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A consultancy perspective of mainstreaming sustainable development through continuous  
improvement

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## Abstract

Environmental protection is a matter of course for most organizations and Environmental Management Systems are a way to go beyond a merely compliance with law. The postulation for continuous improvement (CI) in EMSs is an approach to develop the ecological development further. Thus, the question arises if continuous improvement can help organizations to mainstream the overall concept of sustainable development (SD). SD can be seen as a highly complex process of development and learning itself, and finally the improvement in sustainable performance can solely be obtained through organizational learning. The task of the external consultant, who has to improve his knowledge himself, is therefore to support learning processes that handle with change and the complexity of SD.

This article applies on the case of an Austrian manufacturing company from the galvanizing industry that a continuously improvement of the environmental performance and the implementation of continuous improvement practices can lead to further development towards a „sustainable company“.

Continuous improvement, Continuous Improvement Process, Sustainable Development, (Sustainability) Consulting, Organizational Learning

## Introduction

Sustainable Development means to develop economy in a way that it is able to satisfy human needs without destroying the natural fundamentals on which it depends. It takes time for a profound change in consciousness until environmental aspects become a matter of course for the daily acting. Not until the structural and cultural anchoring for an environmental sound and sustainable development happens the principle of sustainability will be anchored in the awareness and play a constitutive role in society. Organizations have to meet this challenge and frame and develop their processes responsibly (Winter, 2001). Consultants could therefore play the role of an active actor to support learning and change processes in organizations.

The main questions that arise in this discussion are:

- Can continuous improvement as postulated in EMSs be adopted for mainstreaming SD?
- Which role plays the external consultant for the implementation of SD?
- How can consulting support practices of CI?

The proceeding to answer these questions will be explanations of environmental awareness building, EMSs, continual improvement and the CI postulation within EMSs, SD, consulting and SD as consulting issue. A next step will try to combine these aspects and a case study will demonstrate the approach. Finally, the conclusion will discuss the implications.

## Environmental awareness

Environmental protection in corporations changed in recent years: off a merely compliance with limit values towards voluntary responsible positions for operational acting with its impacts on the natural environment. The obligatory assumption of responsibilities can therefore be carried out through the implementation of a standardized environmental management system (EMS).

Initiatives for environmental protection are to stimulate a development which effects a change of behaviors in the long term. The establishment of such consciousness requires an orientation on human psychology and learning. Disinterest and threshold fear have to be overcome, the will to face must find affirmation, taking decisions consequently has to be forced, the ambition to improve has to be activated and innovation-steps have to be encouraged. The external consultant has therefore the task to support the overcoming of these psychological organizational and individual (decision makers and other actors) barriers. Practical experience from this field shows, that first achievements can be initiative for the process of awareness building. Besides an environmental benefit the economic profit has to be available as “ice-breaker”. Every step has to answer the dry economic question “What’s in there for me?” to give responsibility a chance. Motivators for environmental awareness building can be: feelings of success, differentiation to challengers, adaption to improvement processes, the possibility of new entries through new targets towards an ideal result (1), an independent benefit of obtained single goals and the transmission of this climate of progress to other departments of the organization (Winter, 2001).

### Environmental Management Systems

EMSs are strategic management approaches that define how an organization will address its short- and long-term impacts of their products, services and processes on the natural environment (Darnall et al., 2006; Sebhatu et al., 2007). EMSs consist of a collection of internal policies, assessments, plans and implementation actions affecting the entire organization and its relationships with the natural environment (Coglianese et al., 2001). Although standardized EMSs (Eco-Management and Audit Scheme and ISO 14001) give little content regarding

objectives for quality and performance they can be seen as systems for information and incentives – concerning further education and operational information systems and the motivation for ecological work habits (Müller, 2001). An EMS involves the establishment of an environmental policy or plan, an internal assessment of the environmental impacts (this includes a quantification of those impacts and their change over time), quantified goals to reduce environmental impacts, an environmental programme, the provision of personnel and other resources, setup and action control and a documentation of the environmental management (Müller, 2001). As EMSs intend to help organizations embed environmental practices deep within their operational frameworks environmental protection becomes an important element of the companies overall business strategy (Shireman, 2003) and is more likely to develop a culture of ecological awareness.

