ENHANCING SUSTAINABLE DEVELOPMENT THROUGH IMPLEMENTINGCOMPLEX ADAPTIVE SYSTEMS AND REFLECTION: A PROPOSED FRAMEWORK

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Abstract

Most organizations regard Sustainable Development (SD) as important and within a tridimensional approach (including economic, social and environmental dimensions) SD comprises a range of complex issues. However, traditional management approaches do not capture the variabilities as organizations are complex adaptive systems embedded in a complex adaptive context. Consequently, there must be a fundamental shift towards a complexity theory approach (eg. Complex Adaptive Systems, CAS). When SD is viewed from a CAS approach it becomes a continuous process of co-evolution within a rapidly changing context rather than a once off project. Leaders, managers and practitioners work in this complex and rapidly shifting world need crucial skills such as reflection. This paper proposes a framework combining SD, CAS and reflection. Although a framework does not guarantee success it provides a tool to identify SD, CAS and reflection dimensions, develop an integrated approach, create goals, monitor and evaluate outcomes. Lastly, the paper includes management and research implications.

Keywords: Sustainable Development, Complex Adaptive Systems, Reflection, Implementation

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1 Introduction

It was evident from findings in a 2010 survey by the Accenture and UN Global Compact that most organizations regard Sustainable Development (SD) as an important component of business. This survey included 766 CEO's worldwide and 93% of the CEO's stated that sustainability is crucial to the long-term success of the organization. In the majority (75%) of the organizations sustainability strategies were mainly adopted to grow revenue, protect and build product, enhance corporate reputation and decrease cost (Boerner, 2010). However, the statement "Sustainable development is one of those ideas that everybody supports but nobody knows what it means" by Sir Jonathon Porritt (quoted in the Financial Times, 1998) is still valid in many of the 21st Century companies. It seems that at both theoretical and practical levels there still is a degree of confusion regarding the meaning of Sustainable Development (although there are broad universal understandings) and there is a variety of different definitions and interpretations (Becker, 2010; Jabbour and Santos 2008; Wallis *et al.*, 2010).   For consistency of discussion and as the theoretical background for this paper the author uses a tridimensional (including economic, social and environmental dimensions on equal levels) approach to SD. This tridimensional approach is consistent with the views of various authors and organizations (Stead *et al.*, 2004; Byrch *et*

al., 2007; Valezquez, 2011; Elkington, 2006; Hart and Milstein, 2003; Linnenluecke and Griffiths, 2010; UN, 1992; UN, 1997; WCED, 1987).

Traditional linear and mechanistic management approaches are ineffective to capture the multiple variabilities where organizations are operating in complex contexts. Human societies and organizations are complex adaptive systems which are embedded in complex adaptive ecosystems. Consequently, leaders, managers and practitioners need to mimic complexity principles within the organization's structure, strategies, actions, systems, policies and procedures (Regner, 2001; Cunha, 2004; Espinosa and Porter, 2011; Gasparos, 2009). SD within a tridimensional approach (within complex organizations) needs a complex approach as it comprises a range of complex and diverse issues. When there is a fundamental paradigm shift from a traditional linear and mechanistic management approach towards a complexity theory approach (for example Complex Adaptive Systems) and SD is viewed from a complexity theory perspective, it becomes a continuous and dynamic process of co-evolution within a rapidly changing context rather than a once off project (Mitleton-Kelly, 2011; Alaa, 2009). Complex Adaptive Systems (CAS) is regarded as one of the management approaches to re-conceive the design processes and the theory used to understand and manage contemporary organizations and the change processes within organizations within a 21st

Century business context (Ford, 2008). Within a CAS approach, organizations are regarded as dynamic and continuously changing living entities existing within in a complex ecosystem, namely the business context. In an ecosystem, all the different agents/individuals have their own identity but they are interdependent, interact and co-exist for the maintenance and/or survival of the whole system/organization (Rowe and Hogarth, 2005; Kernick, 2002; Espinosa and Porter, 2011).

In addition to working within a complex organization and business context, leaders, managers and practitioners work in a dynamic, fast changing business context where there is a high demand for action to remain competitive in an increasingly interconnected and rapidly shifting world (Barlett and Ghoshal, 2002; Khandekar and Sharma, 2005; Brooks 2005; Pemberton, *et al.,* 2001). Within this context, reflection is an important skill. Similar to SD there is a wide range of definitions and interpretations for the concept reflection. As a theoretical basis for this paper, the author accepts the definition that reflection is a deliberate and complex analytical process to integrate both personal and professional knowledge, skills and experiences with the demands of the situation. This is an integral part of practice to integrate past experiences into the present situation, take into account the influence of future hopes, explore a diverse range of possible alternatives while at the same time considering other people's perspectives. This approach is consistent with the view of multiple authors (Minott, 2009; Hedberg, 2009; Mintzberg, 2004; Seibert and Daudelin, 1999; Thompson and Pascal, 2011). Reflection assists leaders, managers and practitioners to understand practical experiences, analyze situations, collect the relevant information, explore and analyze alternatives, develop creative and innovative solutions (Bannigan and Moores, 2009; Barlett and Ghoshal, 2002; Khandekar and Sharma, 2005; Brooks 2005; Pemberton, *et al.,* 2001).

Based on the previous discussion, it seems that SD within a tridimensional approach and within a complex business context needs a management approach (based on complexity theory) and leaders, managers and practitioner with reflection skills to optimize survival and competitiveness of the organization in a highly complex business context. This notion leads the author to ask the following questions:

• What are the principles to implement CAS at a practical level within a SD context?

• How do practitioners implement reflection to enhance both a tridimensional SD approach and CAS?

The aim and contribution of this paper is to present the first phase of a research project. This first phase relates to the development of a proposed framework to enhance SD through implementing CAS and reflection. The second phase focuses on the testing, refinement and validation of the framework in the empirical context (different organizations, different industries and different countries). The third and last phase focuses on the development of the strategies and actions needed to implement the framework effectively in the different empirical contexts. The first phase makes a contribution at the theoretical level while the second and the last phases make a contribution at the practical level.

This paper is presented in three parts. The first part discusses the relevant literature which forms the basis for the arguments in this paper and includes literature rated to SD, CAS and reflection. The second part includes the proposed framework and practical examples for implementation. The last part focusses on a discussion of management and research implications including suggestions for further research.

2 Literature overview

The literature overview focuses on aspects of SD, CAS and reflection.

2.1 Sustainable Development (SD)

There are increasing demands from society that organizations practice more social and environmental responsibility which leads to increased support for SD (Daub and Scherrer, 2009; Steurer *et al.*, 2005). SD needs to be part of the core business and management decisions, strategies and actions of the organization to be most effective (Hazlett *et al.*, 2010; Samy *et al.*, 2010; Epstein *et al.*, 2010; Chuang and Liao, 2010). There are numerous definitions for SD and this creates a degree of confusion within both theoretical discussions and practical implementations. There are different views related to SD (Velazquez, *et al.,*2011; Edwards, 2005; Gallopin, 2003), namely:

• Economic view: A shift from a rapid growth to a steady-state economy.

• Social view: Respect for and incorporation of cultural and social aspects in business dealings.

• Environmental view: The long-term viability of resource usage and limitation to human impact on ecosystems.

Furthermore, some authors regard SD as a value judgment as SD means different things to different people. These differences are due to the different knowledge, background, perception and values of different people (Becker, 2010; Jabbour and Santos, 2008; Wallis, *et al.,* 2010; Velazquez *et al.*, 2011; Prugh and Assadourian, 2003; Filho, 2000). Based on the different and sometimes incompatible interpretations of SD there is no universal definition (Esquer-Peralta, *et al.,* 2008) but there is growing consensus that an acceptable definition, understanding and practical implementation must contain:

• A tridimensional approach where economic, social and environmental dimensions are equally important and valued (Valezquez, *et al.*, 2011; Byrch,

et al., 2007). This tridimensional notion is also consistent with the view of the WCED (1987) and numerous authors such as Elkington (2006), Jabbour and Santos (2009) and Bansal (2005).

