ABSTRACT
Carbon trading is a relatively new approach that corporations have adopted to address the issue of carbon emissions. Carbon accounting and reporting is an evolutionary rule change in sustainability accounting for the management of climate change and sustainable development.

KEYWORDS:
Environmental management, accounting policies and procedures, innovation process, accounting operations, accounting operational change

INTRODUCTION
This paper applies the population ecology framework to describe the evolution and birth of sustainability accounting rules: the case of carbon reporting. Sustainability accounting and reporting as a current phenomenon, has received prominence among accountants, particularly accounting firms, and policy makers in the U.S. and abroad. Its’ development can be viewed as requiring or involving a codification of new accounting rules that are not mandated yet, they are voluntary.

Carbon dioxide is the main form of greenhouse emissions from human’s industrial activities in areas such as manufacturing of consumer goods, durable household products, as well as from transportation, mining, oil exploration and drilling, and food processing in the agricultural sector. These carbon emissions have been noted to be big sources of pollutants to the environment contributing to environmental degradation, and jeopardizing the health and integrity of natural resources, plants and endangered species.

Carbon trading is a relatively new approach that corporations have adopted to address the issue of carbon emissions. Carbon accounting is an evolutionary rule change in sustainability accounting for the management of climate change and sustainable development. Accordingly, institutionalized corporate governance has been formed to establish bureaucratic procedures for setting carbon emission baseline standards, allocation of carbon credits among participating corporations, exchange rates and structural legal mechanisms to govern the carbon trade (Schaltegger and Cantora, 2012). I argue that the institutionalism and bureaucratization of carbon accounting and reporting are embedded on the population ecology of functional assumptions of organizational change and innovations. The research applies the population ecology framework to describe the evolution, birth, bureaucratization and institutionalization of carbon accounting. The research approach is theoretical and the objective is to show the utility of the population ecology framework in accounting rule making and standard setting procedures. Accordingly, it
will be the first research to apply this perspective to study the evolution and institutionalization of carbon accounting and reporting.

**LITERATURE REVIEW**

The underlying framework in population ecology is that there is a natural selection to populations of organizations in the adaptation process. The approach focuses on those environmental characteristics that select organizational forms, which are best, suited and adapted to the ecosystem. Organizations are examined in reference to time and space, which explain their survival, growth and decline.

In general, the population ecology of evolutionary theory is based on the assumption that all organizations go through three stages: variation, selection and retention over time (Aldrich, 1979; Carroll, 1984; Hannan and Freeman, 1977). Tushman and O’Reilly III (1996) defined the three principles of population ecology “variation, selection, and retention” as follows. Organizations “promote variation through strong efforts to decentralize, to eliminate bureaucracy, to encourage individual autonomy and accountability, and to experiment and take risks. They promote wide variations in products, technologies, and markets” (p.28). The selection process allows - “‘winners’- in markets and technologies by staying close to their customers, by being quick to respond to market signals, and by having clear mechanisms to - ‘kill’ - products and projects” (p. 29). The selection process goes through periods of evolution, growth, decline and ecological adaptation. Organizations select their strategies: they adopt an incremental change strategy during periods of stability and a radical/transformational change strategy during periods of crisis and environmental volatility (Barnett and Carroll, 1995. See also Barnett and Hansen, 1996; Barron, 1999). Finally, Tushman and O’Reilly III (1996) described the retention process as occurring when the market serves as “the ultimate arbiter of the winners and losers” in deciding which of those organizations’ “technologies, products, markets, and even senior managers” will be retained (p.29). They found the population ecology adaptation and fitness approach in the evolutionary theory of variation, selection and retention (Aldrich, 1979) to be applicable to study organizational change and development. Accounting systems are enablers of organizational change and development processes.

Ecology views organizations as communities having interdependency relationships among multiple and diverse populations (Astley, 1985; and Ruef, 2000). Ecology thus argues that the environment is an important factor in the organizational adaptation and selection process. It suggests that environmental changes affect organizational systems, structures, strategies, functions, procedures, and day-to-day activities (Rudel et al., 2011). Accordingly, organizations pursue an adaptive strategy to respond to environmental changes to achieve ecological sustainability (Shrivastava, 1995). In viewing accounting as ecological systems, recent developments in accounting systems, for example, sustainability accounting and reporting practices are assumed to be byproducts of ecological systems, whose structures and forms are determined and shaped by the environment, market forces, technology, natural resources, and geographical locations. The organization-environment linkage selects the birth and evolution of sustainable accounting and reporting systems within the same population or industrial organizations.
The ecological implications for sustainability accounting is that, for accounting rule changes to materialize, there have to be corresponding increases in variations of sustainability assumptions that would allow for the replacement of existing assumptions. In other words, the selection process allows for the substitution of existing assumptions by newer approaches necessitating paradigmatic changes (Kuhn, 1970), in this case, sustainability accounting principles, which contribute to the death of old assumptions that are no longer amenable to change. At the same time, inertia within accounting enables changes in existing assumptions to accommodate the new emerging philosophies of sustainability accounting and reporting. Thus, accounting rule making has followed the adaptation process strategy, which accommodates and revises existing accounting rules and regulations without substitution of newer principles. The current developments in sustainability accounting and reporting guidelines are byproducts of organizational ecological systems and structures. I apply the population ecology framework to study the evolution and birth of sustainability accounting with a focus on carbon accounting and reporting.