Organizations that adopt EMSs can benefit from several aspects: most benefits result from cost savings through reduced resources and energy consumption, an enhanced corporate image and enhanced motivation of employees which results in increasing economic gains and improved operational efficiencies (Müller, 2001, S. 209; Porter and van der Linde, 1995). Further benefits mainly depend on the integration of stakeholder interests but EMSs definitely reduce costs of non-consideration of stakeholder demands for information (Müller, 2001).

#### The postulation for continuous improvement (CI) in EMSs

With the implementation of an EMS, organizations decide to keep the requirements of the particular standard voluntary. Of special importance is the postulation of the continuous development and improvement of the EMS itself and the environmental performance. Both the EMAS and the ISO 14001 standard include the requirement of a continuous improvement

process. This leads to a dynamic-oriented expansion of environmental standards with the intention to launch a dynamic, long-term and sustainable effecting discharge process that enables the organization to reach the objectives anchored in the environmental policy. In practice the CI-postulation challenges organizations to involve both short-term and middle- and long-term perspectives into their environmental measures. Environmental protection should therefore be supported on the strategic level (Gastl, 2005). Pfriedt (1999) describes “Two phases in ecological business policy” which includes the postulation for CI and supports a preservative improvement process (Table 1).

In the first phase un-complex measures for environmental protection and the collection of ecologic information are dominant. The second phase favours the examination with corporate development perspectives.

#### Continuous improvement: What is it?

Defined by the Chartered Quality Institute ([www.theccqi.org/resources/d2-7.shtml](http://www.theccqi.org/resources/d2-7.shtml)), continuous improvement is a gradual never-ending change that is “...*focused on increasing the effectiveness and/or efficiency of an organisation to fulfil its policy and objectives. It is not limited to quality initiatives. Improvement in business strategy, business results, customer, employee and supplier relationships can be subject to continual improvement. Put simply, it means 'getting better all the time'*“. Imai (2001) defined the CI process both as a philosophy and a method with the intention to improve continually including employees from all hierarchical levels. Kostka (2005) describes the following characteristics that are essential for the continuous improvement process: the involvement of the overall staff potential, the elimination of any dissipation, the careful use of resources and the consideration of sustainability in all operations. Bhuiyan and Bagehel (2005)

see CI as “...a culture of sustained improvement targeting the elimination of waste in all systems and processes of an organization. It involves everyone working together to make improvements without necessarily making huge capital investments.”

Historical, CI has its roots in the philosophy of Kaizen (*kai* = change; *zen* = the good, i.e. “improving the good”, “change towards the good”). *Shewhart* developed a steering tool for continuous improvement which was diffused by *Deming* (1986): the PDCA cycle (Plan – Do – Check – Act). The PDCA-cycle concretizes the quality control as a management control loop. In doing so, the process results compared to a standard result or dependent variable (target value) to measure the disparities between the current and the nominal condition. In the case that the measured differences exceed a prior decided degree, corrective measures will be initiated. The four steps of the PDCA-cycle have to be seen as continuous process which has neither a beginning nor an end. Every new cycle has new targeted improvements which have to be established and implemented previous to re-planning and redevelopment. The model assumes that every new defined standard includes internal weaknesses, contradictions and problems and therefore becomes an initial point for further improvements on a higher level (*Gastl*, 2005).

Figure 1: The PDCA-Cycle

To follow a PDCA-cycle means to continually search for better solutions, to create more efficient and more effective processes and to gain improved results. This makes the PDCA-approach universal in that way, that it can be applied in the entire organization on all levels (*Gastl*, 2005). There are three significant requirements for the success of the PDCA-cycle (*Zollondz*, 2001):

- All activities inside and outside the organization have to be understood as a process and accordingly it can be improved.

- Problem solving is insufficient, fundamental changes are required.
- Top management has to act as an ideal, merely assumption of responsibilities is insufficient.

Kostka (2007) argues that CI is a philosophy with an underlying methodology (the PDCA-cycle).

Basis of the CIP-philosophy are principles, which form a “mentality”:

- Focus on improvement- and sustainability
- employee orientation
- focus on processes and results
- quality orientation
- customer orientation
- focus on transparency and facts

To anchor these principles lasting in an organization corresponds with a deep change process that is required for the behavioural patterns of all employees on all organizational levels.