• Corporations need to work together and work with internal (such as employees) and external (such as customers) communities to fulfill the needs and aspirations of current generations without compromising the needs and aspirations of future generations (Byrch *et al.*, 2007; Esquer *et al.*, 2008; Valezquez, 2011; Naude, 2011; Becker, 2010; Jabbour and Santos, 2008; Rassafi *et al.*, 2006).

The key challenge in a tridimensional approach is to find a balance among and achieve excellence in all three these dimensions. In addition, economic performance is usually more easily measurable than social and environmental impact as social en environmental impacts are usually more longer term and not always as easily quantifiable as economic impact, such as profit. Another problem is that companies might have relevant and valid measures to improve environmental and social dimensions but these measures are not always linked to the economic dimension (Baumgartner and Korhonen, 2010; Hart and Milstein, 2003; Velazquez, *et al.*, 2011; Jamali, 2006; Epstein and Buhovac, 2010; Epstein, *et al.*, 2010).

Despite the differences in definitions and interpretations, SD poses both a global and long-term challenge and many businesses have responded to this challenge after denial, anger, bargaining and finally acceptance (Nguyen and Slater, 2010).

In the 21st Century business context, organizations need to integrate economic, social and environmental goals and objectives and draw on the economic, social and environmental information to ensure effective and efficient management choices, strategies and actions. This approach necessitates a diverse range of innovative leadership, management, technological and institutional implementation (Laughland and Bansal, 2011; D'Amato and Roome, 2009).

Consistent with the current views and approaches by various authors, researchers and organizations (Stead *et al.*, 2004; Byrch *et al.*, 2007; Valezquez, 2011; Elkington, 2006; Hart and Milstein, 2003; Linnenluecke and Griffiths, 2010; UN, 1992; UN, 1997; WCED, 1987), the author uses a tridimensional approach to SD which includes the economic, social and environmental aspect at equal levels with the following interpretation:

• Economic dimension: The economic dimension includes financial performance, profit, economic competitiveness and impact. As the focus of SD is on longer term approaches and the company needs to plan and implement effective decisions, strategies, programs and activities in addition to monitoring and evaluating outcomes to improve and secure short as well as longer term economic growth and competitiveness (Steurer, 2005). One criterion of business success is to create shareholder value and it is achieved when a business earns a return on invested capital that is more than the cost of its capital. This means that a high-growth business with a lower to moderate distribution could be able to create more shareholder value than a lower growth business with a higher distribution. Consequently, both executives and shareholders focus on profitability and growth (Nguyen and Slater, 2010).

• Social dimension: This dimension includes both internal and external social needs. Internal needs include the needs of employees while external needs include the needs of the community members in which the company operates (Steurer *et al.,* 2005). Furthermore, the social dimension implies that companies proactively engage both their internal and external communities and incorporate socially acceptable management strategies, actions and solutions while doing business. It includes commitment to diversity; fair compensation; a fair, safe and healthy workplace; fair dealings with suppliers; selection and use of suppliers who adhere to SD principles; and engagement and consultation with governments and communities in which the business functions. A relationship between social responsibility, financial performance and profitability has not been proven and some companies are reluctant to make a very strong commitment to SD, especially in the current economic situation (Nguyen and Slater, 2010).

• Environmental dimension: The environmental dimension includes environmental risks management, responsible use of non-renewable resources and responsible management of emissions (Steurer *et al.*, 2005). It might seem at the start that environmental SD objectives are incompatible with economic sustainability objectives. For example, at the inception and start of an environmental sustainability program the organization might need to incur start-up investments and its operating costs might increase in an effort to obtain environmental objectives which makes SD a less attractive option. Sometimes even after the initial inception and start-up stage, the organization might still encounter challenges to establish objective measures to assess, monitor and evaluate progress towards its environmental sustainable goals as outcomes might only be evident over the longer term. In addition, sustainable environmental goals, strategies and actions contain more than just implementing SD principles as it demands a different new way of thinking, a culture change (with changes in value systems and beliefs) within the organization to ensure that a SD mind-set and approach can be translated to commitment and voluntary behavior. This change is needed from top management right through to all employees and cannot be done in days or weeks but needs a longer period of time with individual, organizational and community investment, effort, commitment and insights (Nguyen and Slater, 2010).

Organizations sometimes need to shift from 'doing things better' and maximizing profitability to 'doing better things' and maximizing value to develop and maintain the balance among the different SD dimensions (Wals and Schwarzin, 2012; McKibben, 2007). Some of the strategies that could be employed to create a balance include aspects such as inspirational, visionary leadership; to link SD to the overall goals, strategies and actions of the organization; set goals and monitor progress towards these goals; and link performance to the goals. In summary the organization needs a SD approach that comprises of leadership, goals, strategy, actions, analysis, monitoring, and evaluation and performance assessment. The mere incorporation of environmental and societal sustainability programs is no guarantee that any organization will meet its economic goals, be profitable and grow (Nguyen and Slater, 2010).

SD is regarded as a process where the economy, environment and social aspects of a region is continuously changing in a way that all these will improve over time and this needs an integrated set of structures, systems, strategies, actions and policies to maximize outcomes. One of the challenges is to avoid strategies and actions that when taking into account the social and natural costs actually cost more than they are worth. This necessitates an increased understanding of the ongoing and changing interactions between society and nature. This notion makes SD a moving target but with clearer understanding and as strategies and actions improve it becomes more attainable. Following this line of thinking SD must be regarded and managed as an unending process defined neither by fixed goals or the specific strategies and actions to achieve these goals but by an approach to create ongoing change. This approach represents a way of understanding SD and the reality that emphasizes the relationships among a diverse range of system parts, rather than the properties of the diverse parts themselves. Issues and problems related to SD are not about resources seen separately but rather about resources viewed together, in interaction with people and capital, which in turn are in interaction with each other. In an effort to address SD issues organizations need to move away from a static, linear, one-factor-at-the-time approach and analysis to a more dynamic whole-system approach and analysis. The static, linear, one-factor-at-the-time approach does not take into account the dynamic complexity of ecosystems and human interactions with them (such as organizations) where the system is as a whole is more than the sum of its different parts (Hjorth and Bagheri, 2006).

There seems to be evidence that organizations which implement SD approaches and practices are resilient; able to survive both internal and external shocks and changes; create economic value, healthier ecosystems and stronger social communities (Laughland and Bansal, 2011; D'Amato and Roome, 2009; Baumgartner and Korhonen, 2010; Velazquez,

et al., 2011; Epstein and Buhovac, 2010; Epstein, et al., 2010).

Within the current business context, there seems to be attempts to develop new and creative ways to not only understand and implement SD in an integrated way and as part of the core business strategies and processes. However, it is evident that the traditional and linear management models are not the most effective approach to attain maximum SD outcomes (Espinosa and Porter, 2011; Ison, 2009; White and Lee, 2009). SD needs to be a co-evolutionary process of changing and integrating management systems which are able to capture the complexities of and enhance longer term SD within the current complex and constantly changing business context (Rammel, et al., 2007). CAS offers such an integrated and co-evolutionary process.

2.2 Complex Adaptive Systems (CAS)

No organization functions in a vacuum and almost every activity implemented by an organization impacts either positively or negatively on the community in which it functions. Along this line of thinking, organizations are regarded as CAS and are in constant symbiosis with their environment (Porter and Kramer, 2006; Espinosa and Porter, 2011). CAS recognizes and emphasizes the permeability, interaction and exchange of information and feedback across all the boundaries particularly those between the organization, its subsystems and external environment (Scott, 1987). Survival, competitiveness and success rely on timely and accurate perception of key external and internal changes and thereafter making the relevant changes to internal systems, elements and processes to effectively respond. CAS as a framework:

• Is characterized by feedback across all boundaries and levels, co-evolution of both bottom-up and top-down development. As a dynamic model it addresses the key issues and challenges to enhance SD and improve the organization's overall adaptability and SD within the changed and/or changing internal and external contexts (Espinosa and Porter, 2011; Hawkin, 2007).

