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Environmental Accounting in Peru: A Proposal Based on the Sustainability Reporting in the Mining, Oil and Gas Industries

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This paper proposes an environmental accounting system in Peru that will improve the sustainability reporting of Peruvian corporations and have a positive impact on all the stakeholders (communities, stockholders, government, NGOs, etc.). This new environmental accounting system will allow companies to properly quantify and report environmental issues and have a more integral assessment and analysis of all the variables which affect their triple bottom line.

Moreover, environmental issues in Peru will be partially solved when companies adhere to accurate measurement rules, timely submission of data, and fulfillment of government regulations. The principle behind the proposal is that accurate measurement, calculation and reporting on pollution levels will improve the ways companies address environmental and social issues, as well as enhance their financial results. This paper focuses on companies of the mining, gas and oil sectors, since they are arguably some of the main contributors to Peru's GDP, as well as some of the nation's largest polluters.

Keywords: environmental accounting, sustainability reporting, CSR, GRI, ISO, Peru.

Contabilidad ambiental: una propuesta basada en los reportes de sostenibilidad en las industrias minera, petrolera y de gas

Este trabajo de investigación propone un sistema de contabilidad ambiental en el Perú que mejorara los reportes de sostenibilidad de las empresas y tendrá un impacto positivo en todos los *stakeholders* (comunidades, accionistas, entidades del gobierno, ONG, etc.). Este nuevo sistema de contabilidad ambiental permitirá a las empresas medir adecuadamente y comunicar aspectos ambientales, además de una evaluación y análisis integral de todas las variables que afectan su *triple bottom line* (aspectos sociales, ambientales y financieros).

Por otro lado, las cuestiones ambientales en el Perú serán parcialmente resueltas cuando las empresas se adhieran a las reglas de medición exacta, presentación oportuna de la información, y cumplimiento de los requisitos del gobierno. El principio detrás de la propuesta es que una medición precisa, cuantificación y presentación de informes sobre los niveles de contaminación permitirá a las empresas optimizar las maneras en que ellas abordan las cuestiones ambientales

y sociales, así como mejorar los resultados financieros. Este documento se centra en las empresas de los sectores de minería, gas y petróleo, ya que representan algunos de los principales contribuyentes al PBI en el Perú, así como los contaminadores más grandes de la nación.

Palabras clave: contabilidad ambiental, reporte sostenible, RSC, GRI, ISO, Perú.

Contabilidade ambiental no Peru: uma proposta baseada no relatório de sustentabilidade nas indústrias: mineira, petroleira e do gás

Este trabalho de pesquisa propõe um sistema de contabilidade ambiental no Peru, que melhorará os relatórios de sustentabilidade das empresas e terá um impacto positivo sobre todos os *stakeholders* (comunidades, acionistas, governo, ONGs, etc.) Este novo sistema de contabilidade ambiental permitirá as empresas a quantificar e relatar, adequadamente, questões ambientais assim como uma avaliação e análise integral de todas as variáveis que afetam a seu *triple bottom line*.

Além disso, as questões ambientais no Peru serão parcialmente resolvidas quando as empresas aderirem às normas de medidas precisas, a apresentação de dados no seu devido momento e ao cumprimento das exigências do governo. O princípio por trás desta proposta é que as medidas precisas, os cálculos e os relatórios de níveis de poluição permitirão as empresas melhorar as formas em que elas abordarão as questões ambientais e sociais, bem como melhorar os resultados financeiros. Este artigo concentra-se em empresas dos setores de mineração, gás e petróleo, uma vez que eles são, indiscutivelmente, alguns dos principais contribuintes para o PIB do Peru, bem como os maiores poluidores do país.

Palavras-chave: contabilidade ambiental, relatórios de sustentabilidade, RSC, GRI, ISO, Peru.

1. Introduction

The Global Reporting Initiative (GRI) defines sustainability reporting as an organizational report that provides information about economic, environmental, social and governance performance. Nowadays, companies are expected to proactively address global environmental issues as part of their corporate social responsibility (CSR) (Kitora, 2008). Hence many companies have adopted standardized reports (some certified) to communicate their performance regarding environmental issues to their stakeholders. In Latin America, when referring to environmental or sustainability reporting (a more comprehensive concept which also includes economic, social and governance performance), GRI is commonly used (Ortas & Moneva, 2011). However, authors such as Boiral and Gendron (2011) question the impartiality, rigor and accountability that companies project through certification. They suggest that an integral approach should be taken in order to have clear and reliable environmental reports.

Harazin and Horváth (2011) claim that environmental accounting can produce reliable information for CSR performance evaluation. Moreover, improved environmental accounting is seen by corporate managers and environmental advocates alike as a necessary complement to improved environmental decision-making within the private sector (Boyd, 1998). The attributes of the framework provided by environmental management accounting facilitates product quality and contributes to competitive advantage. Hence, it is likely that environmental accounting plays an influential role (Dunk, 2007). This paper proposes an integral environmental accounting system to improve the sustainability reporting of Peruvian corporations. A number of theories (legitimacy theory, institutional theory, resource dependence theory and stakeholder

theory) are used as a theoretical framework for such proposal.

2. Sustainability Reporting of Peruvian Corporations

2.1. Current Situation - Description

According to the Global Research Marketing Report on Social Responsibility in Peru 2012, around 78% of the firms in the study, including mining, oil and gas companies, reported any type of social responsibility practices involving donations/grants or direct activities lead by them. One of the main conclusions of that research is that every year there is more information and greater concern by firms to implement and report their sustainability policies.

In this paper, particular attention is paid to large mining companies because they represent the highest percentage of Peru's GDP, and provide more information regarding social and environmental issues in their websites and annual reports.

Benavides and Gastelumendi (2001) found that companies like Newmont, Antamina Mining Company and Barrick Misquichilca have decided to adhere to the Voluntary Principles in Security and Human Rights of the UN Global Compact (the same is true for the company Yanacocha). They also identified that certification of mining operations with the ISO14001, a management certification related to the improvement of the environmental management and prevention, reduction or elimination of environmental impacts, was a common practice for these companies. Moreover, a number of Peruvian mining and oil companies (from none in 2008 to nine in 2012 and three in 2013—as of August 2013) use the GRI guidelines for their sustainability-reporting framework (see Table 1).