### *Benefits of CI*

Organizations are challenged to continually improve because of the constantly faced provocation of “doing more with less”. Increased competitiveness and more stringent regulatory controls result in new criterions for acceptance. It is not possible for a company to stand still and remain competitive. Customers – and the society as a whole – expect to see improvements and demand ever higher standards of quality. Continuous improvement is a necessity for all sectors and in special for manufacturing companies improved processes lead through control of the product to improved cost and reliability. This is to say, that increases in the number of customers lead to increases in profit (Fryer et al., 2007). Cole (2001) characterizes CI as a renewal of the

organization and the effort to prevent a static state. He assigns CI significant benefits, which he details as follows:

- Continuous improvement mobilizes large numbers of employees and increases the potential of raising ideas.
- Small wins can occur parallel and lead in turn to a magnification of results.
- Small wins can lead to large-scale change.
- Series of small wins can be the basis for revolutionary changes.
- By being anchored in current practices, small wins encourage learning that is rooted in daily work routines – exactly the kind of learning that is most likely to be transformed into effective practice – that is, to be retained and institutionalized.
- Small wins spread throughout the organization can provide useful knowledge about the whole system and promote learning.
- Small process wins are often based on tacit knowledge that is not easily noticed and imitated by competitors – in general it is easier to sustain competitive advantage when the knowledge possessed is tacit process knowledge.

#### *Organizational learning through CI*

According to Bessant et al. (1999), the organizational capability of CI provides dynamic mechanisms for involving the organization in learning processes. This is to say that to improve continuously requires commitment to learning. Learning is seen as a continuous process itself, at the same time, it is not well known, how organizational learning and continuous improvement work dynamically and mutually (Savolainen et al., 2007). Other approaches to examine the concept of organizational learning are about the technical and the social view. Argyris and Schön

(1978) distinguish between single-loop and double-loop learning. Single-loop learning is the detection and correction of errors within a given set of governing variables while double-loop learning involves changing those variables. Another approach handles the social view of learning which focuses on how people make sense of their experiences at work. In this view, organizational learning is seen as a political process which involves also cultural aspects (Easterby-Smith et al., 1999).

The success of such improvement practices depends on critical success factors (CFSs) which can be defined as actions and processes that can be controlled/affected by management to achieve the organization’s goals (Fryer et al., 2007). In that sense, organizations have to considerate particular factors that have to go well to ensure success. Fryer (2007) compiled a list of CFSs for manufacturing organizations that ensure the successful implementation of CI programmes. According to this the key factors are strong management commitment, customer management, supplier management and training and learning.

Overall, continuous improvement occurs through procedural practices, as is offered by the PDCA-cycle, which forms a structure for sustaining learning. Factors such as top management commitment and the level of advancement in organizational process management have an influence on the companies’ maturity and efficiency in implementation, an on making progress in a learning process, whereby the question of what kind of learning mechanisms are the most supportive to continuous improvement practices remains unanswered (Savolainen, 2007).

### Sustainable Development

The term of Sustainable Development (SD) has according to Dyllick (2008) three central sources: In the Brundtland report “Our common future” (1987), SD was defined as follows:

*“Enduring development is a development, that meets present needs without hazarding future generations to meet their needs.”* Some years later during the world summit in 1992 in Rio de Janeiro, SD was described that way: *“Economic development will only be sustainable if the acceptance of natural and social systems is considered.”* But the origin of the term SD is much older. *Von Carlowitz* mentioned the term associated with forestry (i.e. not to cut down more trees than the forest is able to produce) already in 1713.

As there are actually hundreds of definitions for “sustainable development” this resulted in a constructive dialogue of what SD is (Dale, 2001). Overall, it can be outlined that all definitions for SD are shifting from a goal-oriented to a process-oriented view as numerous recent publications support this opinion. Representatively, *Holling (2001)* argues, *“Sustainability is the capacity to create, test, and maintain adaptive capability. Devevelopment is the process of creating, testing, and maintaining opportunity. The phrase that combines the two, “sustainable development” thus refers to the goal of fostering adaptive capabilities and creating opportunities. It is therefore not an oxymoron but a term that describes a logical partnership.”* This approach is a shift from a command-and-control model to a self-organizational model which is more likely to succeed if it can emerge organically from unsustainable behaviour to manageable steps (Newman, 2005). Instead of being a final objective, sustainable development has to be understood as a continuous process of change (*Jokinen et al., 1998*). That is to say, SD is a moving objective which can involve long to the point of being indefinite time cases.

### An explanation of consulting

Meffert and Bruhn (1995) tracked the classification of corporate consulting, amongst others, as a special type of services. They point at the consequences of this service characteristic in three areas:

- Consulting is a potential product and not concrete, whereby the quality of the product depends on the consultant’s subjective capability.
- Consulting is immaterial and intangible both concerning results and applied resources.
- Consulting results evolve from an integration of both the consultants and the clients qualifications.