• Offers a planning and analytical tool to observe and understand the dynamics and co-evolution of organizational networks (Espinosa and Porter, 2011).

• Allows organizations to integrate changes, uncertainty and non-linearity and at the same time improve understanding of co-evolutionary processes while dynamic patterns emerge and further develop across boundaries and levels (Cross et al., 2003; Rammel et al., 2007).

• Is interactively complex, displays quick and unpredictable change without any apparent patterns (Tan et al., 2005).

• Consists of a diverse range of agents, elements, systems and subsystems which interact in densely interconnected networks. Agents process a range of

information and have the capability to modify their behavior based on the processed information (McDaniel, 2007).

Within a CAS approach, complexity results from the patterns of interaction between the elements and/or the individual agents: for example, the people in an organization. New and/or different relationships can facilitate sudden and/or ongoing change and generate surprising behaviour (both good and bad) and solutions to complex problems (Rowe and Hogarth, 2005; Espinosa and Porter, 2011; Goldstein et al., 2008; Sawyer, 2005; Holden, 2005; Tan et al., 2005). Agents are entities (or people) who within a complex system participate in the process of spontaneous change in such a system and the behaviors of agents are based on non-linear rules. It is possible that the goals and behaviors of the different agents might be in conflict and these conflicts might prompt agents to adapt to each others' behaviors, learn and evolve. Consequently, CAS is regarded as an open evolutionary aggregate of interacting and interdependent agents (Ballantyne and Varey, 2008; Desai, 2010). There is not one particular person who has all the information, knows and understands exactly all the processes and who oversees complexity in the whole system. Conversely, each agent gains information and insights from and pays attention to the local environment and responds primarily to agents in that same local environment (McDaniel, 2007).

When a social dimension forms an integrated part of a tridimensional SD approach and is embedded as part of the CAS approach it is different from CAS observed in the nature. In a framework where the social dimension is embedded (Desai, 2010) it:

• Co-creates and stimulates emergency of creativity, innovation and learning within the boundaries of administrative control and coordination.

• Addresses and emphasises the role between organizations and interactive technologies in the co-creation and emergence of learning, innovation and adaptability.

• Stimulates and improves both acquisition and transfer of knowledge, modifies relevant behavior to reflect the new knowledge, skills and insights.

In CAS, agents (people) act and react according to the internal and external context and conditions in which they and the organization function. Behaviours and actions are not centrally controlled and/or directed by central management. In CAS the emphasis shifts away from the formal structure to the interdependencies and interrelationships between agents within the organization as well as their interrelationships with agents in the business context in which the organization is functioning within. All these internal and external interrelationships form interdependent networks and nodes occurring simultaneously at multiple levels and between multiple agents. A node is where agents interact collectively, for example in a formal or informal

meeting. Networks and nodes become embedded throughout and across the organization and across different organizations. Agents seek and build connections (with other agents, knowledge and/or resources) or when required reconnect spontaneously to accommodate the demands of a dynamic and changing context. This leads to dynamic innovation, creativity and emergence (Ford, 2008).

Building blocks (or components) are recognizable regularities, processes, procedures and constraints in a dynamic and an ever-changing environment where agents learn to evolve and develop effective combinations of useful responses. These components:

• Can be recombined in endless configurations to produce new and different components and/or actions.

• Can be recombined during turbulent and/or changing contextual situations; enable agents to respond quickly and switch direction; allow different (the most appropriate agent) to take the lead at different times and manage tensions and the needed changes by the exploring and implementing a range of diverse perspectives and options.

• Are sturdy enough to maintain and ensure some stability and routine while at the same time being flexible and adaptable to allow the emergence of new, innovative and creative ideas.

CAS have specific key behaviours namely, self-organization, edge of chaos, attractors, fitness of landscapes, feedback loops, co-evolution, emergence and path dependence and detail is provided for each of these key behaviours.

Self-organization: Self-organization refers to the spontaneous emergence of new structures and/or elements that emerge at different points and times. Emergence could be incremental and/or dramatic as and when change occurs as a response between subsystems. This emergence is usually a spontaneous and bottom up process which occurs through interactions and interrelationships as agents interact and recombine without much top down design and/or control (Rowe and Hogarth, 2005; Espinosa and Porter, 2011; Nishiguchi, 2001; Goldstein et al., 2008; Sawyer, 2005; Holden 2005; McDaniel, 2007). Too many interactions might cause behavior that never stabilises into recognizable patterns while too few interrelationships and interactions might cause a lack of dynamic self-organization (McDaniel, 2007).

The information and knowledge sharing among groups across networks is central in determining how building blocks are combined and recombined. The ongoing and dynamic exchange and sharing of information and knowledge creates energy which leads to new ideas, sometimes novelty, turbulence and uncertainty. This information and knowledge sharing could assist not only emergent changes but also stabilization and guide external and internal structuring processes within an organization. In addition, agents use the information and knowledge to reflect on individual contributions, emergent relations

and interrelationships, for example who was doing what; what is the interaction and relationships at multiple levels (Ford, 2008).

By allowing and encouraging agents to self-organize within a culture of trust, agents (employees) are encouraged to learn from previous behaviours and develop new, creative and innovative ideas. When there is a clear vision, simple building blocks, freedom and flexibility to self-organize (and regroup if needed) into groups with similar interests, results could be accomplished in a short time (Penprase and Norris, 2005).

Emergence: Emergence is the unpredictable development of creative, innovative and new patterns and properties during self-organization (Rowe and Hogarth, 2005; Espinosa and Porter, 2011; Nishiguchi, 2001; Goldstein et al., 2008; Sawyer, 2005; Holden, 2005). CAS is intrinsically unpredictable as it is a dynamic network of interconnected agents (with interdependencies and interrelationships) who connect and interact with each other in a variety of differing ways which leads to emergent properties of the whole system. Emergent properties is a point when a whole system becomes more than the sum of the parts. In these open and non-linear systems, small changes might lead to big overall changes in the whole system (Blashki et al., 2012). Emergence is very often noticeable and triggered during crises and unplanned situations when individuals and/or groups organize and adapt to fulfil the new urgent demands and needs (Rowe and Hogarth, 2005; Espinosa and Porter, 2011; Nishiguchi, 2001; Goldstein et al., 2008; Sawyer, 2005; Holden 2005). One characteristic of emergence is organizational learning through the bottom up and empowerment processes which generate new and innovative ideas, progress to innovative development, trial projects, and adoption of applicable new innovations (Espinosa and Porter, 2011; Rihani, 2002).

Edge of chaos: Interactions where groups self-organize and where there is simultaneous stability and instability is known as the 'edge of chaos (Rowe and Hogarth, 2005; Espinosa and Porter, 2011; Nishiguchi, 2001; Goldstein et al., 2008; Sawyer, 2005; Holden 2005; Penprase and Norris, 2005). Very often during times of crisis and unplanned change there is overall excitement and a diverse range of creative and innovative ideas are discussed, analyzed and developed (Penprase and Norris, 2005). During the discussion, analysis and development of new ideas there might be conflict but this could create a good opportunity for people to actively work on relevant responses leading to productive energy to shift towards solving key problems (Espinosa and Porter, 2011; Rihani, 2002). Within a CAS framework attractors, fitness of landscapes and feedback loops are some of the key components to understand and implement at the edge of chaos (Penprase and Norris, 2005).

Attractors: Attractors emerge in a response to the change process and are those aspects that organizations, groups and/or individuals are naturally drawn towards. Attractors are prerequisites for order, serve as road maps for future behaviours, build on previous experiences, assist to determine how adaptation will occur, and often act as feedback loops to behaviors. Stable attractors keep behaviors in predictable patterns, encourage a stable environment, lead to more predictable, less creative and innovative behaviours. Conversely, unstable attractors cause creative behaviours and could lead to positive change if people are willing and able to adapt to the required changes (Penprase and Norris, 2005).

