Design of Cleaner Production Frameworks: an Operational Tool for Sustainable Transition

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Abstract

Growing out of macroeconomic agenda, streamlined resource efficient cleaner production guidelines emphasizes more than ever on the importance of organizational sustainability. The cohesion between resource efficient cleaner production and social and environmental responsibility policies also suggests that if institutionalized, cleaner production guidelines rooted in the concepts and depositions of sustainability could result in development of strategic managerial frameworks with micro and macroeconomic benefits. Appropriately, and in support of such principle, this paper suggests development of an interconnected managerial framework that can translate general principles of sustainability into formulation of the resource efficient cleaner production guidelines.
The applicability of the proposed approach was tested in a pilot study in Costa Rica. While emphasizing on the importance of the local policies and perceptions of the internal and external stakeholders, results highlighted the need for institutionalization and customization of the frameworks according to organizational type, size, culture, capability, capacity and location. Although universal, the proposed framework could be specifically instrumental to the developing nations aiming at a sustainable transition.

Keywords: *Sustainable development goals (SD), Sustainable transition, Corporate social responsibility (CSR), Cleaner production (CP), Costa Rica.*

1-Introduction

1.1 Sustainable development

Brundtland Commission Report (World Commission on Environment and Development, 1987) has made a great contribution to emerging sustainability by emphasizing the importance of sustainable development and in effect forcing it to the top of the agenda of the United Nations and the multilateral development banks (Daly, 1990). To date, although, sustainable development still at some levels is a contested concept with a wide range of meanings; it is embraced by big business, governments, social reformers and environmental activists. After initial reluctance, 95% of large companies in Europe and the USA now believe that sustainable development is important due to its capability to

link environmental and socio-economic issues together (Giddings et al., 2002). The concept of sustainable development (SD) has been partially a result of growing awareness of the global links between mounting environmental problems, socio-economic issues related to poverty and inequality, and concerns about a healthy future for humanity (Hopwood et al., 2005). Although, SD paradigm which was introduced in a formal fashion in the 1990s (Khalili, 2011) targets environmental, social, ecological and economic sustainability through a cohesive framework that treated them as interconnected goals, transition to SD require consideration of a much more extensive and integrated set of objectives that among others include monitoring the outcome of developmental activities via a wide range of indicators. A large established literature has been growing in the area of sustainability in organizations, particularly business firms. The focus of these studies has been to better understand why and how firms decide to adopt more sustainable practices. Attentions have been drawn toward importance of the firms external and internal drivers (firms stakeholders) while examining what motivate organizations to develop and/or implement a sustainability agenda (DeLange, et al., 2012). In 2009, MIT Sloan Management Review published results of a survey conducted to evaluate if sustainability will change the competitive landscape and reshape the opportunities and threats that companies face? If so, how? And how worried are executives and other stakeholders about the impact of sustainability efforts on the corporate bottom line? What are companies doing now to capitalize on sustainability-driven changes? And what strategies are they pursuing to position themselves competitively for the future? The survey revealed a strong consensus that sustainability is having and will continue to have a material impact on how companies think and act (MIT Sloan Management Review, 2009). The alignment of the micro- and macroeconomic objectives (at firm, regional scales) is expected to improve as SD is gaining wider acceptance as a paradigm for macroeconomic policies. As an effort for turning toward a civilization of enhanced human well-being and environmental resilience concept of the "Great Transition" (Raskin et al., 2010) proposed different scenarios for development of a suite of strategic plans including those focused on global value changes for a sustainable transition. In 2012, in order to remind policymakers and other stakeholders of the importance of reaching a solid outcome for SD, during Rio+20 processes Colombia, Guatemala, and Peru submitted a proposal for enriching Sustainable Development Goals (SDGs) post 2015. The main reasons for the proposal among other was stated to be observed lacks, at all levels, of prioritizing sustainable development, limited access to financial resources, weak commercial viability of the required investments, inadequate and inappropriate human, financial, technical and institutional capacity dedicated to implementation and evaluation of the outcome, limited public awareness and a lack of change in lifestyles. At the bottom line this proposal suggested that outcomes of transitional activities have to be measured in multiple dimensions and at the macroeconomic level (Issues Brief 6 –UNDESA 2012).