However, Porro (2008) found that some firms have intensively used sustainability reporting as a defense mechanism against criticism from diverse stakeholders (especially NGOs and communities) for their irresponsible actions against the environment. According to Porro (2008) some companies use CSR initiatives in order to hide their environmental issues, a practice he refers to as “social marketing.” This, he explains, is why mining companies have increased their programs of solidarity with communities.

In Peru, mining companies are specially scrutinized and are obligated to allocate a certain portion of their earnings to infrastructure and social projects in communities that are negatively affected by their operations. The funds are directed to local authorities and regional governments to promote or develop new schools, hospitals, roads, electricity or water distribution, drainage, and so on. A report by the German Embassy in Lima, Peru (2009), states that exporting companies, mining corporations in particular, have increased social commitment mainly because of social and media pressure.

Table 1. Peruvian Mining and Oil Corporations sustainability reporting using GRI (from 2008 to 2013)

Organization	Sector	2008	2009	2010	2011	2012	2013
Antamina	Mining	0	G3, B, 3p	G3, A, GRI	G3, A, GRI, (2)	0	G3, A, GRI
PASSAC Argentum	Mining	0	G3, C, Sd	0	G3, C, Sd	0	0
PASSAC Huaron	Mining	0	G3, C, Sd	0	G3, C, Sd	0	0
PASSAC Quiruvilca	Mining	0	G3, C, Sd	0	G3, C, Sd	0	0
Yanacocha	Mining	0	G3, B, Sd	G3, B+, Sd	G3, B, Sd	G3, A, GRI	0
El Brocal	Mining	0	0	G3, B, Sd	G3, B, Sd	G3.1, B, GRI	0
Pan American Silver - Unidad Huarón	Mining	0	0	G3, C, Sd	G3, C, Sd	0	0
Pan American Silver - Unidad Morococha	Mining	0	0	G3, C, Sd	G3, C, Sd	0	0
Pan American Silver - Unidad Quiruvilca	Mining	0	0	G3, C, Sd	G3, C, Sd	0	0
Xstrata Copper Southern Peru Division	Mining	0	0	G3, U	G3, A, GRI	0	0
Empresa Minera Los Quenuales S.A.	Mining	0	0	0	G3, C, Sd	G3, B, 3p	0
Refinería La Pampilla	Energy	0	0	0	G3, B, GRI	0	0
Xstrata Copper Peru	Metals Products	0	0	0	G3, A, GRI	G3, A, GRI	G3, A, GRI
Barrick Perú	Mining	0	0	0	0	G3, B, GRI	0
Compañía Minera Poderosa S.A.	Mining	0	0	0	0	G3, B, GRI	0
Duke Energy Perú	Energy	0	0	0	0	G3, B, GRI	0
LA CIMA	Mining	0	0	0	0	G3, B, GRI	0
Repsol Perú	Energy	0	0	0	0	G3, A, GRI	0
Grupo Milpo	Mining	0	0	0	0	0	G3, A, GRI

Source: Own elaboration based on GRI (2013)

2.2. Current Situation – Main Issue: Mismatch between the corporations's stated CSR policies and the perception of other stakeholders

Peruvian economic actors (companies, government, investors, employees, etc.) are involved in a challenging task to promote sustainable development, especially in the mining, oil and gas industries. Currently, it is a common practice worldwide to publish corporate sustainability reports (environmental reports, CSR reports, sustainable reports, etc.) that provide information on economic, social and environmental issues. To instill trust among stakeholders, more and more sustainability reports are based on the GRI standard, and some of them are even certified by external auditors. According to Boiral and Henri (2012) the problem with these reports is that they are not transparent, and do not reflect actual corporate sustainability performance. Similarly, the conclusions of the Japanese Institute of Certified Public Accountants – JICPA (2007) states that there are some issues regarding comparability of environmental reporting, namely disparities in the locations and methods for displaying the information and lack of uniformity in quantitative information boundaries¹.

Moreover, in a study about the Canadian mining company Barrick, Vervaeke (2013) argues that a fundamental disconnect exists between Barrick's stated intentions and the outcomes experienced locally around the Pierina and Lagunas Norte mines in Peru. Testimonies collected from community members in Peru, and relevant documents show that mining companies try to neutralize dissent to their operations, and to acquire consent for current operations through moral and intellectual counsel.

In Peru a number of cases support Boiral and Vervaeke's statements. Three of the most important are presented below:

Case 1: Yanacocha Mining

The case of Yanacocha Mining which, operated by US firm Newmont and Peru's Buenaventura, is clear example of the mismatch.

Information disclosed: In the company's website the company states that it engages in "Mining which respects the environment". Moreover, Yanacocha holds two environmental certifications: ISO 14001 and ISO/IEC 17025 4. In 2012 Yanacocha proudly held an A grade for the G3GRI (an improvement from a B in 2011 and 2009 and a B+ in 2010).

Events and major issues: Regretfully past incidents reveal a different situation from what the company portrays in its reports. For instance, in 2000, 151 kilograms of toxic metal from the company were spilled while being transported by a contracted truck; in 2004, more than 10,000 people living in the Cajamarca area protested the expansion of Yanacocha onto nearby Cerro Quilish; in 2006 protests broke out against the expansion of the company's Carachugo pit, and escalated to violent clashes that resulted in a single casualty, a local farmer. In 2011, in Cajamarca, a northern Peruvian city of 362,000 people, crowds opposing Newmont's Conga mine gathered in the city's central square.

Case 2: Southern Copper Corp. (SCCO)

SCCO states that its principal environmental projects in Peru are the gas and dust recovery systems at

¹ While some consider that the environmental reports produced by Japanese companies are advanced, even by world standards, and that they are important sources of information, others see problems with the comparability of data contained in different reports (JICPA, 2007).

Ilo. According to the company's website, Southern generates relatively little hazardous waste and all such waste is handled according to current regulations. No contingency was reported in 2009. Also, they were not levied any significant fine regarding environmental damage from our mining operations. This has been achieved through management based on our environmental policy, aimed at: (1) climate change (reducing the use of fossil fuels and output of greenhouse gas emissions, and also improving our power efficiency), (2) water (optimizing water use) and (3) biodiversity (responding to potentially negative impacts on wildlife, soils, and underground waters). This company got a G3 A grade in 2011 and G3, U grade in 2010. Nevertheless, these rankings are questionable in light of the views of members in the local community. In April 2010 a protest was held against Southern Copper Corp. (SCCO)'s Tia Maria mine near Arequipa, a city of 836,000 people close to Peru's border with Chile.