Attractors include the values and behaviours which people or organizations are drawn towards and are connected with the professional and organizational identity of the various individuals. Some of the key attractors in an organization might include practitioners' mental models, organizational policies, structures and procedures which encourage specific ways of acting and working (Rowe and Hogarth, 2005).

Fitness landscape: The fitness landscape includes all the interactions, interrelationship and interdependencies between the different people and the different groups of people, different units, and/or different organizations which form webs of networks and feedback loops. These feedback loops move the organization into its fitness landscape (Rowe and Hogarth, 2005; Espinosa and Porter, 2011; Nishiguchi, 2001; Goldstein et al., 2008; Sawyer, 2005; Holden 2005; Penprase and Norris, 2005). The ability of an organization to adapt and change in an effort to meet changing demands and needs depends on the fitness landscape of that specific organization which in turn depends on the particular organization's interactions with other organizations in the same or similar business context. Change in one organization might causes a ripple effect and will have an influence on and effect change in other organizations which share the same or similar business context. Similarly, change in one organizational department might cause a ripple effect in other departments which then need to adapt to occurring change in an effort to survive and/or remain competitive (Penprase and Norris, 2005).

Feedback loops: Without an over-arching framework and/or an overall agent who controls the flow of information, interactions and interrelationships within a CAS approach are rich and non-linear. Non-linear feedback is agents' ability to provide and receive responses to their own and other agents' behaviour (Rowe and Hogarth, 2005; Espinosa and Porter, 2011; Nishiguchi, 2001; Goldstein et al., 2008; Sawyer, 2005; Holden 2005; Penprase and Norris, 2005). In non-linear relationships and interactions the different inputs are not always proportional to outputs as small change efforts might convert to big impact and outcomes. On the other hand, large change efforts

might convert to little impact and outcomes (McDaniel, 2007). These feedback loops have an influence on how an organization reacts in the current and future situations and might reshape the processes, procedures and/or structure of the organization. All the feedback loops are critical for both formal and informal communication within an organization as it support sharing and disseminating of new and creative information and knowledge to all levels in the organization (Penprase and Norris, 2005).

Co-evolution: Due to the ongoing flow of energy, knowledge and information into the system, CAS result in continual change and uncertainty is inevitable and an integral part of an evolving system (Rowe and Hogarth, 2005; Espinosa and Porter, 2011; Nishiguchi, 2001; Goldstein et al., 2008; Sawyer, 2005; Holden 2005; Penprase and Norris, 2005).

Co-evolution is the evolutionary process between two or more elements and/or sub-systems which is driven by reciprocal selective pressures and adaptations between these elements and/or sub-systems (Jeffrey and McIntosh, 2002; Berkes et al., 2003; Rammel, et al., 2007). Within a CAS approach adaptation to an organization's context is a continuously moving target which implies that an organization is unable to achieve a 'correct' position as the context is continuously changing. Based on this notion, agents need to continuously compromise, adapt and co-operate to reach the most appropriate and workable solutions rather than 'correct' solutions. Organizations continuously monitor and evaluate each other in an ongoing and complex process of co-evolution (McDaniel, 2007).

Path dependence: Path dependence indicates that emergent adaptations and changes are directly tied to that particular system and history in which they have developed. It means these changes do not represent universal causes or truth as they realte to a particular system and history (Rowe and Hogarth, 2005; Espinosa and Porter, 2011; Nishiguchi, 2001; Goldstein et al., 2008; Sawyer, 2005; Holden 2005; Penprase and Norris, 2005). Path dependence assists with the translation of new ideas, innovations and developments from one context to another (Espinosa and Porter, 2011).

2.2.1 Limitations to a CAS approach

It must be noted that the adaptable capability of CAS does not necessarily equate to success and/or competitive advantage. CAS produce variations in the current system and these changes might or might not lead to success, survival and/or competitive advantage for the organization (Espinosa and Porter, 2011). By implementing CAS it does not mean that organizations need to totally abandon effective 'traditional' management strategies such as decision making, problem solving, data analysis, goal setting, monitoring, evaluation and other relevant management strategies during their day-to-day operations.

However, the effective management strategies need to be acknowledged, implemented and combined within the overall CAS approach (Penprase and Norris, 2005).

Within a CAS approach elements and agents need to self-organize, interact and form interdependencies and interrelationships without much top down design and/or control. In addition, they need to be able to deal effectively with continual change and uncertainty as CAS is an integral part of an evolving system (Rowe and Hogarth, 2005; Espinosa and Porter, 2011; Nishiguchi, 2001; Goldstein et al., 2008; Sawyer, 2005; Holden 2005; McDaniel, 2007; Penprase and Norris, 2005). Based on this line of thinking it is evident that reflection is a very valuable and necessary skill for leaders, managers and practitioners implementing and working within a CAS approach.

2.3 Reflection in a business context

Reflection occurs during a range of different situations on a past, present and future timeline. Reflection on past events results in enhanced knowledge and skills which benefits current and/or future events. Reflecting on the present context assists to identify and manage problems as soon as they occur which leads to effective and time related problem solving, decision making and the emergence of new and creative innovations. Reflection on future events has the positive contribution that possible problems could be identified before they even occur and the most relevant solution is found (Hedberg, 2009; Doyle and Young, 2000; Seibert and Daudelin, 1999; Raelin, 2001).

One of the many challenges for any leader, manager and practitioner is to move new and innovative ideas from conception to full development, action and implementation. Reflection is one of the techniques that assist leaders, managers and practitioners to suggest and analyze new ideas and concepts, make judgments and develop the new knowledge and information to suit the organization's context. Reflection is very important when a person attempts to reply to, act on and/or adapt to new knowledge and information, such as a CAS approach (Hall, 2009). Leaders, managers and practitioners who implement reflection during decision making and problem solving processes take more purposeful, meaningful and value-driven action (Hedberg, 2009).

Reflection supports CAS implementation as it is an active, structured, probing, pondering, purposeful exploratory process to work through complex ideas and analysis of knowledge and feelings for which there is not always an obvious solution, sometimes leading to unexpected outcomes and/or new and different perspectives (Gray, 2007; Mintzberg, 2004). These are all skills that support the implementation of CAS.

Reflection encourages and supports leaders, managers and practitioners to confront and challenge themselves (and others), discover and explore a range of alternative interpretations and perceptions, develop and implement new and innovative ideas. In addition, it encourages leaders and managers to challenge current assumptions and develop improved collaborative, up-to-date and responsible ways to manage companies and become aware and receptive of alternate ways of behaving and reasoning. Reflection is a deeper process than merely understanding as during reflection a person needs to integrate a particular concept into his/her knowledge structures, and then relate this concept to other forms of knowledge and experience (Raelin, 2001; Gray, 2007; Pavlovich, *et al.*, 2009).

Reflection is a process where people disengage from a particular experience and use the time to deliberately think about, review and thereafter construct meaning from the experience. The notion that leaders, managers and practitioners within the current business context need to act and provide quick solutions appears to be contradictory to reflection where leaders, managers and practitioners are encouraged to ask questions, analyze, look for underlying problems and different perspectives. This is a shortsighted view and it is important to realize that action without reflection can be detrimental to the survival, success and competitive advantage of a company and has negative consequences for the individual. Although it is difficult for leaders, managers and practitioners to slow down in a fast paced world, it is a worthwhile investment of time as reflection assists them to handle urgent demands, learn quickly, develop and implement creative and relevant solutions. Reflection does not need to be a long and drawn-out process (Hedberg, 2009; Doyle and Young, 2000; Seibert and Daudelin, 1999; Raelin, 2001). Table 1 summarizes the characteristics of reflection.

Table 1. Characteristics of reflection (Minott, 2009; Hedberg, 2009; Mintzberg, 2004; Seibert and Daudelin, 1999; Thompson and Pascal, 2011)

What reflection is	What reflection is not
Process of disciplined cognitive critique combining research, content knowledge, a balanced judgment to analyze, synthesize, form connections, and understand the 'what', 'how' and 'why' of a particular situation and/or experience within an organizational context.	A casual or abstract approach with pausing from time to time to just ponder and think.
A complex ongoing analytical process to integrating personal and professional knowledge with the demands of the situation as part of innovative practice.	A mechanistic and descriptive process.
Opening a diverse range of possible alternatives and perspectives. This includes other people's perspectives.	Exploring and discovering the underlying truth of a particular situation.
Integrate past knowledge, information experiences, and meanings into the present situation, analyze and consider the influence of future contexts, goals, approaches and strategies.	Focusing only on the here and now.