1.2. Corporate social responsibility for sustainability

Today, despite slow initial responses, many companies and sectorial organizations are trying to identify ways in which they could address sustainability issues and contribute to sustainable development. One of the main driving forces for this interest has been legislation, which is increasingly tailored towards promoting sustainable development (Delbard, 2008). For example European Commission (EC) is actively involved in drawing up policies and legislation to encourage corporate social responsibility (CSR). These ranged from 'polluter pays' legislation through 'producer responsibility' policies to 'core labor standards' and 'social governance' span all industrial sectors, from primary extraction to consumer products (Azapagic, 2013). Definitions presented for CSR also has been ranging from ethical–philosophical concept to action-oriented managerial concept of social and environmental responsiveness. Most CSR classifications seem to be made based on six criteria; motive, relation to profits, group affected by decisions, type of act, type of effect, and expressed or ideal interest (Garriga et al., 2004). In the absence of regulations, however, often debate has been taking place on finding more familiar and/or achievable definitions for CSR (Marrewijk, 2003). For example, in

defining CSR, neoliberal writers tend to see it fundamentally as the adoption of a set of voluntary policies, codes or guidelines initiated and driven by the corporation. The Australian Treasury, in a submission to the Joint Parliamentary Inquiry on CSR, defined CSR as 'a company's management of the economic, social and environmental impacts of its activities'. Neo-Keynesian approaches, however, tend to utilize a wider definition that more clearly recognizes the active role of the corporation's 'stakeholders' and perhaps also the state in the definition of what is corporate social responsibility while it is generally defined as an approach adopted voluntarily by corporations and without external regulation by either stakeholders or the state (Broomhill, 2007). Dahlsrud, (2008) while acknowledging that addressing environmental issues is a significant focus of CSR models, defined five core element of CSR to be "Voluntariness", "Stakeholder", "Social", "Environmental", and "Economics". Based on dimension ratios, he also suggested that there would be more than a 50% probability for any of these dimensions to be included in a random definition of CSR, emphasizing that all of these dimensions are necessary in order to understand how CSR can be developed. While CSR is more generally understood as being the way through which a company could achieve a balance of its economic, environmental and social imperatives, at specific levels, it is used to address expectations of both shareholders and stakeholders (Galbreath, 2010). The collaborative nature of CSR agenda has been also addressed in international development while it was regarded by some as a vehicle through which the private sector can contribute to poverty reduction and other social objectives, which will not be achieved by governments acting alone (Fox, 2004). According to United Nation Industrial Development Organization (UNIDO), as a strategic business management concept, it is crucial to distinguish CSR from simply being a charity, sponsorships or philanthropy focused initiative. UNIDO guideline, accordingly, recommend that while focusing on the small and medium size enterprises (SMEs) we should be careful not to promote uptake of CSR strategies unless there is a clear understanding that such strategies would not adversely affect SMEs economic viability.

1.3. Sustainability Tools: Pollution prevention, Resource Efficient Cleaner Production, and Corporate Social Responsibility in the era of sustainable transition

As indicated before, most recently, environmental management tools P2/CP have been grouped into categories focused on addressing technical, legislative, environmental, and social aspects of the firms. Examples include tools to institutionalize assessment and coverage of environmental externality (ies) of the firms, design of resource efficient cleaner production programs (and use of sustainability focused reporting guidelines (i.e. GRI) (European Territorial Cooperation project Act Plan, 2011). Subsections bellow provide concentrated views of P2/CP/CSR tools that if used properly could be instrumental to achieving sustainability. The US Environmental Protection Agency 2010-2014 Pollution Prevention (P2) Program Strategic Plan for post 2014 which was published in February 2010 more specifically calls for five main topics to be considered in the design of P2 strategies while addressing three categories of sustainability: Environmental, Social, and Economics (see figure 1)(www.epa.gov). While much of the early emphasis of the UNEP cleaner production program was on process technology, the interpretation of the term, cleaner production owed much to the earlier concept of pollution prevention the terminology commonly used in US since 1970s (Ayres , and Ayres, 2002). The term 'clean production' itself was invented in May 1989 as 'the conceptual and procedural approach to production that demands that all phases of the life cycle of a product or a process should be addressed with the objective of prevention or minimization of short and long-term risks to humans and to the environment'. The RECP terminology of cleaner production emerged primarily in Europe and through the initiatives of the industry and environment Office of the United Nations Environment Program (UNEP). The scope of the CP was conceptually advanced to address sustainability in 1998 while the *International Declaration on Cleaner Production stated that a*chieving sustainable development is a collective responsibility. After 14 years of experience, the NCPC Program was reviewed and in 2009 UNEP and UNIDO launched the new joint Resource Efficient and Cleaner Production (RECP) Program extended CP focus