Case 3: Xstrata Copper

Switzerland-based Xstrata Copper presents a bulletin of sustainability and holds an ISO 14001:2004 certification. However, in 2011, two people died in protests against water use at Xstrata Plc's Tintaya mine, located 240 kilometers south of Cuzco.

The seriousness of the environmental and social issues is even more clear after taking into account some important facts about the mining, oil and gas sectors in Peru:

- Mines consume huge amounts of water for separating minerals from rock. It takes 28 liters (7.4 gallons) of water to make 0.5 kilogram (1 pound) of copper in Chile, and similar amounts in Peru.

Even after processing, the water at some mines is so toxic that it can't be reused. Peru's biggest mines, such as Conga, in the Andean highlands, where there is almost no rain from May to October.

- The Peruvian government has declared that securing water resources is a first priority for the nation. According to Hugo Jara, head of the country's National Water Authority, Peru faces long-term shortages because water is already in short supply in areas where mines are expanding. The government needs to invest \$394 million in reservoirs and canals by 2016 to address annual water shortages in the dry season in the Andes.
- According to official data, due to the El Niño weather phenomena, rainfall in the highland mining regions has been below average for the last two years. Furthermore, according to a March 2012 study by the 62-nation Intergovernmental Panel on Climate Change, global warming has likely increased and prolonged droughts in some regions of the world.

In summary, there are discrepancies between what the mining corporation's state and what other stakeholders' perceive to be true. It is worth mentioning that a number of corporations have been legally penalized for environmental violations, yet managed to dodge paying their fines due to deficiencies in the legal and judicial system².

3. Theoretical Framework

A number of theories can support the proposal for the adoption of an environmental accounting system in Peru. In the next paragraphs those theories will be presented.

² In the last three years the fines are estimated in 135 million soles which 92 million are in suspension (El Comercio, Abril, 8, 2013).

Hoque (2006) names a number of institutional and contextual perspectives for accounting research (Legitimacy Theory, Institutional Theory and Stakeholder Theory). Following Chen and Roberts (2010), in this paper the Resource Dependence Theory (Pfeffer & Salancik, 2003) is also used to enhance the analysis.

According to Chen and Roberts (2010), Legitimacy theory focuses on whether the value system of an organization is congruent with the value system of society, and whether the objective of organizations is to meet social expectations. Legitimacy theory, however, does not specify on how the congruency could be reached or how the actions should be formulated. Depending on the purpose of legitimation, there are primarily two levels of legitimacy – institutional legitimacy and organizational (or strategic) legitimacy.

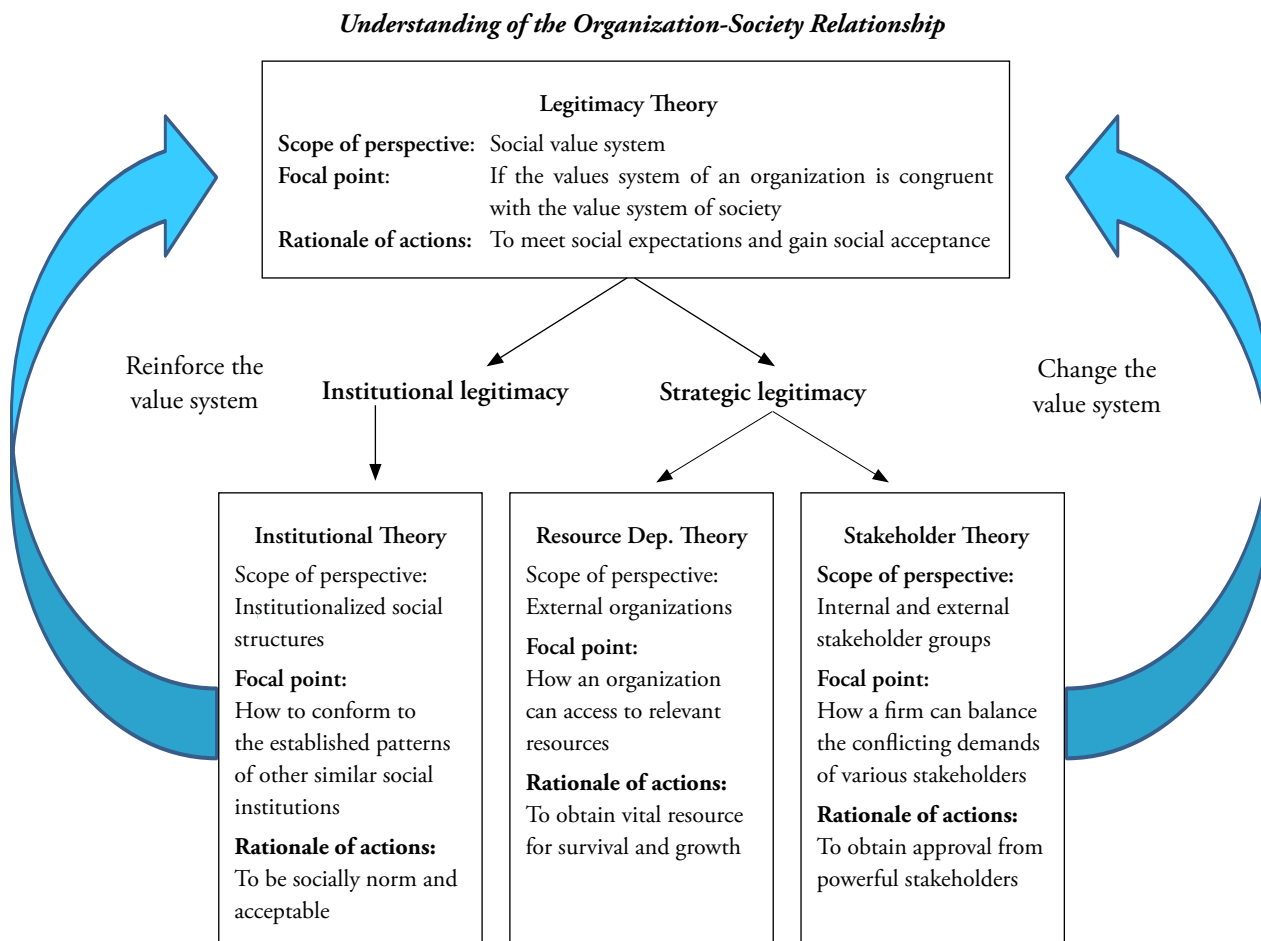
The process of seeking institutional legitimacy is directly related to institutional theory. The concepts of resource dependence theory and stakeholder theory are more relevant to the process of strategic legitimacy.