Knowledge, information and experiences gain meaning through reflection and leaders, managers and practitioners are able to make more sense of their world and the business context (Minott, 2009; Hedberg, 2009; Mintzberg, 2004; Seibert and Daudelin, 1999). Within a practical approach, reflection means to critically examine the underlying assumptions of a person's own knowledge, skills, experiences, actions, beliefs and assumptions and then reflect on these in relation to tasks, actions, events and/or decisions and the overall meaning of what constitutes good management practice (Cunliffe, 2004; Zeichner and Liston, 1996).

There are different types of reflection and each of these has its own advantages (Hedberg, 2009), namely:

• Pre-reflection for example where leaders, managers and practitioners set personal learning goals and become more engaged in their own learning, growth and development.

• Reflection-in-action: Reflection-in-action (for example during an event) where experiences and outcomes are constantly analyzed and actions redirected as needed.

• Reflection-after-action: Reflection-after-action (for example shortly after an event) allows people to analyze a particular event, draw valuable conclusions and learn from it.

Reflection can be done on both a peer group and personal level and both these add value to the learning in the company. Reflection within peer groups increases interpersonal and cultural understanding. When the person reflects at a personal level and/or with the assistance of a mentor it assists to gain self-insights which in turn facilitates personal growth (Hedberg, 2009; Raelin, 2001; Reynolds, 1999; Vince, 2002).

It is evident that there are clear benefits for using reflection and that it is a crucial skill in a dynamic fast changing business context. Vince (2002), Doyle and Young (2000), Hedberg (2009) and (Raelin, 2001) are

of the opinion that reflection assists leaders, managers and practitioners to:

- analyze past experiences from multiple perspectives, develop insights and learn from these to develop new understandings and appreciations;

- enhance decision making processes to be more value driven, purposeful and meaningful while also continuously examining the impact and outcomes of decisions and actions;

- find and analyze possibilities, make connections and gain important perspectives that are effectively implemented in future decisions and problem-solving;

- think differently and construct knowledge in a range of differing ways, apply new learning and perspectives and cope with the demand for constant learning and change;

- make sense of day-to-day practical experiences and situations and make sense of the business context;

- invest in their professional learning, participate in continuing education, seek greater challenges in their work, examine more complex solutions to recurrent problems and work collaboratively;

- continually expand their solution database and do not use the first solution that comes to mind.

To reap the benefits of ongoing reflection it needs to be promoted, implemented and embedded in the organizational culture.

2.4 SD and CAS

Traditional fragmented, linear and mechanistic management approaches are unable and unsuitable to cope with SD issues as these are related to complex, self-organizing and constantly changing systems. Therefore, there needs to be a shift from linear and mechanistic to non-linear thinking and management approaches in order to understand and solve the problems related to SD. Although there has been a gradual improvement in the implementation of SD strategies and actions, many leaders, managers, researchers and practitioners still find it difficult to grasp the essence of SD at a practical level. SD is often perceived and managed as a project with a start and end point rather than an ongoing and continuously changing process that needs to be integrated in all strategies, activities, policies, procedures of an organization. SD issues involve subsystems at a variety of diverse levels, and there is no single point of view for monitoring, evaluation, measurement and analysis. Such problems cannot be captured or solved by management approaches that work from the assumption that the relevant systems are simple. SD is complex and includes a range of complex systems which means that it cannot be captured and described through simple and linear management approaches (Hjorth and Bagheri, 2006). Planning for and development of strategies and actions for SD needs to be process oriented rather than fixed-goal oriented. SD continuously evolves based on the needs and demands

of both the internal and external communities in which the organization functions. In addition, as leaders, managers and practitioners gain a better understanding of SD the strategies and actions for implementation are developed, tested and refined. Consequently, SD is a moving target and uncertainty are essential characteristics and SD needs to be treated within a framework which is capable of handling these characteristics (Bagheri and Hjorth 2007) and CAS is one such system.

CAS enhances problem solving as it increases complexity, diversity of ideas and patterns of behaviours which in turn stimulate information generation. The ideas and patterns of behaviours which enhance the ability to adapt and change effectively and efficiently are stabilized and repeated and those that do not are rejected (Desai, 2010).

2.5 Reflection in a SD context

Continuous and effective reflection is advantageous to both individuals and organizations as leaders, managers and practitioners function and compete in demanding, rapidly shifting and interconnected organizational and business contexts. These contexts demands that they gather relevant knowledge and information, sort through and analyze this knowledge and information, develop and analyze alternatives and thereafter develop creative and integrated solutions. This demands action, quick learning of new skills, making independent decisions and finding innovative solutions. Reflection effectively assists and supports this process (Barlett and Ghoshal, 2002; Hedberg, 2009; Khandekar and Sharma, 2005; Brooks, 2005; Pemberton, *et al.*, 2001). Reflection is very compatible with and supportive of SD as SD is a dynamic concept which demands an adaptive learning and flexible process rather than a fixed linear approach to enhance continuous improvement of economic, social and environmental dimensions at an equal level (Harris, 2007). It must be emphasized that although reflection is an effective and a valuable tool it is not a replacement for action or a strategy and/or an excuse for procrastination (Hedberg, 2009).

Minnott, *et al.*, (2011) and Cunliffe (2004) mentioned that reflection within a SD context is beneficial as it assists leaders, managers and practitioners to:

- develop more responsive, collaborative and ethical ways of managing organizations and SD;

- implement critical thinking, moral decision-making and problem-solving and most people find it easier to deal with constant change, uncertainty, ambiguity, and a diverse range of socio-cultural and ethical issues.

- gain the needed skills to examine and challenge assumptions and decisions that are made based solely on profitability;

- realize and move away from the idea that there is only one way of managing and that maintaining the

current management approach is crucial, and that leaders and managers know what is best for everybody internal and external to the organization.

• be less prone to complacency, ritualistic strategies, thoughts and actions as they think critically regarding their own personal growth, interactions and relationships with colleagues;

• recognize and address social and ethical challenges within the organization and the communities in which the organization operates;

• gain a deeper understanding and awareness of different alternatives and perspectives as well as the fact that they need to transform outdated ways of management in an effort to survive and maintain a competitive advantage in the current ever-changing business context;

• implement ethical criteria, including equality of opportunity and social justice during decision-making and problem-solving processes.

2.6 CAS and Reflection

CAS build on the assumption that systems are influenced by a range of diverse factors, variables and changes to relationships among components. In addition, CAS is dynamic, self-organizing, interactive and with evolving relationships at various levels of the particular systems. The edge of chaos is a zone of complexity wherein a varying set of circumstances occur which create uncertainty without clear linear steps. A CAS approach necessitates that leaders, managers and practitioners ask different questions, assist each other to analyse a range of different answers, options, perspective, alternatives and ways of doing things within different contexts. There needs to be an acceptable and worthwhile vision combined with suitable basic rules and boundaries to provide direction and then the rest is left to the flexibility and adaptability of the system as the context is dynamic and continually changes. Within a CAS approach problems are multilayered, sometimes unsolvable or difficult to solve, with patterns of behavior that require leaders, managers and practitioners to be interdependent, build interrelationships and act as creative decision makers. Successful leaders, managers and practitioners function effectively with adaptability, interconnectedness, and are able to recognize and respond to emerging and unpredictable complex problems (Hodges, 2011; Johnson and Webber, 2009; Lacayo, 2007; Plsek and Greenhalgh, 2001).