to cover Cleaner and Resource Efficient Production to link RECP more profoundly with today's most pressing environmental concerns at local, regional and global levels and to emphasize the triple bottom line relevance to production efficiency, environmental conservation and human development (http://www.unep). Intermediate analysis of the CP impact indicated that in North America and Europe opening the door for more formal environmental management systems and strategic investments across a variety of business functions, leading to higher productivity, revenues and market share (Hart, 1995; Porter and van der Linde, 1995). The, UNIDO has based its CSR program on the Triple Bottom Line (TBL) approach, which has proven to be a successful tool for industry of any size, more specifically for SMEs in the developing countries. (http://www.unido.org).

1.4. Example approach to design of CSR specific CPs

Cleaner production defined as an "integrated preventative environmental strategy" for improved resource efficiency, minimization of risks and environmental impact, and reduced waste and costs in an organization's operations (Mugwindiri, et al, 2013). Most recently UNIDO has moved toward similar stratagem and suggested design of CSR programs to be important element of Serbian Cleaner Production Centre. Accordingly, through CP centers and as a part of a support system, UNIDO developed a network via which they could offer industry clients training on development of CSR strategies, implementation and reporting. (UNIDO Cleaner Production Center in Serbia, 2012). CSR issues that can be tackled through CP specific strategies could include design of environmental and social strategies and economic outcome (prosperity). Accordingly, properly implemented CP with CSR can bring along a variety of competitive advantages, such as enhanced access to capital and markets, increased sales and profits, operational cost savings, improved productivity and quality, efficient human resource base, improved brand image and reputation, enhanced customer loyalty, better decision making and risk management processes(What is CSR? UNIDO).

2. Project goals and objectives

Moving toward a sustainable transition it has become evident, even more than ever, that there is an urgent need for expanding on the traditional focus of the CP guidelines. For example, describing how to address resource constraints and the need for institutionalization of the CP initiatives and costs. Conforming to sustainability aspirations, the main goal and objective of the paper is to: I. Demonstrate how strategic planning for sustainability can be operationalized by developing a stepwise framework for design of CSR specific, and resource efficient CP initiatives; II. Discuss why design of the framework should account for the purposes and the focus of the local and regional sustainable economic development goals and objectives; III. Emphasize the importance of developing policies that can promote understanding and adoption of CSR focused, resource efficient CP initiatives while targeting both internal and external stakeholders; and IV. Demonstrate how design of the frameworks utilizes synergy among management strategies embedded in the premises of the CP and tactics intended in CSR initiatives.

The proposed methodology provides opportunity to simultaneously address business profitability, social welfare and human capacity development needed to ensure a sustainable transition from millennium development goals to those defined by sustainable development goals and objectives.

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3-Methodological approach

In line with the main goal and objective of this study, the proposed methodological approach demonstrates how a systematic step-by-step framework can be designed to enable companies, particularly, small and medium size enterprises develop and asses their sustainability programs and initiatives. In another word, evaluating/managing their

operational economic and sustainability risks/benefit by adopting (institutionalizing) resource efficient and stainability focused CP strategies from any combinations of sub-topics identified for tool discussed in section 1.3. (See Figure 1 provided below).

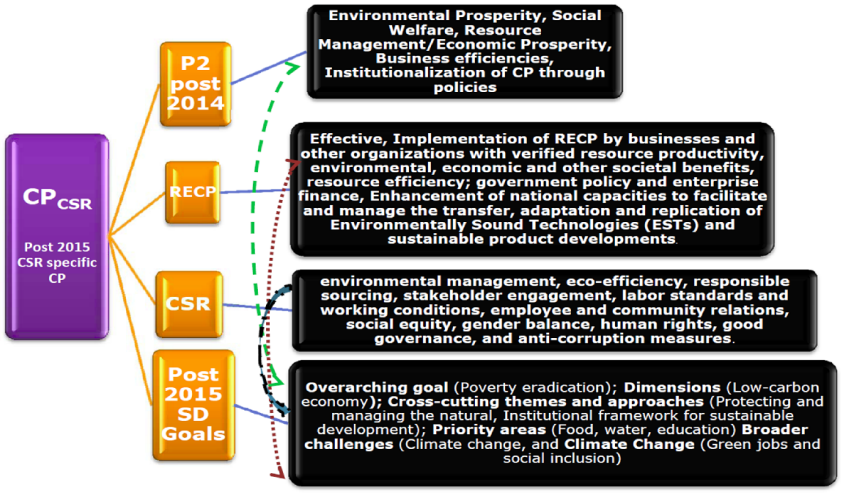

Fig. 1. Sustainability infused tools for Sustainable transition (reduced version of tools definitions)