Chen and Roberts (2010) also posit that institutional theory is similar to legitimacy theory but concentrates on the relationship between environment and organizations, especially the stability and survival of organizations. While legitimacy theory itself does not specifically express how to meet social expectation and gain social support, institutional theory strongly emphasizes that organizations can incorporate institutionalized norms and rules to gain stability and enhance survival prospects. Thus, conformity to these established institutional patterns is the pathway to legitimacy, and to receive support and attract resources. Resource dependence theory also focuses on the effects of environment on organizations. However, instead of concerning itself with social expectation, resource dependence theory attempts to explain the

effect of environmental constraint on organizations. Resource dependence theorists state that organizations must engage in exchanges and transactions with other entities for various resources. As organizations are not self-contained or self-sufficient, they rely on their environment for existence, and the core of the theory focuses on how organizations gain access to vital resources for survival and growth. Resource dependence theorists believe that although organizations are constrained by their situations and environment, organizations possess both the desire and the ability to negotiate their positions within those constraints through various tactics. Stakeholder theory is also concerned with the effect of environment on organizations. However, as opposed to the other theories treating the “environment” as a whole, stakeholder theory focuses on the relationships between organizations and its various stakeholders who constitute the environment. This holds true because stakeholder theory recognizes that (1) the impact of each stakeholder group on the organization is dissimilar, and (2) the expectations of different stakeholder groups are not only diverse but also sometimes conflicting. Thus, how to receive support/approval from different influential stakeholders rests upon the ability of organizations to balance these conflicting expectations. illustrates the relationships among the theories.

Moreover, Chen and Roberts (2010) also posit that while legitimacy theorists usually emphasize the importance of compliance with the expectations of society, stakeholder theory (Freeman, 1984) explicitly recognizes that society is composed of different constituents (stakeholders) who have different and even conflicting expectations of firms. While resource dependence theory concentrates on external organizations with power and resource, stakeholder theory acknowledges that stakeholder groups (both

Figure 1. The Relationship among the Theories



Source: Chen and Roberts (2010)

external and internal) have unequal power and ability to influence the actions of an organization (Barnett, 2007; Mitchell et al., 1997). Stakeholder theory explicitly recognizes the expectation differences among various groups and stresses the importance for organizations to meet the expectation of as many stakeholder groups as possible (Freeman, 1984).

Chen and Roberts (2010) concluded that although these theories are different in their levels of perspec-

tive, specificity, and resolution, their objectives are much the same. They have a common interest – to explain how organizations ensure survival and growth. Most importantly, they all emphasize that financial performance and efficiency may be necessary but not sufficient for organizations to continually survive.

On the other hand, Chen and Roberts (2010) state that there is an overlap among the legitimacy theory, institutional theory, resource dependence theory and

stakeholder theory. Chen and Roberts (2010) also posit that Legitimacy theory is more appropriate when research primarily focuses on how corporations manage their public image, while the social expectation of corporations is generally assumed without reference. The origin of expectation may not necessarily be identifiable, and similarly, the targeted audience of such legitimization may not be explicitly named (an example of which could be voluntary disclosures). Institutional theory is considered a proper choice for studies that investigate a specific corporation structure, system, program, or practice that is commonly implemented by other similar organizations as a part of normal business operations (such as the employer matching gift program).

While legitimacy theory and institutional theory are generally implemented in studies concerning the activities of one firm, resource dependence theory and stakeholder theory are suitable for research interested in the relationship and interactions between two or more organizations or groups. Resource dependence theory is typically useful for studies that explore the dynamic interactions between two competing or complementary organizations, such as the conflicting actions between environmentally indifferent firms and environmental protection groups, or the close connections between nonprofit organizations and the public relations arm of business corporations. Although such studies could also be guided by stakeholder theory, the original intent of stakeholder theory, according to Freeman (1984), is to allow managers to go beyond common business practices if necessary. Thus, stakeholder theory may be more applicable to studies that explore unexpected social or environmental activities undertaken by corporations (Chen & Roberts, 2010). Table 2 illustrates those conclusions by applying these applicable theoretical frameworks to social and environmental accounting.

As previously mentioned, some Peruvian corporations, especially those in the Mining sector have already adopted a type of sustainability reporting approach (most of them GRI —see Table 10.1) but mismatch between what is stated in the sustainable reports and the opinions of some stakeholders (NGOs, communities, etc.) still persists. In this paper a mandatory adoption of a new environmental accounting system complemented with a new sustainability reporting framework could improve the current financial, environmental and social situation. As can be seen in Table 10.2, the Resource Dependency Theory seems to be the best theoretical framework fit for this proposal. This statement is justified in the following paragraphs.

As mentioned above, the resource dependence theory (Pfeffer & Salancik, 1978, 2003) emphasizes that whatever resources are vital to the survival of an organization, the organization will pursue strategies to ensure the continuing supply of the resources.

An important question can be addressed: Why the resource dependence theory is preferred over the other theories mentioned above?

The legitimacy theory stresses the necessity to avoid any threat to an organization's legitimacy, but is less specific on the consequence of being or not being legitimate. Resource dependence theory, in contrast, addresses the effect of legitimacy.

