2007), it is very hard to reach a collective intentions, if the “we-intentions” it is build as a sum of “I intentions”. In order to make different individuals or stakeholders to act collectively, it is necessary that collective intentions are the product of a distinctive mode of practical reasoning, team reasoning, in which agency is attributed not only to *A* or *B*, but to *AB* as a unique agent (Gold and Sudgen, 2007). This is consistent with a co-accountability framework.

Secondly, it is important to highlight regarding to *management of uncertainty and of quality*, that although the specification of variables can change over time, nevertheless, the process has to define clear boundaries of co-accountability for a specific moment and priority problems to be solved. More in detail, who are the engaged stakeholders, which indicators are relevant and which are the consequences in case of non-compliance for a specific time and scenario. If co-accountability boundaries remain uncertain, it is not possible to distinguish who are engaged stakeholders, for what, and subject to which consequences.

Thirdly, by applying the third core element of PNS, the intellectual and social structures that reflect

problem-solving activities D becomes a toolkit for the practical application of co-accountability. The solution of complex problems require a continual process of engagement of those who are affected by and who affect a certain issue (Bebbington and Larrinaga, 2014). This continuity in the process of participation not only will allow the strategic tool-kit to adjust changes over time but also it will allow stakeholders to acquire experience that will help them to improve their interaction and cooperation skills with each other (Gold and Sudgen, 2007).

4.4 *The co-responsibility of co-accountability*

Variable *E* offers a clear view on a system of shared rights and responsibilities on an individual and collective level that offers guidance in reshaping long- term strategies (Andreoni et al., 2003; Schlenker et al., 1994).

Firstly, by considering the first core element of PNS, the plurality of perspectives and commitments, *E* considers essential an ethical commitment and responsibility not only in the process of disclosing accountability but also in the use or abuse of power enacted by the process. Therefore, is based on reciprocity, there is tolerance of tensions and admission of possible antagonisms, but overall there is a desire of coexistence beyond self-interest (O'Connor, 1999). Therefore, it exists a responsibility from power-account holders for the consequences of their actions. AB stakeholders share the rights and responsibilities, and both collective and individual responsibilities operate simultaneously (Gluckman, 1972).

Secondly, applying the *management of uncertainty and of quality*, *E* does not exclude or substitute individual responsibility but complements it (Schlenker et al., 1994). Along the same lines, in co-accountability collective power and individual power should be complemented. As such, *E* represents simultaneously an evaluation tool and a strategic redefinition enabler at a dual level of individual stakeholders and stakeholder network. In this sense, co-accountability should be helpful to guide the redefinition of individual strategies (each stakeholder) and multiple strategies (stakeholder network) towards the achievement of its goals and missions.

Thirdly, by applying the third core element of PNS, the intellectual and social structures that reflect problem-solving activities, *E* has to put in place not only a mechanism of (i) evaluation performance but also of (ii) evaluation of strategy. In both cases considering simultaneously individual and collective perspectives. In the case of evaluation of performance, *E* is related with the measurement of co-selected dimensions and performance indicators. In other words, AB not only selects and provides information to estimate *C* but, ultimately, has the co-responsibility of making a self-evaluation of performance. The self-evaluation is done both at individual and collective level.

In the case of evaluation of strategy, *E* aims to go one step forward towards consequential accountability. The mere evaluation of performance without any related consequence can be particularly dangerous, overall in the case of bad performance due to lack of responsibility. Considering that all stakeholders specified in AB are subject to consequences accordingly to the performance evaluation makes co-accountability a powerful tool for redefining strategies in the long run. Although, it has been proved that voluntary system of rewards and, even more, of punishments can act as a mechanism to harness cooperation and good performance (Andreoni et al, 2003). However, co-accountability prefers to transform a system of rewards and punishment into a step that evaluates strategies and helps to redefine it when needed. In this sense, *E* guides AB stakeholders to evaluate and redefine strategies when needed at a dual level: (i) co-strategy (of the group of stakeholders as a whole) and (ii) individual strategies (each stakeholder need to modify its attitude toward the AB power and account-holders for the sake of the broader co-accountability interest).

5 Conclusions

This paper has introduced different epistemic paradigms and it has linked them with the concepts and definitions of accounting and accountability. In particular the epistemic position discussed are: the neo-positivist (Popper, 1962), social constructionist (Berger and Luckmann, 1966) and PNS (Funtowicz and Ravetz, 1991; 1993; 1994; 2003). These epistemologies are presented as non-conflicting, but on the contrary useful for different purposes depending on the cognitive needs that they have to satisfy. Consequently, by adopting different epistemic positions it is possible to shape differently the same science, i.e. accounting and accountability.

The debate on epistemologies in accounting and accountability is not new (Laughlin, 1995, Lowe, 2004; Quattrone, 2004), but herein the paper contribution is to promote a vision of multiple epistemologies and to deepen the role of PNS. The paper, indeed, contributes to differentiate between social-costructionism and PNS which previously has been considered as a method used in the social-costructionist arena (Frame and Brown, 2008; Brown, 2009).

In the authors' thought, PNS is different when compared to social-constructionism in terms of ontology because it does not aim to reach an *institutionalized* reality, but it *negotiates* flexible solutions for contingent problems by involving stakeholders in the debate. This different ontology determines accounting and accountability features when placed under the PNS domain, and it shapes them as sciences useful to solve specific issues.

In being PNS epistemology oriented to practical knowledge instead of to reach 'the' knowledge, it needs flexible frameworks. In order to satisfy this need and to develop an understanding of PNS potentialities in the accounting and accountability realm, the paper proposes the co-accountability framework, which is considered to have powerful implications in practical terms. In this regard, this study explores PNS epistemology to develop the co-accountability framework in order to extend the previous work in dialogic accountability (Bebbington et al, 2007; Frame and Brown, 2008; Brown, 2009). The developed framework works in relation to the key accountability issues (Mashaw, 2006; Rached, 2016) and it trays to translate them in practical useful indication for implementing accountability in dynamic environments. First, regarding the accountability issue: "accountability from who to whom?" Co-accountability blends the traditionally separated roles of account-holder and power-holder into one role of account-power-holders and accepts that relevant stakeholders can change across time. Second, regarding "accountability for what?" Indicators become co-selected, go beyond quantitative indicators and need to describe how problem-solving activities are performing. Third, regarding "accountability how?" the paper suggests that the process of information generation is dynamic and ongoing, given that in real contexts conditions, multi-stakeholders and issues to be solved change constantly. More in detail, the proposed co-accountability framework suggests a circular process of dynamic variables that are fed and feedback into each other in an ongoing process. Furthermore, co-accountability is focused on information useful to find solutions. Fourth, co-accountability fulfils a gap of previous accountability frameworks developing an answer to: "accountability under which consequences?". Although rights and responsibilities are shared this does not imply the disappearance of individual rights and responsibilities but on the contrary the need of complementing each other in the most sustainable way. We argue that in order to achieve that, co-accountability could perform evaluation and strategy redefinition on a dual level of (i) individual performance and strategy redefinition and, (ii) collective performance and strategy redefinition giving thus, an answer to "accountability under which consequences".

The co-accountably framework proposed in this paper is thought to have deep practical implications and to be used as a road map in contexts in which accountability needs to produce useful knowledge deriving by a process of negotiation of interests and information.

Finally, the authors are aware that other epistemic approaches could be studied, developed and applied, but they think that the specific ontology and the consequent type of knowledge deriving by

PNS owns potentialities particularly worth of attention in the current dynamic economic environment.

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