The proposed framework for example could take into the account the main criteria identified for the post 2014 pollution prevention design while focusing on the "climate Change" issues (see combination in Figure 1) or use RECP guideline while focusing on "food, water and sanitation" identified for post 2015 SDG. Such selections should also consider organization's capabilities, values, size, operation type and country's policies, state of the economy and specified regional developmental goals and objectives. In support of the main goals and objective of the study, the methodological approach should also focus on facilitating development of an easy to understand and implement multilateral managerial framework that is capable of translating general principles of sustainability into design of environmental management strategic tools. The impacts (benefits or Risks) of the firm's sustainability approaches then can be assessed according to the firm, country, and regional developmental goals and objectives. The format for evaluating how companies' value importance of developing/adopting/expanding on the existing CP and CSR initiatives could be as follows:

Step 1: Identify existing/institutionalized regulatory or voluntary programs, polices, particularly those aligned with environmental, economics, and social aspects of firms operation such as CP:

- CP is in place (Yes NO)
- CP is embedded in business policy (Yes NO)
- Social and environmental initiatives in Place (Yes NO)
  - If yes identify types of CP initiatives (*types of projects)*

Step 2: Identify existing/institutionalized regulatory or voluntary programs, polices, particularly those aligned with environmental, economics, and social aspects of firms operation such CSR:

- CSR in place (Yes NO)
- CSR is embedded in business policy (Yes NO)
  - Social and environmental initiatives in Place (Yes NO)
  - If yes identify types of CSP initiatives = indicators of CSR initiatives (*types of projects)*

Step 3: Identify cohesiveness among CSR and CP guideline/focus/interest in the company

Step 4: The need for optimizing alignment of the micro- and macroeconomic objectives with expected outcomes of CP or CSR initiatives

Step 5: Anticipate/Assess impacts of implementing CP-CSR on the economics of the company, country (within which company operates) and the region if applicable
Step 6: Identify constraints for example: Lack of financial resources, need for creation of knowledge, supporting government policies, alignment with country/regional development goals, financing opportunities in collaboration with international agencies and private industry.
Step 7: prioritize constraints and address those most influential to financial success of the company and state of economy and social development in the country/region.

4. Application in Costa Rica: Pilot study

The natural progress toward sustainable transition require initiatives that can create synergy among management strategies embedded in the premises of the CP tactics, the essence of the CSR strategies in the spirit of sustainability. Such a transition, accordingly, require understanding of the companies' perception and knowledge of sustainability issues and tools (such as RECP and CSR) that can be used to address those.

4.1. Assessment of the company's perception of CP and CSR initiatives.

An approach to design of RECP specific sustainability strategy is presented for Costa Rica in agricultural product packaging and export. Data for this study was collected by developing a simple questionnaire which aimed at understanding perception of CP, CSR, and their values and applications in the industry. The first step was to understand company's size, product, location, business type and emphasis. Second step focused on evaluating if companies are familiar with and value practicing CP and CSR initiatives. Finally, we attempted to understand perceived challenges and/or opportunities associated with adopting CP and CSR strategic tools in the sampled industry:

- Most companies had clear understanding and knowledge of what CP and CSR are and their values for the company.
- Most companies valued CSR for the company more than CP.
- Lack of government assistance, effective public policies, and external financial assistance were three most important barriers for adoption of any type of CSR or CP strategies.
- Companies also emphasized on the importance of educating both consumers and employees about values of CP and CSR: stating that enhancement of the CP or CSR focus and initiatives require training for employees.
- Although almost all companies indicated that CP is important, but a very few had CP in place due to capacity constraints and need for high levels of paper work.
- Universally companies believed that adoption of CSR and CP would be increased substantially in the future. CSR more than CP (Figures 2).