Pfeffer and Salancik (1978) state that the environment is not simply a given condition to be absorbed, avoided, or accepted, it is the dynamic outcome of interactions between many organizations seeking their own goals and interests. When organizations face manageable uncertainty and external constraint, they may search for arrangements or form alliances with others to coordinate their actions. Empirical studies

Table 2. Applicable theoretical framework to social and environmental studies

Theory	Study focus	Example
Legitimacy theory	How firms manage their image when the social expectation is assumed and the targeted audience is not explicitly named	Voluntary social and environmental disclosures
Institutional theory	The adoption of a specific corporation structure, system, program or practice that is commonly implemented by similar organizations	Employer matching program for employee charitable giving
Resource dependence theory	The dynamic interactions between two competing or complementary organizations	Conflicting actions between environmentally indifferent firms and environmental protection groups, or close interactions between nonprofit organizations and the public relations ... of corporations
Stakeholder theory	Unexpected social or environmental activities undertaken by corporations	Voluntary participation in activities benefiting society without explicit self promotion or publicity

Source: Chen and Roberts (2010)

based on this theory have investigated how organizations strategically managed their external constraints through selection of employees (Pfeffer & Leblebici, 1973; Salancik, 1979), compositions of boards of directors (Peng, 2004; Pfeffer, 1972a, 1973), and business mergers (Finkelstein, 1997; Pfeffer, 1972b; Pfeffer & Nowak, 1976). Furthermore, when faced with unmanageable interdependence, organizations would seek to use the greater power of the larger social system and the government, using tactics such as political actions, to alter the environment for their needs. Pfeffer and Salancik (2003) state that political actions and alliance are two important strategies for organizations to create an environment for their needs. However, as to legitimation strategy, they believe that developing alliances with other organizations that possess a particular legitimacy is a less criticized and more effective strategy than the use of political means.

In the Peruvian mining sector, a number of corporations have been forced to stop operations because of the pressure of some of its stakeholders

(NGOs, communities, etc.) because of environmental issues (for example, the cases of Newmont/Yanacocha's Conga Project and Southern's Tia Maria project). Hundreds of protests and social conflicts have occurred in the last decade because of those environmental issues. However, as presented above many companies are issuing sustainability reports that have been graded positively by GRI. This contradictory and chaotic situation could be improved if there is a clear system to measure and report environmental issues. In this paper a mandatory environmental accounting and sustainability reporting system (SASB) is proposed. Considering all the factors of the Peruvian context from the four theories presented the resource dependence theory looks the more suitable for its conceptual framework.

4. Review of previous research

Research on environmental accounting in Peru is limited to a number of publications. They include studies by the University of The Andes (Canicella,

2011; Quispe, 2010; Figueroa, Orihuela & Calfucura, 2010; and Chanca, 2012). However, no integral, systematic analysis has been done as the research either focused on macroeconomic issues (Quispe, 2010) or simply provided information at a basic introductory level.

5. Hypothesis and objective of this paper

The main hypothesis in this paper is that the current accounting system in Peru is inadequate for ensuring that companies report environmental issues. This paper proposes a new accounting system in Peru complemented with a new sustainability reporting framework that measures and reports environmental issues adequately. The system will have a positive impact on all stakeholders (communities, stockholders, government, NGOs, etc.)

6. Methodology

The research approach is based on a systematic analysis of primary and secondary sustainability data from 2007 to 2013 in both English and Spanish. Primary data was obtained through surveys done in March 2013 among faculty members and students of top business schools in Peru, and through interviews with other stakeholders including entrepreneurs, representatives of a regulatory institution, and representatives from a top four auditing and consulting company. The secondary data analyzed in the research includes sustainability, environmental and other relevant data available on companies' web sites and other public sources. The research analyzed performance measurement indicators presented in the data. In order to avoid major discrepancies resulting from differences among sectors, the study focuses on the oil, mining and gas sectors.

The results of this survey and interviews indicate that there is a need and demand for an environmental accounting system in Peru. Furthermore, the study reveals that the mining industry, being the economic backbone of Peru, is extremely influential and does not have a choice but to seriously start implementing cleaner production technologies and to adopt an integral environmental accounting system to strengthen the drive towards sustainable development.

6.1. Interviews with stakeholders (entrepreneurs, regulatory institution and top four auditing and consulting company representatives)

Interviews took place in March 2013, in Lima, Peru. CEO's and accountants of firms of different sizes and industries, as well as managers of a regulatory institution and top four auditing and consulting company were interviewed. Conclusions from these interviews are presented in brief below.

A) *Company representatives interview results*

- Environmental accounting is a relatively unknown field among representatives of small and medium size corporations. However, upon learning about the field, they expressed interest and understanding for its importance and, especially in light of social conflicts associated with mining companies.
- In the case of big corporations, there is some knowledge of environmental accounting and there is even some interest in hiring professionals with environmental accounting skills. However, the availability of professionals with such skills is limited.
- According to CEO's and accountants of big corporations, there is broad agreement that environmental accounting should be implemented specially in the mining, fishing and cement in-

dustries, as these industries are regarded as major polluters. Some interviewees even mentioned that for those industries it should be mandatory. After learning about the potential financial benefits from environmental accounting, namely improving a company's bottom line, some interviewees added that environmental accounting ought to be mandatory for all the manufacturing companies. Nevertheless, some opposition was expressed regarding the implementation of environmental accounting, even in a voluntary form.

B) Regulatory Institution's results

- According to a top manager in a regulatory institution, while attention is generally on extractive industries, all companies, regardless of industry are in fact obligated to report their environmental performance.
- Environmental accounting regulations should be issued by a government institution (CNC – Peru's equivalent to the FASB), but the opinions of corporations and accountants should also be taken into account.

C) Manager in Top Four Accounting Firm

- There is a demand from big corporations (especially from the extractive and manufacturing industries) for professionals with environmental accounting, and some accounting firms have strong interest in training their personnel with such skills.

6.2. Surveys at Top Business Schools

In this study students and professors at Peruvian business schools were asked about the perceived importance of teaching environmental accounting. The study found a highly favorable perception among students and professors for having an environmen-

tal accounting course at their schools (see Figure 2). The survey was conducted following a presentation about environmental accounting by the author of this research.

The survey indicates that the stakeholders (current and future –students–) perceive environmental accounting to be a field with high demand and importance.

7. Theoretical Framework for a Sustainability Accounting System

Burritt and Schaltegger (2010) state that there are two main paths for the development of sustainability accounting. The first path adopts the critical theory perspective, which holds that sustainability accounting is a fad that will disappear in time. The second path (managerial path) views sustainability accounting as powerful tool that can support effective decision making by taking into account the diverse interests of all actors including different types of managers and various stakeholders.