Schade (1996) argues similar as he classifies consulting as a contract property which is immaterial, integrative and profoundly individualized. As a contract property, the result of consulting processes depends on the behaviour of the involved and is therefore neither determinable through controlling the input nor through evaluating the output. Martinuzzi (2005) asserts that an overall accepted definition for corporate consulting is not available. He points out that although particular authors follow their own cognitive interest, several elements of definitions for consulting practices can be outlined: externality/independency, individualized service, voluntariness, alignment of problems, economic orientation and top management as target group.

### Consulting issue Corporate Sustainability

While questions of environmental protection and sustainable development are barely picked out as a central theme in economic oriented consulting research there are also hardly any

considerations of roles and functions that external consultants could fulfil in the scientific discourse of environmental management.

With the introduction of standardized EMSs in the mid-nineties the issue of environmental management and therefore an opportunistic access to questions of corporate environmentalism became more dynamic. The strong concentration on EMSs led to a change of perspectives of environmental oriented consulting services. As before technical and legal questions were focused now questions of operational and organizational structure, project management and public relations became more important. The defensive approach which was formed by imperatives and prohibitions lost ground for an orientation of internal saving potentials and the hope for an improved corporate image. External consultants could henceforth give external support for the implementation of EMSs or certify them as independent evaluators. But the specific role of consultants was barely discussed in the technical literature of environmental management. Till now consultants are reduced to their function as information providers in the sense of a compensation for short-coming and primarily studied as an expense factor. Little discussed is their part as independent actor who could make a contribution for the implementation of sustainable development (Martinuzzi, 2005). For the case of SD, Mohe et al. (2002) suggest that sustainability is first of all a regulative idea assigned to organizations from the outside, as an external social requirement. Concerning the relationship between consultant and client (the organization) they argue that the constellation for sustainability consulting has to be analytically dissolved:

- Consultants are offering consulting to organizations in a field where in the first run it's not about the adoption and solving of internal problems but about the treatment of an – first of all – external challenge.

- The level of experience in the field of consulting research exhibits empathically the limitations of external consulting and points the self-contained development of effective organizational learning processes.
- If consultants are too passive in their communication concerning SD as a challenge from the outside they risk becoming an affirmative accompanist of what organizations are willing to do anyway without important change of the corporate strategic program.
- The conclusio seems paradox: The consultants have to make the confrontation of organizations (i.e. their clients) with social challenges active to their field of activity and have although hardly to work on it to launch and support endogenous organizational learning and development processes.

Besides Mohe et al. (2003) also Birke et al. (2003) and Martinuzzi (2005) suggest in their studies that the complex dynamic challenge of SD requires new forms of consulting practices. Becke (2003) postulates therefore a corporate strategy towards an integrated concept of SD in the framework of an inconclusive organizational learning process. Consulting has to be an interdisciplinary cooperation of consultants in this context, as for the complexity of SD both a singular discipline and perspective and an isolated side by side of different structured consulting accesses from varying disciplines is insufficient. Shared approaches for learning and understanding between the consultants permit a self-reflexive treatment with particular disciplinary accessions, which seems necessary for the development of “true” sustainability.

Putting it all together: Continuous improvement – sustainable  
development – consulting

The change of the paradigm inside the sustainability discussion from a normative-prescriptive understanding to a regulative idea of “support, organization and continuity of a process for searching, learning and creating” opens the option to develop sustainability as a formal principle for organizational change and innovation processes. SD and sustainable management remains a matter of the ability to change and to develop it on an individual corporate level. That is to say, the implementation of SD is a self-dependent process, and organizations are venues of political – and values based – debates that aren’t always compatible to sustainability and mainly not unlimited changeable because of previously conducted technical-economic development paths (Birke et al., 2003).

Birke et al. (2003) argue that if the sustainable development of an organization is understood as a management statement for continual equilibrium of economic success, environmental performance and social responsibility then it relies on innovations in normative, strategic and operative management, its objectives, tools and processes. Although it’s unexplained what kind of contribution management tools and systems make in this context it seems clear that sustainability oriented instruments from the development of business area, strategy, product and organization, valuation methods for product life cycle, product environment and quality, and also social standards etc. are necessary and essential. It is crucial how they are configured individually in an organization, and if they are combined additive or “generic”.