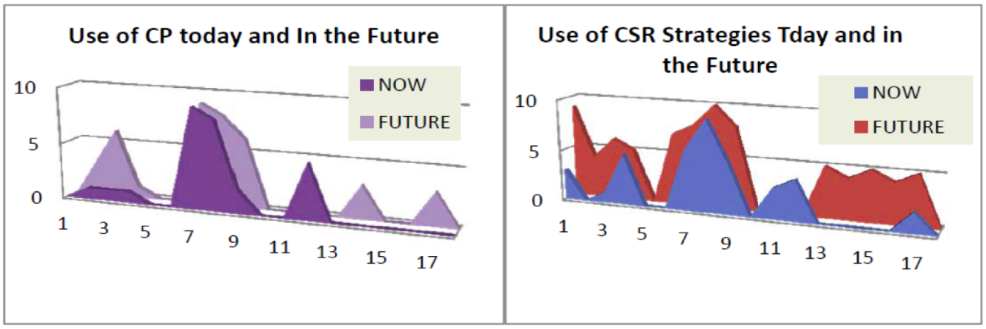

Fig. 2. Expected change in adoption of CP and CSR today and in the future

4.2. Country sustainable development goals and objectives

The second step was to understand country's economic development and sustainability focus. As such, we have reviewed and summarized results of a report that was published by World Bank for Costa Rica in June 2014 (data in the report was obtained by surveying 310 stakeholders of the World Bank Group in Costa Rica. Stakeholders were invited to provide their opinions on the WBG's work in the country). Results of data analysis in summary were as follows: 70% indicated that country is in right direction, while across all stakeholder groups, "transport" was considered to be the top development priority in Costa Rica. Respondents across stakeholder groups and sectors all agreed that development in "*job creation and employment*" would contribute the most to poverty reduction in Costa Rica. Respondents across sectorial areas agreed that development in "*transport*" would contribute the most to economic growth in Costa Rica (60 % or responses) followed by "*Foreign direct investment*", "*trade and export*", "*employment*", "public sector reform", "domestic private sector development" and "education" (41, 36, 24, 22, and 19 and 13% respectively). Factors contributing to shared prosperity included better "entrepreneurial opportunities", "education and training", "better ensured job opportunity", and a *"consistent economic growth"* (according to the 47, 40, and 31% of responses, respectively). General analysis of the survey also suggested that at country level the most influencing parameters seems to be "need for *economic growth" and "education" followed by addressing "climate change issues", "social protection" and "protection of environmental systems"* (Figures 3a, and 3b).

4.3. Regional development goals

Analysis of data provided for sustainable economic development in Latin America and the Caribbean agenda for post-2015 development indicated the need for promoting equality and structural changes that could result in reduction of "*monetary poverty*". Most importantly, development of multidimensional approaches capable of suppressing poverty relative to society's developmental level. The other regional development issues seem to be associated with the "quality of urbanization processes" in the region; "population demographics"; "vulnerability to extreme natural events exacerbated by climate change"; "dependency on the environment and natural resources", and others which require greater resilience both economically and in terms of social protection (www.eclac.org).

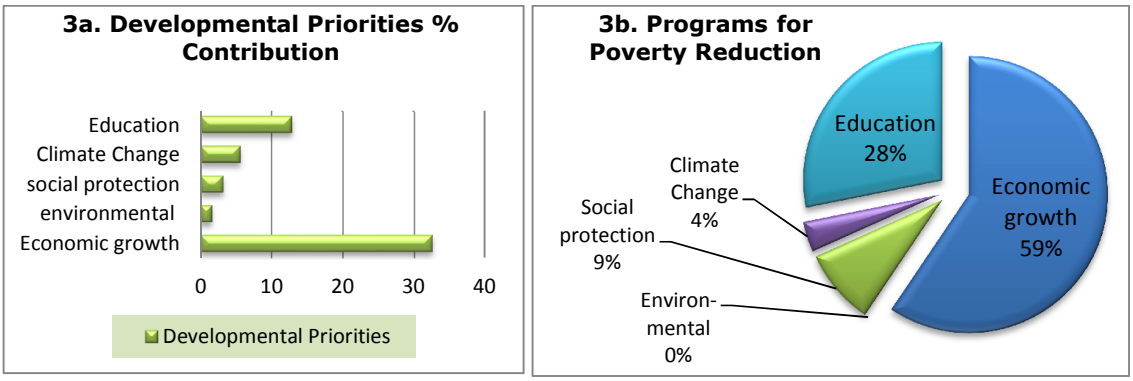

Fig. 3a and 3b. Factors impacting development priorities in Costa Rica (analysis of World Bank Data)