To function effectively in a CAS approach that is constantly changing and where direction constantly shifts leaders, managers and practitioners need a range of approaches and adaptive behaviors to determine what to do and work out what works best in a particular organization, within a specific situation and business context. In a CAS approach, participants are encouraged to move out of their comfort zones towards uncertainty which stimulates innovative and creative problem solving. In addition it encourages

development of capabilities to adapt to ongoing change, build on existing knowledge, continuously improve performance and generate new knowledge. Reflection is a crucial skill to find balance between tension and comfort, and to determine what worked and what did not work. Reflection assists leaders, managers and participants to implement nonlinear dynamics; function within unpredictability and uncertainty; create interconnectedness, interrelationships and interdependence through self-organization that leads to the emergence of new knowledge, skills, behaviours and contexts (Hodges, 2011; McQuillan, 2008).

3 Proposed framework

Figure 1 illustrates the relationships and interrelationships regarding the desired dynamics between SD, CAS and reflection to maximise SD outcomes. The author is of the strong opinion that aspects of SD, CAS and reflection must be implemented simultaneously and SD needs to include a tridimensional (economic, social, environmental) approach. Based on a combination of SD, CAS and reflection approaches ('what') and the particular strategies and actions ('how'), there will be a differing range of tangible and intangible value and impact ('outcomes') ranging from successful to unsuccessful. Different organizations, different industries, and within the context of different countries there will be different outcomes.

During phase 2 of this research the framework will be tested, validated and refined and during the last phase the relevant strategies and actions will be developed. It is beyond the scope of this paper to in detail discuss the relevant strategies and actions but the author envisages some of the following strategies and actions:

• Define SD, CAS and reflection and implement in an integrated way in all the business processes.

• Ensure effective communication of SD, CAS and reflection approaches within the organization.

• Build (through recruitment and selection), develop (though formal and informal training) and maintain (through retention) a capable and committed workforce who is able to implement a SD, CAS and reflection approach.

• Link performance and outcomes to accountability.

• Embed a company culture where SD, CAS and reflection is preferred.

• Implement long-term approaches and outcomes.

• Provide the needed guidelines and frameworks but utilise a flexible approach to the implementation and integration of SD, CAS and reflection.

• Develop and maintain effective leadership and leaders who model SD, CAS and reflection.

Figure 1. Proposed framework for SD, CAS and reflection
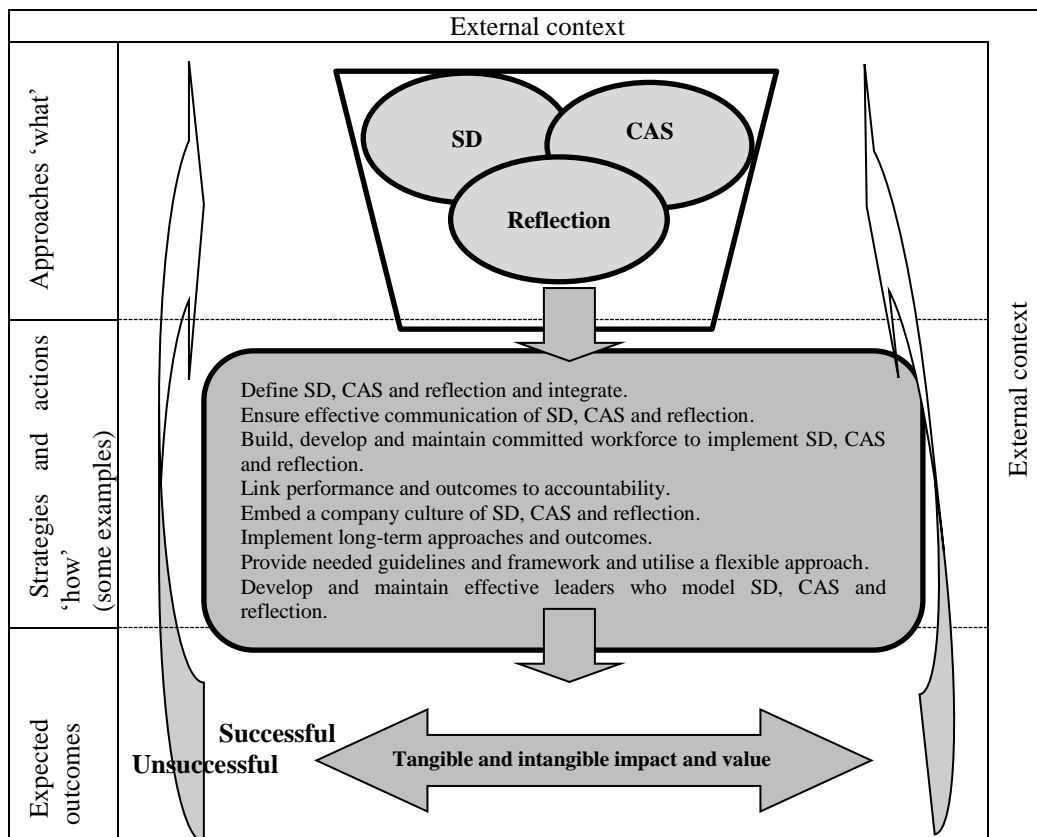
4 Management implications

Intelligent, efficient and effective leadership is essential throughout and during all management implementations (Tan *et al*., 2005). Shifting from a machine like management approach, such as many of the traditional management models, where senior managers determine actions and behaviours of other levels of management and employees in the organization, to a CAS approach (with self-organization, collaboration and emergence) means that large numbers of leaders, managers and practitioners need to be involved in the decision-making and problem-solving processes. Consequently, there needs to be consultation among leaders, managers and practitioners as well as with community members who might be impacted by or have an influence on processes (if only to a limited extent). Consultation methods could include structured large formal workshops and/or smaller informal discussion groups (Rowe and Hogarth, 2005).

At a practical organizational level, it is advantageous if leaders (in consultation with managers, practitioners and community members) develop a framework for the implementation SD, CAS and reflection within their particular organization. This framework needs to be unique as each organization (and its internal and external community members) are unique. However, this framework needs

to include generic principles for the implementation of SD, CAS and reflection (for example some aspects presented in this paper).

It is very important to emphasize that a framework alone does not necessarily guarantee success but is a tool (or a road map) to identify linkages, compare current approaches and practices, and gain an understanding of the changes to be made. Therefore, a framework could assist to identify the different dimensions included in SD, CAS and reflection, develop a suitable integrated and structured approach, create goals and assist towards ongoing monitoring and evaluation (Becker, 2010; Wallis, *et al.,* 2010; Mori and Welch, 2008; D'Amato and Roome, 2009). Once a framework is designed it needs to be tested, evaluated and refined in the particular organization. After testing, evaluating and refining the framework an organization will have a framework most suited for implementation in that organization to maximize outcomes.

5 Research implications

The aim and contribution of this paper was to present the first phase of a research project which related to the development of a proposed framework to enhance SD through implementing CAS and reflection. The second phase focuses on the testing, refinement and validation of the framework in the empirical context (different organizations, different industries and

different countries). The author will directly consult with leaders, managers and practitioners to test, validate and refine the framework and in addition use the relevant data collection and analysis techniques. Effective consultation will ensure that the framework has practical value and are not only applicable at a theoretical level. After the framework has been tested, refined and validated it could be used in different ways:

• To provide direction to organizations for implementation.

• As the basis for empirical research where researchers develop and test a diverse range of hypotheses within particular organizations, industries and contexts.

The third and last phase of this research focuses on the development of the strategies and actions applicable to implement the framework effectively in the different empirical contexts. This will also be done in consultation with a range of leaders, managers and practitioners and through the relevant data collection and analysis techniques. As SD, CAS and reflection are all complex issues a lot more research is needed at both theoretical and practical levels to:

• Search for creative, innovative approaches and frameworks to address the complex local, national and global short and long-term challenges related to an integrated SD approach through implementation of CAS and reflection approaches.

• Test, validate and refine the different possible approaches and frameworks in a different range of industries, different size companies and in different countries.

• Ensure that practical, realistic and implementable strategies and actions are developed and tested to implement the validated approaches and frameworks effectively and successfully.