As the regulative idea of SD neither includes an optimization strategy for a “triple-win” nor a master plan for the corporate reorganization, it can though offer a benefit. It challenges both practitioners and scientists to conceive corporate sustainability as an evolutionary and process-

oriented management which has to find rules and resources for complex and disputing internal and external adjustments (Birke et al., 2003; Martinuzzi, 2005).

Environmental Management norms include the postulation for CI but in different specificities. Within the scope of EMAS, the CIP is directly focused on the improvement of the environmental performance whereas in ISO 14001 it aims an indirect improvement. The ISO standard demands the “ecologic efficiency” in the means of a functioning and continually improving EMS whereas EMAS tries to achieve “ecologic effectiveness” in the means of a continually improving environmentalism. Concerning the issue of SD the direction for CI of both EMAS and ISO 14001 is to criticize. The term “continuous improvement” is not stringent focused on a sustainable development (Müller, 2001). Birke et al. (2003) point out that EMS didn’t succeed in achieving CI and endogenous organizational learning in the past.

Ecological sustainable modernization is an evolutionary-opened, knowledge-based and learning-conditioned concept which expects innovation capabilities of all actors. Thus it offers though chances to change industrial relations in a positive way. It seems that an ecology- and sustainability-oriented modernization in organizations opens both options for innovation and reorganization and new concepts for knowledge-work and consulting (Birke et al., 2003). Characteristics like preparedness for reform, innovation capacities and the ability to continuous improvement are not only the result but premises for the implementation of new management systems. As in every organizational reform or consulting intervention “the recursive sliding of social practice” determines the progress and the result for new management practices too: Innovations are adapted and in effective processes of iterative (i.e. repeated) corrections “polished” until they are appropriate in and for organizations. The success of these processes depends on the way how interests, expert knowledge, models of orientation and routine activities

update themselves in the case of management practices. The phenomenon of recursivity decides whether innovation potentials are avoided or continually improved and intrinsic advanced. Summing up, the literal challenge for management and consulting is the handling of recursivity in a specific organizational change. In a paradox way, more understanding of recursivity and the management of this phenomenon could be the result of future efforts to “mainstream” the overall concept of SD in organizations (Birke et al., 2003; Wimmer, 1999).

The successful management of such a complex process – as is the case in SD – requires the development of new methodologies and tools of development, that provide a course of action leading to a state of higher sustainability and towards ideality and the objective of an ideal (final) result respectively (1). The procedure therefore requires the creation of continuous feedback which can take its appliers to higher levels. For the process of SD, “backcasting”-practices can lead to achieve the designated effects: selecting a goal and imagining how to get there works better than adapting to prediction when the problem is complex, when changes needed are major, and when trends and externalities play a role in the problem (Nattrass et al., 1999).

The balance of economic, ecologic and social sustainability generates a consulting demand on which environmental and management consultants are barely prepared. The problem-oriented tailoring of knowledge concepts, the combination of transdisciplinary (2) consulting competencies and the company-specific application of learning-based consulting procedures makes high demands on consulting. The change in the paradigm of SD generates the need for consulting which can't be met with a consulting standard that is focused on instruments. Consulting Know-how is advanced and short-lived special and expert knowledge which allows a partial consulting with “up-scaled benchmarking” on the basis of more or less founded intersectoral and cross-company generalizations. Birke et al. (2003) claim, that this approach is

insufficient for sustainability-oriented or ecological modernization processes which have to be aligned interdisciplinary and towards a specific reorganization of the whole organization. Consulting services that are able to coordinate the necessary know-ledge from natural and engineering sciences and business and organization studies problem-oriented are currently the exception. Birke et al. (2003) argue therefore that a system-theoretical approach is necessary to innovate consulting itself towards the overall concept of SD: some kind of “transdisziplinary consulting for consulting”, will be required whereby consulting is seen as a social process.

### Case Study

#### *Methodology*

Data were gathered by STENUM GmbH, the companie’s external consultant for environmental issues, during implementation processes and different research projects since 1996. In addition, company documents available were used, as well as STENUM’s “cumulative knowledge” through involvement in development and implementation processes.

#### *Case Company*

A. Heuberger Eloxieranstalt GmbH is an anodizing company with 22 employees in Graz, Austria. The company is treating the surface of a broad range of aluminium parts by electrolyte generating a surface film of aluminium oxide. The company is specialised in processing orders within a very short time. Annually, some 90 000 m<sup>2</sup> of aluminium sheet metal, profile and small parts are treated in the plant initially. Heuberger has participated in the ECOPROFIT® (EP) program (3), of the City of Graz since 1996 and stayed within ever since (Fresner, 2006).