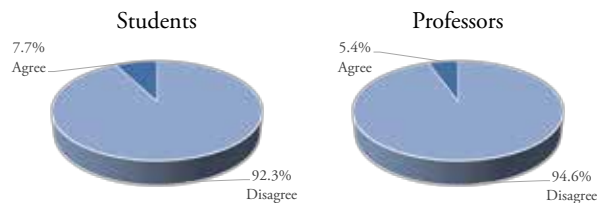
7.1. Critical perspective

Gray and Milne (2002) suggest a radical view that it is not possible to define what a sustainable organization would look like, and that using accounting as the basis for sustainability reporting presents the risk of conspiracy. Others like Maunders and Burritt (1991) are more optimistic, stating that tools can be devised for helping companies to incorporate environmental considerations into their activities and actions.

7.2. Managerial perspective

According to Burritt and Schaltegger (2010), three approaches can be located within the managerial path towards corporate sustainability accounting. First, and significantly contrasting with the critical path, is the

Figure 2. Perceptions on the Importance of Teaching Environmental Accounting at Peruvian Business Schools



Source: Own elaboration, 2013

inside-out approach. Next is the outside-in approach, and finally the twin-track approach, which combines both.

7.2.1. Inside-out approach: In this approach, sustainability accounting is a set of pragmatic tools, which contributes to solutions to environmental and social business problems. The approach helps managers condense strategically relevant sustainability issues into key performance indicators and information requirements. Burritt (2002) developed a framework of decision-making, which recognizes that decisions vary in terms of type of data (monetary or physical), scope (past or future), range (short or long run) and periodicity (regular or ad hoc) of the information gathered. Data provided by sustainability accounting for strategic decision making provides a starting point for good decisions, but only if the data are related to desired goals will the quality of decisions be improved (Chambers, 1966; Schaltegger & Burritt, 2000).

7.2.2. Outside-in approach: In this approach, reporting is driven sustainability accounting development process can be started on the basis of a stakeholder or shareholder-orientated view, or a multiple stakeholder engagement process, or by referring to cultural expectations (Burritt & Schaltegger, 2010). Aras and Crowther (2009) suggest that the more enlightened

a corporation is, the more likely it is to realize that socially responsible activities make business sense, and that engagement with stakeholders can actually be used to help improve corporate economic performance (Schaltegger & Burritt, 2005). Corporate reputation is an important element in this approach.

7.2.3. Twin-track approach: The twin-track approach brings both inside out and outside in together (Schaltegger & Wagner, 2006). Henri and Journeault (2010) state the importance of seeking empirical evidence about the influence of management control systems on environmental management (termed eco-control), as well as on economic and environmental performance of organizations. They examine four main uses of data: (1) To monitor compliance with environmental policies and regulation; (2) To motivate continuous improvement; (3) To provide data for internal decision making and (4) To provide data for external reporting.

This paper suggests a twin-track approach of sustainability accounting in Peru. The following paragraphs present a more detailed explanation of the proposed system.

8. Proposal for an Environmental Accounting System in Peru

One of the main issues in Peruvian corporations regarding sustainability and the environment is the lack of accurate reporting, accounting and assessment. Most companies provide general information about the amounts they invested towards sustainable practices, but do not specify the exact amount of the resources they used, and the way these resources are contaminating the environment.

As mentioned earlier, the mining, oil and gas industries are the major contributors to Peru's GDP, and

they are also the largest polluters in the country. The mining sector pollutes water and soil, among other resources, while the oil and gas sectors emit greenhouse gases.

Moreover, according to data gathered from interviews with top executives of the Big Four in Peru, there is a demand (from big corporations, especially in the mining and cement sectors) for professionals with environmental accounting knowledge; however, the supply of professional with these skills is very scarce. The views of the interviewed executives are consistent with the opinions of students and university faculty members who stated almost unanimously that environmental accounting is a course which should be taught in business schools.

In addition, there is a growing pressure from other stakeholders such as government, NPOs, and NGOs for better practices by corporations with regards to environmental damage issues. It should not be surprising that in the short term, companies will be first hesitant to disclose their practices related to environmental issues and applying sustainable/environmental accounting. For this reason it is important to create incentives for voluntary disclosure in the short term, and to require and enforce accurate disclosure in the long-term.

8.1. Proposal

A *twin-track approach* is proposed for improving sustainability reporting in Peru. In this approach companies would apply the regulations mandated by the government regarding sustainability issues. The Peruvian government would set an oversight institution to manage and issue standards related to sustainability reporting and environmental accounting. Since there is a divergence between what companies report and what other stakeholders (communities, government)

perceive, a standardized set of regulations (environmental accounting rules) will be followed by all the firms. In order to succeed in this proposal, the government would educate corporations, so they will feel motivated to apply these environmental standards. If companies realize that they can improve their bottom lines after following these new environmental accounting standards, they would certainly follow the rules.

Therefore, a win-win situation is created. On one hand, corporations can improve their economic performance after applying environmental accounting practices (lowering costs and pursuing the projects which were halted because of legal, environmental and social issues). On the other, communities will improve their standard of living (new jobs, better living conditions –environmental situation–). Finally, the government will gain from the added tax revenue.

This approach will have an indirect positive impact on the social, environmental and economic situation in Peru. All the stakeholders (corporations, NGOs, communities, government, etc.) would be required with enforcement to participate actively in the solution of the issues presented above.

In Latin America (and more precisely, in Peru), environmental accounting is still an undeveloped field, thus successful experiences in other regions are taken as a benchmark for the future application and development of environmental accounting in Peru. After some research, the Japanese environmental accounting system was chosen as a model for Peru, since it is one of the most developed worldwide. However, since the context and situation, as well as the accounting systems, differ greatly between Peru and Japan, the Japanese model must be modified to suit Peruvian conditions.

The following proposals are suggested:

- (1) Ministries to take part: Ministry of Economy and Finance; Ministry of Energy and Mines; Ministry of Production; Ministry of Agriculture and Ministry of Environment.
- (2) In order to minimize pollution and improve efficiency (less waste) through cleaner production, the following accounting concepts/theories must be implemented (see Table 2).

Table 2. Main topics and methods to be implemented in the Peruvian Environmental Accounting System

Material Flow Cost Accounting (MFCA)	ISO 14051
Life Cycle Assessment (LCA)	ISO 14040
Water footprint	ISO 14046
Greenhouse gas (GHG) accounting	ISO 14064
Carbon footprint of products	ISO 14067

For example, Material Flow Cost Accounting (MFCA) –ISO 14051– would be implemented. The same will occur with other concepts and methods. Moreover, the greenhouse gas emissions, water footprint and carbon footprint of products will be reported to the Ministry of Environment

8.2. Current most used sustainability reporting standards

Currently, the most used “standardized” sustainability reporting forms are GRI and ISOs and they are reviewed in the following paragraphs.