Accordingly, I extend Schultz’s (1998) argument that organizations develop new accounting rules only when they are necessary to address “new problems that do not seem to be covered by existing rules and when these problems are fairly recurrent, consequential or salient” (p. 845). This approach enables the organization to retain what has been learned from past experiences in the form of “codified” rules and regulations. Thus, bureaucratization takes place (Schultz, 1998). Once these rules are codified and are institutionalized, they are accepted as legitimate by accounting rule standard organizations, for example, the Financial Accounting Standards Board (FASB). They become the standard norms governing population of organizations.

THEORETICAL DEVELOPMENT/MODEL

One of the most important developments in sustainability accounting rule making processes is the birth of carbon accounting and reporting; Carbon dioxide is the main form of greenhouse emissions from human’s industrial activities in areas such as manufacturing of consumer goods, durable household products, as well as from transportation, mining, oil exploration and drilling, and food processing in the agricultural sector. These carbon emissions have been noted to be big sources of pollutants to the environment contributing to environmental degradation, and jeopardizing the health and integrity of natural resources, plants and endangered species.

According to Hespenheide et al. (2010), for environmental firms, the management of carbon emissions is an important goal. Companies formulate “carbon positions” from which they develop plans to reduce overall emissions or identify targeted opportunities for energy efficiency, cost savings, and eventually trading of carbon allowances and offset credit. They referred this type of carbon accounting as “carbon counting,” “carbon footprint” or “carbon inventory” (p. 57). Although there are goal conflicts amongst developed countries when managing climate governance (Harris and Symons, 2013), there is consensus that economic development models focusing on industrialization and societal transformation should include low-carbon emission policies that compliment climate resilient sustainable development policies to manage the risks associated with climate change. Energy efficiency has been widely accepted
in the construction industry as well as in building roads and bridges to promote greener building and architecture (Wong, et al., 2015).

Carbon trading is a relatively new approach that corporations have adopted to address the issue of carbon emissions. Schaltegger and Cantora (2012) suggested that carbon accounting is an evolving area in sustainability accounting for transparency and decision-making purposes. When there is an environmental management accounting system, carbon accounting can have monetary approaches in decision making contexts. Green emissions have been associated with climatic changes, and the ecological implications for human responses have brought evolutionary changes in accounting systems (Parmesan, 2006; Oppenheimer, 2013). Accordingly, I view carbon accounting as having ecological basis for the formation of institutionalized corporate governance to develop and establish bureaucratic procedures for setting carbon emission baseline standards, allocation of carbon credits among participating corporations, regulate exchange rates and structural legal mechanisms to govern the carbon trade mechanisms. Carbon accounting is a consumption based accounting for emission trading and carbon credit accounting to manage greenhouse gas (GHG) emissions (Homma et al., 2012; Mozner, 2013; Sarkar, 2010; Souchik, 2012; Wiedmann, 2009). It needs to be noted that institutionalism and bureaucratization are based on the functional assumptions, where the recent developments in sustainability accounting, i.e., the case of carbon accounting, can be viewed as being embedded in the functional assumptions of organizational change and innovations.

CONCLUSION

Carbon accounting is a good example that documents the functionality of sustainability accounting, which is adopted to reduce carbon emissions of products and services, and their labelling for marketing purposes (Stechemesser and Guenther, 2012). Carbon accounting is a by-product of current accounting practices such as activity based costing (ABC) and balanced score card (BSC), where there are no fundamental changes in existing financial and cost accounting techniques for product costing, pricing and market planning. It has brought incremental changes to the methods in which corporations can extend financial accounting rules to manage carbon trading. When carbon accounting is widely accepted, sustainability accounting focusing on environmental protection and reduction of carbon emissions, not only reduces government oversight and the need for regulatory compliance, it also serves as mechanisms to enhance corporate image and citizenship with the community and society at large. In terms of accounting birth rules, carbon accounting has contributed to the proliferation of accounting rules on how to record, price, exchange and disclose carbon emissions.

REFERENCES