Anodizing is a galvanic process in which the surface of the aluminium is converted to aluminium oxide which protects the basic material against corrosion and wear. By grinding and polishing the surface can be prepared in different decorative qualities prior to anodizing.

In 1997 they decided to introduce an EMS according to EMAS. As a basis for the introduction the work done during the first year in the ECOPROFIT® programme was used. The typical elements, as mentioned below, of EP – a low level EMS – were adopted (Fresner, 2000):

- formation of an (environmental team)
- Input/output analysis providing an overview of the efficiency of the use of material and energy and a classification of waste and emissions
- Material and energy flow analysis to show the reasons for waste and emissions
- Options for improvement (by product changes, good housekeeping measures, changes in raw materials, technological changes, internal and external recycling)
- Feasibility studies to show the environmental and financial benefits of the options
- Implementation of measures and follow up to analyze the effects of these measures

These elements helped to start a process of continuous improvement by providing key tools for the monitoring and controlling of environmental effects, quick improvement, the feeling of success, the stimulation of motivation and creating of capacity for autonomous problem solving.

The management system today includes all aspects of business (quality, health and safety). As the consulting experience showed, the most effective way of involving especially SMEs (small and medium sized enterprises) is apparently not an individual on by one basis, but by working with them in small groups, almost in a club like atmosphere, whereby EP illustrates a model case for such a club. Working in groups creates a special atmosphere of inter-corporate learning.

As Heuberger’s development-path shows, the starting with single simple measures for environmental issues motivated the organization to develop its environmental performance further and strengthen its intention through the implementation of an EMS. A first working program, including the following tasks, was done by the organizations environmental team itself:

- Development of a project to guarantee compliance with current Austrian legislation
- Evaluation and written documentation of the working conditions at all the workplaces to fulfill the legal requirements
- Definition of procedures for anodizing, analysis of process baths, maintenance
- Definition of responsibilities, corrective measures and an auditing procedure
- Documentation of the management system

The analysis included benchmarking with other plants and with the best available technology. An external consultant provided the necessary information and guided through the process. The findings partly were eye openers both for operators and management. A variety of simple good housekeeping measures were the result as was the definition of plans for a technical revamp to upgrade to best available technology.

Next steps were to introduce the elements of these eco-projects into the daily procedures of the company.

Particular attention to formulate a convincing environmental policy was paid by the managing director: The environmental guidelines are a testimony of the commitment according to which the protection of the environment is an essential part of management which results in objectives and procedures for everyone in the company. They were accepted very well and the feedback of the employees was explicitly positive, after they had been amended by examples showing how they affect daily practise.

The environmental policy includes the statement *"We try to minimize the effects of our activities on the environment"*. This line is explained by a special paragraph to make the point clear to the employees and illustrate the meaning addressing actual activities in the company: *"We know that this is a continuous task consisting of many small steps, which have to be implemented continuously. We try to do so e. g. by improving our racks to optimize the utilization of the process solutions and to reduce the consumption of water and energy. We try to minimize drag-out by systematically studying dripping and improving our rinsing technology and practise."*

The backbone of the EMS is formed by the monthly meetings of the environmental team. In the meetings, the following topics are discussed:

- Progress of environmental programme
- Overview of new developments
- Current problems
- Compliance with existing regulations
- Training needs
- Discussion of current indicators of consumption of materials and energy
- Ideas for improvement

Employees are continuously trained e.g. regarding first aid, the handling of materials and the reduction of the use of chemicals. In spite of doubling its production the company reduced its water consumption, the specific (surface related) consumption of chemicals and the gas consumption, which led to important reduction of costs. Implemented organizational changes are team work, an environmental team (later on transformed into the production improvement team), team and individual bonus, increased internal communication, increased service orientation (doing product development and consulting for clients), installation of a controlling system

(consequent data acquisition, calculation of indicators, plan/actual comparison) and green procurement. Technical changes are installed continuously too with the intention to adopt the best available technology. Summarizing, the ideas for these measures were generated out of an intense discussion process of the team members with suppliers and the external consultant. For the overall improvement process “Heuberger’s stakeholders” are involved, as shown in Table 2. Over the years, the company traced a step-by-step approach towards a “sustainable company” which is still an on-going process.