8.2.1. Global Reporting Initiative (GRI)

GRI is arguably the most commonly used environmental reporting initiative. The International Integrated Reporting Council (IIRC), a global coalition of regulators, investors, companies, standard setters, accounting professionals and NGOs, considers

GRI for sustainability reporting, while using IASB for financial accounting.

A critical part of the GRI's success was “maintaining balance between the individual and collective interests of diverse constituencies, between inclusiveness and efficient pursuit of technical objectives, and between building a new institution and not challenging existing institutions and power relations” (Brown, de Jong & Lessidrenska, 2009). A sole focus on social forces being championed is insufficient when evidence suggests both internal and external influences on sustainability accounting and reporting are important (Adams, 2002). The growing institutionalization and standardization of corporate sustainability reporting based on Global Reporting Initiative (GRI) guidelines has contributed to the belief that it is indeed possible to paint a clear, accurate picture of a company's situation (Boiral & Henri, 2012).

However, after doing some research on inter-firm sustainability performance comparability (a study of 12 mining firms using GRI guidelines), Boiral and Henri (2012) concluded that it is not possible to credibly compare and classify company reports in the mining sector on the basis of their GRI sustainable development reports. A systematic analysis of indicators highlighted three main reasons: the immeasurable nature of many aspects of sustainable development; the incomparability of data on indicators that are supposedly measurable; and incomplete and ambiguous information.

Moreover, in theory, most GRI indicators are supposed to result in numbered information. Generally speaking, it is clear that designers of the G3 guideline were seeking to define measurable criteria that might eventually invite comparison, in spite of the global and elusive nature of sustainability. Ironically,

however, quantitative indicators are not necessarily the most comparable. Two main reasons explain this paradoxical situation: different measurement scales used, and the particular context of each organization (Boiral & Henri, 2012).

In May 2013 GRI's G4 was issued with more focus on materiality and no "grading" system (A, B, and C), among other changes. At present, it is still too early to judge the effectiveness of these modifications on improving sustainability reporting.

8.2.2. ISOs

There are a number of Peruvian companies that despite holding ISO 14000 certifications, continue to have social and legal problems conflicts with the communities surrounding their mines. This problem is also found elsewhere in South America, such as in Argentina's Minera La Alumbrera (Presencia Latinoamericana, 2013).

One of the main reasons why companies obtain certification is to improve their reputation and credibility among stakeholders. However, since social conflicts still arise among certified companies (for example), another way to measure and qualify a company is needed.

8.2.3. SASB

The Sustainability Accounting Standards Board (SASB) is a non-profit American institution which mission is to develop and disseminate sustainability accounting standards that help publicly-listed corporations disclose material factors in compliance with SEC requirements. Through these standards, along with associated education and outreach, SASB is working to increase the usefulness of information available to investors, and improve corporate performance on

the environmental, social, and governance issues most likely to impact value.

All standards issued by SASB meet the following set of minimum criteria: relevant, useful, applicable, cost-effective, comparable, complete, directional and auditable.

One of the most important characteristics of the SASB is that the standards vary according to the industry. Consequently, the SASB has issued standards for the following industries: Health Care, Financials, Technology and Communications, Non-Renewable Resources, Transportation, Services and Resource Transformation. In the near future, the SASB will issue standards for the following sectors: Consumption I and II, Renewable Resources & Alternative Energy and Infrastructure.

Moreover, in some other countries like Japan, there are some environmental reporting standards. In 2007 the Ministry of the Environment in Japan issued the Environmental Reporting Guidelines, which were updated in 2012. These standards are broadly applied by Japanese corporations to disclose environmental issues in their sustainability or CSR report.

In the Peruvian case, sustainability reporting is not very common except for the case of the mining industry where sustainability reporting became relatively frequent since 2010.

It is a fact that some sectors like the mining and oil industries pollute more the environment than others. Thus, every industrial sector requires different types of environmental reporting standards. Since the SASB has standards that vary according to the industry, the SASB look like the best fit for Peru.

8.3. Theoretical perspectives for adopting environmental accounting: Corporations' Benefits

Some of the most important theoretical frameworks on the benefits for corporations from adoption of environmental accounting practices include Legitimacy Theory, Stakeholder Theory and Porter's Hypothesis. These perspectives are not necessarily mutually exclusive, but could be considered supplementary to each other (Gray, Kouhy & Lavers, 1995).

8.3.1. Legitimacy Theory: The basic tenet of legitimacy theory is that companies cannot continue to exist and thrive if their beliefs and methods contrast with the values of the society they operate in. This implies that there is some form of 'social contract' between the company and its host. If an organization cannot justify its continued operation, then in a sense the community may revoke its 'contract' (Godschalk, 2010).

8.3.2. Stakeholder Theory: Godschalk (2010) cites Berman, Wicks, Kotha, and Jones (1999), as the author of the two models on stakeholder management:

The Strategic Stakeholder Management model: The nature and extent of managerial concern for a stakeholder group is viewed and determined solely by the perceived ability of such concern to improve financial performance.

The Intrinsic Stakeholder Commitment model: Firms are viewed as having a normative [moral] commitment to treating stakeholders in a positive way, and this commitment is, in turn, seen as shaping their strategy and impacting their financial performance.

8.3.3. Porter's Hypothesis: Porter and Van der Linde (1995) state that stricter environmental regulation would lead to innovative approaches that

would enhance competitiveness. Afterwards, Wagner, Schaltegger, and Wehrmeyer (2001) moderated Porter's hypothesis and argued that companies implementing corporate environmental accounting will perceive at least some benefits from doing so.

In the Peruvian case the three theories mentioned above were taken into consideration towards the formulation of the new integral environmental accounting system. As mentioned above, companies must see a benefit from implementing an environmental accounting system for sustainability purposes.

8.4. Factors that can contribute to the real implementation of the environmental accounting

Environmental accounting is still incipient in Peru (even some people refer to the macroeconomic definition when talking about it), thus in this paper a new environmental accounting system is proposed. This proposal is based on the Japanese government's approach. According to Saka and Burrit (2003) a number of factors did encourage the upward trend of environmental reporting and environmental accounting disclosure in Japan. Those factors are analyzed according to the Peruvian context and characteristics in order to determine if the fundamentals of the "Japanese model" can be applied in a South American country.