• Develop a range of evaluation instruments to determine both the tangible and intangible impact and outcomes related to the implemented approaches, strategies and actions.

6 Conclusion

It is very clear that SD, CAS and reflection support and benefit each other to increase survival, success, competitive advantage and organizational performance. A CAS approach encourages and supports constant change and adaptation in reaction to the changing internal and external contexts which is compatible with and supportive of the organization's SD challenge as this challenge is also constantly changing and adapting in response to the internal and external context to enhance long-term SD through adaptable systems (Espinosa and Porter, 2011). Reflection is an effective tool as organizations which co-evolve with both their internal and external environments in an adaptive and SD manner need to modify their structures, strategies, processes and procedures over time. This is based on previous

knowledge, information experiences and lessons learned (Rammel, *et al.*, 2007).

It is clear that a CAS and reflective approach is not the answer to all SD challenges but provides effective approaches and these are very effective in combination with traditional management approaches as an overall attempt to provide a more integrated and deeper understanding of SD as well as the effective and successful management of SD at local, national and global levels. The notion is to use a combination of effective strategies to attain the best possible outcomes and not simply replace one system with another would as this will only create new sets of problems (Richardson, 2008).

References

1. Alaa, G. 2009. "Derivation of Factors Facilitating Organizational Emergence Based On Complex Adaptive Systems and social autopoiesis theories", E:CO, 11: 19-34.
2. Bagheri, A. and Hjorth, P. 2007. "Planning for Sustainable Development: a Paradigm Shift Towards a Process-Based Approach", Sustainable Development, 15: 83–96.
3. Ballantyne, D. and Varey, R.J. 2008. "The service-dominant logic and the future of marketing", Journal of Academy of Marketing Science, 36: 1-14.
4. Bannigan, K. and Moores, A. 2009. "A model of professional thinking: Integrating reflective practice and evidence based practice", Revue Canadienne d'Ergothérapie, 76: 342-350.
5. Bansal, P. 2005. "Evolving sustainability: a longitudinal study of corporate sustainable development", Strategic Management Journal, 26: 197-218.
6. Baumgartner, R.J. and Korhonen, J. 2010. "Strategic thinking for sustainable development", Sustainable Development, 18: 71-75.
7. Barlett, C.A. and Ghoshal, S. 2002. "Building competitive advantage through people", MIT Sloan Management Review, 43: 34-41.
8. Becker, J. 2010. "Use of backcasting to integrate indicators with principles of sustainability", International Journal of Sustainable Development World, 17: 189-197.
9. Berkes, F., Colding, J., Folke, C. (Eds.). 2003. "Navigating social–ecological systems: building resilience for complexity and change". Cambridge University Press, Cambridge.
10. Blashki, G, Abelsohn, A, Woolard, R, Arya, N, Parkes, MW, Kendal, P, Bell, E and Bell, W. 2012. "General practitioners' responses to global climate change – lessons from clinical experience and clinical method". Asia Pacific Family Medicine, 11, 6: 1-5.
11. Brooks, S. 2005, "Corporate social responsibility and strategic management: the prospects for converging discourses", Strategic Change, 14: 401-411.
12. Boerner, H. 2010. "Sustainability rises to top of strategy-setting for growing number of corporate leaders", Corporate Finance Review, 15: 32-34.
13. Byrch, C., Kearins, K., Milne, M. and Morgan, R. 2007. "Sustainable "what"? A cognitive approach to understanding sustainable development", Qualitative Research in Accounting & Management, 4: 26-52.
14. Chuang, C. and Liao, H. 2010. "Strategic human resource management in service context: taking care of business by taking care of employees and customers", Personnel Psychology, 63: 153-196.

15. Cross, J., MacAllister, R., Abel, N., Stafford-Smith, D. and Maru, Y. 2003. "Australian rangelands as complex adaptive systems: a conceptual model and preliminary results", Conference Proceedings, Townsville.

16. Cunha, M. P. and Cunha, J. V. 2006. "Towards a complexity theory of strategy", Management Decision, 44: 839-850.

17. Cunliffe, A.L. 2004. "On becoming a critically reflective practitioner", Journal of Management Education, 28: 407-426.

18. D'Amato, A. and Roome, N. 2009. "Leadership of Organizational change. Toward an integrated model of leadership for corporate responsibility and sustainable development: a process model of corporate responsibility beyond management innovation", Corporate Governance, 9: 421-434.

19. Daub, C., and Sherrer, Y.M. 2009. "Doing the right thing right: The role of social research and consulting for corporate engagement in development cooperation", Journal of Business Ethics, 85: 573-584.

20. Desai, DA. 2010. "Co-creating learning: insights from complexity theory", The Learning Organization, 17: 388-403.

21. Doyle, W. and Young, J.D. 2000. "Management development: Making the most of experiences and reflection", The Canadian Manager, 25: 18-19 and 28.

22. Edwards, A.R. 2005. "The Sustainability Revolution: Portrait of a Paradigm Shift", New Society Publishers, Gabriola Island.

23. Elkington, J. 2006. "Governance for sustainability", Corporate Governance, 14: 522-529.

24. Epstein, M.J., Buhovac, A.R., and Yuthas, K. 2010. "Implementing sustainability: The role of leadership and organisational culture", Strategic Finance, 91: 41-47.

25. Epstein, M.J. and Buhovac, A.R. 2010. "Solving sustainability implementation challenges", Organizational Dynamics, 39: 306-315.

26. Esquer, J., Velazquez, L. and Munguia, N. 2008. "Perceptions of core elements for sustainability management systems (SMS)", Management Decision, 46: 1027-1038.

27. Espinosa, A. and Porter, T. 2011. "Sustainability, complexity and learning: insights from complex systems approaches", The Learning Organization, 18: 54-72.

28. Filho, W.L. 2000. "Dealing with misconceptions on the concept of sustainability", International Journal of Sustainability in Higher Education, 1: 9-19.

29. Financial Times. 1998. "Natural step to sustainability", Financial Times, 7 January: 6.

30. Ford, R. 2008. "Complex Adaptive Systems and Improvisation Theory: Toward Framing a Model to enable Continuous Change", Journal of Change Management, 8:173-198.

31. Gallopin, G. 2003. "A systems approach to sustainability and sustainable development", Seriemedio ambiente y desarrollo, 64: 20-32.

32. Gasparatos, A., El-Haram, M. and Horner, M. 2009. "The argument against a reductionist approach for measuring sustainable development performance and the need for methodological pluralism", Accounting Forum Journal, 33: 245–256.

33. Goldstein, J., Hazy, J. and Silberstang, J. 2008. "Complexity and social entrepreneurship: a fortuitous meeting", Emergence, 10: 9-24.

34. Gray, D.E. 2007. "Facilitating Management Learning. Developing critical reflection through reflective tools", Management Learning, 38: 495-517.

35. Hall, M.J. 2009. "Reflective Learning Practices Drive Business Results". T + D, 63: 13 (one page).

36. Harris, N. 2007. "Understanding Corporate Capacity in the Non-Renewable Resource Extractive Sector, Australia", Business Strategy and the Environment Business, 16: 538–553.

37. Hart, S.L. and Milstein, M.B. 2003. "Creating Sustainable Value". Academy of Management Executive, 17; 56-69.

38. Hawkin, P. 2007. "Blessed Unrest", Penguin, New York,

39. Hazlett, S.A., McAdam, R., and Murray, L. 2007. "From quality management to socially responsible organisations: the case for CSR". International Journal of Quality and Reliability Management, 2: 669-82.

40. Hedberg, P.R. 2009. "Learning through Reflective Classroom Practice: Applications to Educate the Reflective Manager", Journal of Management Education, 33: 10-35

41. Hjorth, P. and Bagheri, A. 2006. "Navigating towards sustainable development: A system dynamics approach", Futures Journal, 38: 74–92.

42. Hodges, H.F. 2011. "Preparing New Nurses with Complexity Science and Problem-Based Learning", Journal of Nursing Education, 50: 7-13.