5. Proposed strategy for designing sustainability focused RECP in Costa Rica

While emphasizing the importance of devising applicable strategies in support of sustainable development (SD), we demonstrate how effective management frameworks

can be designed according to the premises of the resource efficient cleaner production (CP), P2 post 2014 guideline, post 2015 SDG, domains of corporate social/environmental responsibility (CSR), companies internal and external specifications as well as country's and regional developmental goals and sustainability agenda (See Figure 4). Application of the proposed framework accordingly is proposed in in pilot study for Costa Rica utilizing macro and micro level data provided by the World Bank and those obtained through simple questionnaires. Data collection and analysis was conducted in collaboration with the faculty at Instituto Tecnológico de Costa Rica.

Upon completion of our data collection and analysis, while utilizing steps similar to those involved with proposed strategic design presented in section 4, we suggest design of CSR specific RECP to include the following steps:

- Focus on Company Internal Factors:
  - Enhance employees' knowledge of sustainability (CSR) and environmental management strategies (RECP) and their impact on company performance *(Education and training for internal stakeholders)*;
  - Focus on using business efficiency as an indicator for selecting best approaches to design of CSR or RECP strategies for the company (if company already has CP programs use it to develop CSR strategies for the company)
  - Institutionalize RECP practices which could address CSR goals and objectives by including those in core business decision-making processes;
  - Identify company resources and assets that can support implementation of the RECP, CSR, or combination of both initiatives.
- Focus on Company External Factors Should be on:
  - Country Level assessment of the regulatory systems/approaches and benefits (subsidies), and policies that could provide assistance with implementation and financing RECP options.
  - Identifying the levels of uniformity among company's CSR or RECP strategies with those identified by country and Regional strategies for meeting sustainable development goals and agendas post 2015a. For example consider business efficiency, economic development, education, and energy efficiency/use of renewable the primary focus of the company
- Developing the framework/guideline in consultation with the internal and external stakeholders.

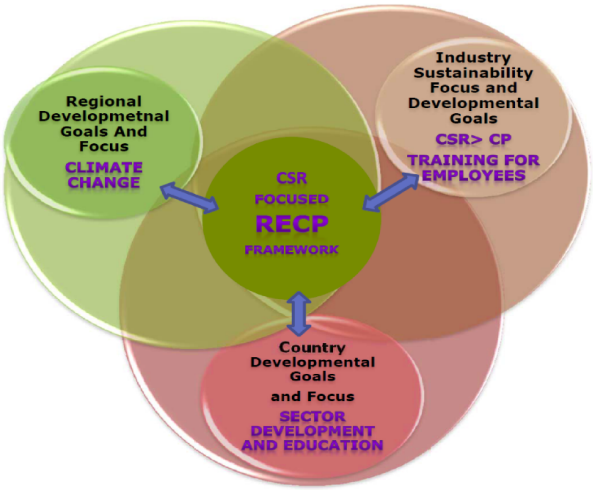

Fig. 4. Design elements of the sustainability (CSR) specific RECP (*regional and country specific focus were selected from U and WB reports*)

6. Conclusion

With the challenge of sustainable development becoming as considerable as ever, paper highlights the importance of considering social and economic prosperity indicators in the

design of resource efficient CP strategies. While pointing out the values of the advanced environmental management and sustainability tools and guidelines, such as those associated with P2 post 2014 guideline, RECPs, CSRs and post 2015 SD goals and objectives, we underscore the importance of designing CP strategies according to a framework that is sensitive to both micro and macro level economic development goals and objectives of the organizations. Similarly, we are emphasizing the significance of understanding organizations' internal and external dimensions as well as resources and constraints prior to approaching design of the framework. Results of the case study in Costa Rica suggest that success of the sustainability focused CP initiatives require understanding of the organizations internal and external environment (country, region), developmental goals, objectives, and initiatives such as those concerned with providing financing mechanisms in support of sustainability initiatives. The role of the education and awareness of the importance of sustainability is also valued as a strategic tool for a sustainable transition.

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