### Conclusions

Continuous improvement is a philosophy for management with an underlying methodology: the PDCA-cycle. This approach offers a concept for organizational learning where better solutions are achieved through small improvements, whereby the whole organization is involved.

The understanding of the CIP as postulated in the standards for environmental management (EMAS and ISO 14001) is according to Birke et al. (2003), Gastl (2005) and Müller (2001) insufficient for an overall application of the CI-concept to other organizational areas. However, CI in the tradition of Kaizen and the view of the CIP as a management philosophy seem to increase the understanding and the usefulness of the methodology for organizational learning processes, whereby the question what kind of learning mechanisms are the most supportive to continuous improvement practices remains unanswered. The implementation of an EMS could be the initiator for the adoption of a “CI-thinking”.

Summarizing, sustainable development can be seen as a complex, dynamic process of further development and learning towards ideality, i.e. better solutions, whereby the creation of awareness for sustainability leads over a deep organizational change. The external consultant has

to be seen as an actor that is also subject to a further development and learning processes. SD in fact requires new forms of learning, consulting and collaboration where CI could be an approach to mainstream continual further development and learning.

As shown in the case study the involvement of employees from all corporate levels and the company’s stakeholders and the further development of the external consultant’s know-how provided a learning environment for all actors with the intention to understand the message of SD and find proprietary solutions. But obviously, a further development towards sustainability could be obtained because of a broader commitment to CI, which is part of the organizations philosophy and the strong commitment of top management. Another driver could be an influence by the EP network.

More research on the perception of the benefits of sustainable strategies and continuous improvements by consumers and enterprises regarding monetary and ethical categories seems to be necessary. Another question concerns the transferability of the concept of ideality to SD and the connections to CI. Therefore, more focused research has to be done, and overall empirical studies have to be done to obtain representative statements.

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Appendices

[Insert appendices here]

## Footnotes

- (1) The term “Ideal Final Result” (IFR) is an implementation-free description of the situation after the problem has been solved. It focuses on customer needs or functions needed, not the current process or equipment. The goal of formulating the IFR is to eliminate rework by addressing the root cause of the problem or customer need. A basic principle of TRIZ (Theory of Inventive Problem Solving), a problem solving method based on logic and data, is that systems evolve towards increased ideality, where ideality is defined as

$$\text{Ideality} = \text{S Benefits} / (\text{S Costs} + \text{S Harm})$$

Evolution is in the direction of increasing benefits, decreasing costs and decreasing harm. The extreme result of this evolution is the Ideal Final Result (IFR): it has all the benefits, none of the harm and none of the costs of the original problem. The IFR describes the solution to a technical problem, independent of the mechanism or constraints of the original problem (Domb, 1997).

In recent years several authors (e.g. Junghanns et al., 2008; Zobel, 2007; Bannert et al., 2007) tried to assign principles of the TRIZ-method to other disciplines (marketing, logistics, personal management etc.) than technical engineering. Hence the suspicion emerges if the principle of the IFR could be adopted for SD. Couldn't sustainable development itself be the IFR, and the process of developing sustainability through stepwise improvements a process towards ideality? According to Laszlo (2003) organizations generate value when (negative) impacts are low, so towards ideality, and the IFR could according to that be the case, if an organization wouldn't cause any impacts to its stakeholders and to its environment, which is in practice unlikely. But through a continuous improvement of its processes and products an organization might achieve a level closer to the IFR.

- (2) Transdisciplinarity: First of all, there exists no consistent understanding of transdisciplinarity in the current scientific practice. Mostly the term is associated with adverbs like integrated, comprehensive, holistic, action-oriented, use-oriented, practical, communication-opened, team work-stimulating and trans-boundary across disciplines. Initially the term was created in the 1960s but becomes more and more attraction in science-political discussions. Concerning the SD-discussion the following definitions of transdisciplinarity seem very useful:

*“Transdisciplinarity refers to knowledge or research that scales off its technical and respectively disciplinary boundaries and that defines and solves its problems independent from disciplines with an external-scientific view. [...] transdisciplinarity requires disciplinary competences, but not that way that problems are seen one-dimensional in solely a technical or disciplinary perspective. The reason for this expansion of the perception [...] is that] problems disoblige more and more to define them towards a system of our scientific habits. It is essential to associate the scientific knowledge again with lifeworldly/material problem positions and aims with a problem-solving intention.” (Mittelstrass, 1992)*