43. Holden, L. M. 2005. "Complex Adaptive systems: Concept analysis", Journal of Advanced Nursing, 52: 651-657.

44. Ison, R.L. 2009. "How to Act in a Climate Change World: Systems Practice, Systemic Inquiry and Action Research", Springer, London.

45. Jabbour, C.J.C. and Santos, F.C.A. 2008. "The central role of human resource management in the search for sustainable organizations". The International Journal of Human Resource Management, 19: 2133-2154.

46. Jamali, D. 2006. "Insights into triple bottom line integration from a learning organization perspective". Business Process Management Journal, 12: 809-21.

47. Jeffrey, P. and McIntosh, B. 2002. "Co-evolution as a conceptual model in search for sustainable modes of water management". Discussion paper prepared for the AQUADAPT workshop, Monpellier October 25th–27th 2002.http://www.aquadapt.net.

48. Johnson, B.M. and Webber, P.B. 2009. "An introduction to theory and reasoning in nursing" (3rd ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

49. Kernick D. 2002. "Complexity and healthcare organization. In Complexity and Healthcare. An Introduction", Sweeney K. & Griffiths F. (eds), Radcliffe Medical Press, Abingdon, Oxon. pp. 93–121.

50. Khandekar, A. and Sharma, A. 2005. "Managing human resource capabilities for competitive advantage", Education and Training, 47: 628-638.

51. Lacayo, V. 2007. "What complexity science teaches us about social change". MAZI, 10: 6-9. Retrieved from http://www.communicationforsocialchange.org/mazi-articles.php?id=333

52. Laughland, P. and Bansal, P. 2011. "The top ten reasons why business aren't more sustainable", Ivey Business Journal, Jan/Feb: 12-19.

53. Linnenluecke, M.K. and Griffiths, A. 2010. "Corporate sustainability and organizational culture", Journal of World Business, 45: 357-366.

54. McDaniel, R.R. 2007. "Management strategies for complex adaptive systems", Performance Management Quarterly, 20: 21-41.

55. McKibben, B. 2007. "Deep Economy: The Wealth of Communities and the Durable Future", Times Books, New York, NY.

56. McQuillan, P.J. 2008. "Small-school reform through the lens of complexity theory", Teachers College Record, 110: 1772-1801.

57. Minott, M.A. 2009. "Reflection and reflective teaching, a case study of four seasoned teachers in the Cayman Islands", Saarbrücken, Germany: VDM Verlag.

58. Mintzberg, H. 2004. "Managers not MBA's: a hard look at the soft practice of managing and management development", San-Francisco: Berret-Koehler.

59. Mitleton-Kelly, E. 2011. "A complexity theory approach to sustainability. A longitudinal study in two London NHS hospitals", The Learning Organization, 18: 45-53.

60. Mori, Y. and Welch, E.W. 2008. "The ISO 14001 environmental management standard in Japan: results from a national survey in four industries", Journal of Environmental Planning and Management, 51: 421-445.

61. Naude, M. 2011. "Sustainable development in companies: Theoretical dream or implementable reality?", Corporate Ownership & Control, 8: 352-364.

62. Nguyen, D.K. and Slater, S.F. 2010. "Hitting the sustainability sweetspot: having it all". Journal of Business Strategy, 31: 5-11.

63. Nishiguchi, T. 2001. "Co-evolution of inter-organizational relations", in Nonaka, I. and Nishiguchi, T. (Eds), Knowledge Emergence, Oxford University Press, Oxford, pp. 197-222.

64. Pavlovich, K., Collins, E. and Jones, G. 2009. "Developing Students' Skills in Reflective Practice: Design and Assessment", Journal of Management Education, 33: 37-58.

65. Pemberton, J.D., Stonehouse, G.H. and Yarrow, D.J. 2001. "Benchmarking and the role of organizational learning in developing competitive advantage", Knowledge and Process Management, 8: 123-135.

66. Penprase, B. and Norris, D. 2007. "What nurse leaders should know about complex adaptive systems theory", Nursing Leadership Forum, 9: 127-132.

67. Plsek, P.E., and Greenhalgh, T. 2001. "The challenge of complexity in health care", BMJ, 323: 625-628.

68. Porter, M. and Kramer, M. 2006. "The link between competitive advantage and Corporate Social Responsibility", Harvard Business Review, 84: 78-92.

69. Prugh, T. and Assadourian, E. 2003. "What is sustainability, anyway?", World Watch Magazine, September/October: 16-24.

70. Rammel, C., Stagl, S. and Wilfing, H. 2007. "Managing complex adaptive systems — A co-evolutionary perspective on natural resource management", Ecological Economics, 63: 9-21.

71. Rassafi, A.A., Poorzahedy, H. and Vaziri, M. 2006. "An alternative definition of sustainability using stability and chaos theories", Sustainable Development Journal, 14: 62-71.

72. Raelin, JA. 2001. "Public reflection as the basis of learning", Management Learning, 32: 11-30.

73. Regner, P. 2001. "Complexity and multiple rationalities in strategy processes", in Volberda, H. and Elfring, T. (Eds), Rethinking Strategy, Sage, Thousand Oaks, CA, pp. 43-56.

74. Rihani, S. 2002. "Complex Systems Theory and Development Practice", Zed Books, New York, NY.

75. Rowe, A. and Hogarth, A. 2005. "Use of complex adaptive systems metaphor to achieve professional and organizational change", Nursing and Health Care Management and Policy, 51: 396-405.

76. Samy, M., Odemilin, G. and Bampton, R. 2010. "Corporate social responsibility: a strategy for sustainable business success. An analysis of 20 selected British companies", Corporate Governance, 10: 203-217.

77. Scott, W.R. 1987. "Organizations: Rational, Natural, and Open Systems", Prentice-Hall, Englewood Cliffs, NJ.

78. Sawyer, R. 2005. "Social Emergence: Societies as Complex Systems", Cambridge University Press, Cambridge.

79. Seibert, K. and Daudelin, M.W. 1999. "The role of reflection in managerial learning: Theory, research and practice", Westport, CT: Quorum Books.

80. Stead, W.E., Stead, J.G. and Starik, M. 2004. "Sustainable Strategic Management", ME Sharpe, New York, NY.

81. Steurer, R., Langer, M.E., Konrad, A. and Martinuzzi A. 2005. "Corporations, Stakeholders and Sustainable Development 1: A theoretical exploration of business-society relations", Journal of Business Ethics, 61: 263-281.

82. Tan, J., Wen, J and Awad, N. 2005. "Health care and services delivery systems as complex adaptive systems", Communications of the ACM, 48: 36 – 44.

83. Thompson, N. and Pascal, J. 2011. "Reflective practice: an existentialist perspective", Reflective Practice, 12: 15-26.

84. United Nations. 1992. United Nations Conference on Environment and Development, Rio de Janeiro, 14 June, Agenda 21, 1992. Geneva: United Nations. http://www.unep.org/.

85. United Nations. 1997. United Nations Earth Summit +5, New York, 23-27 June, 1997. Geneva: United Nations. http://www.un.org.esa/earthsummit/.

86. Velazquez, L.E., Esquer, J., Munguıa, N.E. and Moure-Eraso, R. 2011. "Sustainable learning organizations", The Learning Organization, 18: 36-44.

87. Vince, R. 2002. "Organizing reflection", Management Learning, 33: 63-78.

88. Wallis, A.M., Kelly, A.R. and Graymore, M.L.M. 2010. "Assessing sustainability: a technical fix or a means of social learning?", International Journal of Sustainable Development & World Ecology, 17: 67-75.

89. Wals, A.E.J. and Schwarzin, L. 2012. "Fostering organizational sustainability through dialogic interaction", The Learning Organization, 19: 11-27.

90. White, L. and Lee, G. 2009. "Operational research and sustainable development: tackling the social dimension", European Journal of Operational Research, 193; 683-92.

91. World Commission on Environment and Development. 1987. "Brundtland Report". http://www.ace.mmu.ac.uk/eae/Sustainability/Older/Brundtland_Report.html; 1987.