- 1) **Government initiatives – Ministry of the Environment's guidelines:** A coordinated approach with the participation of several ministries is required. Moreover, corporations must submit their results to the Ministry of the Environment regarding environmental issues—air pollution (including acid rain), water pollution, ground contamination, ground sinkage, etc.

The Ministry of the Environment (Ministerio del Ambiente or MINAM, acronym in Spanish-) should have the actual authority to penalize corporations that do not meet the minimum requirements set by the MINAM.

Moreover, the MINAM should obligate corporations to submit audited environmental accounting information. MINAM must also train its technicians to do some environmental accounting auditing so that they can verify the accuracy of submitted information. According to Boiral and Gendron (2011), the literature on sustainability development tends to take for granted the reliability of certification audits, which are too often considered as a sort of trademark of corporate good conduct and accountability. Boiral and Gendron (2011) suggest that we should be skeptical of the ability of certification auditing to ensure the accountability of organizations with respect to sustainability.

The approach follows the model of EITI (Extractive Industries Transparency Initiative)³ Since Peru is composed of three parties, the government, corporations and civil society, a multi-stakeholder auditing institution should include representatives from these groups, members of the big four, and professionals from the ISO and Peru 2021.

- 2) ***Acquisition of ISO14001 certification.*** As explained above, some companies that are involved in social and environmental issues (Yanacocha and Xstrata, for example) already have ISO 14001. Considering that they acquired ISO 14001 voluntarily, it is likely that if the Peruvian government would mandate corporations to apply the *concepts*

of the other ISOs suggested (*no current market standard like the ISOs are proposed*), they will oblige.

- 3) ***Credibility of environmental information reporting is increasing through higher numbers of third party involvement.*** This paper proposes that the Peruvian government obligate companies to submit environmental information audited by a third party.
- 4) ***Environmental reporting award systems contribute to the increase in corporate environmental reporting.*** The MINAM should reward the most “green” corporations. The reward selection committee should include some members of NGOs and the Catholic Church.
- 5) ***Growth of eco-funds and socially responsible investments encourage corporate environmental information disclosure.*** This factor would motivate corporations to implement an adequate environmental accounting system.
- 6) ***Environmental ratings: in Japan, ratings agencies encourage disclosure of environmental accounting information by companies wishing to improve or maintain their ratings.*** The Peruvian government would create a new agency —under the MINAM— which would rate the corporations’ environmental activities.
- 7) ***Increased pressure for corporate social responsibility: As explained above, this is perhaps the most important factor:*** the pressure from communities, NGOs, members of the Catholic Church and others can motivate corporations to implement an adequate system.

³ EITI is a multi-stakeholder institution which increases transparency over payments by companies from the oil and mining industries to governments and to government-linked entities, as well as transparency over revenues by those host country governments.

This twin-track approach will capitalize on the strengths of both the inside-out and outside-in approaches. One of the main issues is why would the corporations feel motivated to implement environmental accounting? If MFCA or LCA, for example, can allow the corporation to be more efficient, and therefore to improve its bottom line, then the company would implement those environmental practices. Evidence shows that adequate implementation does in fact improve financial results.

8.5. Assurance of Environmental Reporting

According to the Japanese Institute of Certified Public Accountants - JICPA (2007) a key issue with environmental and CSR reports is how to ensure the credibility of the information on climate change risk contained in them. There are three ways of ensuring credibility: 1) Third-party opinions by audit corporations that are the result of something similar to an assurance engagement; 2) Third-party opinions by parties other than audit corporations that are the result of something similar to an assurance engagement and 3) Third-party opinions that are not the result of an assurance engagement (comments carried in environmental or other reports from third parties such as NPOs, university faculty members, consultancies, or audit corporations). This paper proposes a system which is a combination of the three presented above.

From the information presented, it is clear that the situations in Japan and Peru differ greatly. Japan is an industrialized country in which MFCA is significant overall; whereas Peru is a country dependent on the export of raw materials, hence, MFCA and LCA are used for detecting inefficiencies in the production process. In the mining sector, those environmental accounting practices (for example, after implementing LCA and Water Footprint) would allow the

companies to apply new techniques for water management (decreasing the use of water or reusing it or applying sea water reverse osmosis desalination) and treatment of contaminated soil. In the oil and gas sectors they can be used to minimize the GHG emissions and decrease pollution.

9. Contributions

This paper makes a number of contributions. From the academic perspective, not much research has been done in Peru about environmental accounting. From the social, environmental, accounting and economic perspectives, note the following: 1) enhance reporting and communication, to avoid information issues in Peruvian corporations; 2) reduce consumption of natural resources and improve efficiency of corporations; 3) improve the social conditions in Peru, especially in regions where mines, gas and oil companies are located; 4) solve environmental issues in the mining, oil and gas sector 5) improve the overall socioeconomic situation in Peru through the multiplier effect of mining, oil, and gas industries in the Peruvian economy.

10. Conclusions

Over the last decade the importance of CSR and sustainability reporting has grown, making them important topics not only in governments or civil society (local and international) but also in the corporate world.

From the accounting perspective, a more accurate way of measuring and calculating could partially help to reduce the social issues that arise from business operations. With accurate measurement, timely reporting to government authorities, and fulfillment of minimum requirements by companies, the environmental issues in Peru could be solved. Companies in the industrial sector could become more productive and therefore,

improve their bottom line by applying Environmental Accounting concepts and methods like Material Flow Cost Accounting (MFCA) and Life Cycle Assessment (LCA), for example.

Assurance⁴ is an important issue, since the certification through third party auditors would make the sustainability reports more trustworthy for various stakeholders. A standardized system (environmental accounting system), with numbers that are understood, and honored by all the stakeholders, would minimize conflicts. Moreover, if those numbers have been certified by an independent multi-stakeholder organization —similar to EITI—, the credibility among all the stakeholders would be improved and therefore, the success probability of the new environmental accounting system in Peru would be higher.

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⁴ Enhancing the credibility of sustainability reporting, ensuring accountability and transparency to stakeholders, improving quality of sustainability performance and reporting are some of the important reasons to adopt assurance in sustainability reporting.

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