*“Transdisciplinarity has four distinct features. First, it develops a distinct but evolving framework to guide problem solving efforts. This is generated and sustained in the context of application and not developed first and then applied [...]. Second, because the solution comprises both empirical and theoretical components, it is undeniably a contribution to knowledge, though not necessarily disciplinary knowledge. [...] Third, the results are communicated to those who have participated in the course of that participation and so, [...] the diffusion of the results is initially accomplished in the process of their production. Fourth, transdisciplinarity is dynamic.” (Gibbons et al, 1994).*

- (3) ECOPROFIT® (EP) is a low level environmental management system based on the approach of Cleaner Production (CP). The focus is on the identification of opportunities to solve emission problems by a preventive approach (Yaacoub et al., 2006). Developed by STENUM the CP project for companies with the full title **Ecological Project For Integrated environmental Technology** started in 1991 commissioned by the City of Graz.

It is the design of ECOPROFIT® that makes the success of this Cleaner production programme:

- workshops on the most important environmental topics for the company representatives (consisting of training units and interactive examples) for company representatives
- individual consulting which ensures the implementation of the identified Cleaner production-options
- continuous exchange of experience between the company representatives
- co-operation between the ECOPROFIT team (STENUM and Department of Environmental Protection) and the ECOPROFIT company representatives
- the ECOPROFIT award for environmental performance, given by the commissioner.

More than 15 years later, over 160 companies from Graz from different sectors, both micro-enterprises with 5 employees as well as big companies from the automobile industry with more than 3 000 employees have already participated in the ECOPROFIT beginners' programme. Furthermore, more than 60 % of the enterprises have joined the ECOPROFIT-Club and thus stay in the programme in which they work together for a continuous improvement not only of their environmental performance.

Table 1

*Two Phases of ecological business policy*

Phase I	Short-term economic saving potentials
	Single technical measures
	Organising task allocations
Phase II	Long-term ecologic/economic profit and loss account
	Integrated ecologic product and process optimization
	Ecologic organizational development

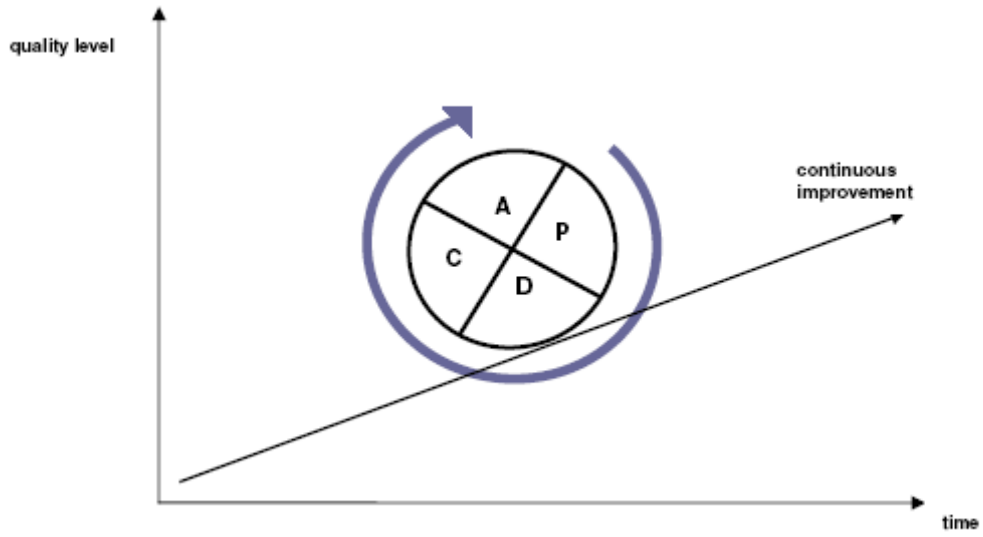
Table 2

*Heuberger’s stakeholders*

<b>Stakeholder</b>	<b>Form of involvement and benefit</b>
Regional government	Transparency, easier access to real data, cooperative problem solving approach, development of action plans
Neighbours, general public	Transparency, open days, participation of the general manager as speaker in public events, press articles
Employees	Transparency (indicators), increased communication, team solving approach, inclusion in decision making
Suppliers	Mutual understanding of problems, additional know how for supplier and company through plant tests, integration of supplier to process development
ECOPROFIT Club	Group of similarly thinking people with similar problems
Clients	Information, training, dialogue regarding product design, eloxal suitable construction, recycling of aluminium, introduction of reusable packaging

Figure Captions

Figure 1: The PDCA-Cycle



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