



An integrated diagnostic tool for identifying and quantifying the opportunities for sustainable consumption and production in industry



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ABSTRACT

A new, integrated, diagnosis tool in the field of industrial sustainability management named the 'Initial Review for Sustainable Consumption and Production,' was developed and tested. Most of the existing tools for an initial diagnosis and for identification of suitable interventions in this area have some of the following drawbacks: a. they are incomplete because they do not address all levels of the management pyramid; b. they are qualitative and miss many of the important opportunities for company improvements; c. they are tool-driven. By being tool-driven they are weak because the tools are often used without questioning the specific company's needs. These limiting features of process improvement tools can cause a company to invest its limited resources inappropriately. However, because the '**New Initial Review**' approach was based on 'systems theory' and 'learning theory,' it has properties of a holistic, quantifiable and '**need-driven**' approach. By '**need-driven**' is meant that selection of the tool or intervention is based on analysis of company's specific needs and potentials for improvement. Pilot testing of the new approach performed in 57 companies documented that the characteristics of the new Integrated Diagnostic Tool are important for orienting enterprise leaders to carefully select the appropriate tools from among the growing number of voluntary tools, to use in their company. The application of this need-driven diagnostic tool resulted in effective identification and efficient exploration of potentials improvements in Sustainable Consumption and Production, which had been hidden within the enterprise management pyramid; some of which started within the enterprise governing levels including relationships with stakeholders and going through management systems and processes to complete life cycle of the products. The research shows importance of a good diagnosis for effectiveness of interventions in area of Sustainable Consumption and Production in industry and discuss related drivers and barriers. Among interesting research findings is high and relatively easily accessible potential for improvements related to relationship with stakeholders or difficulties related to exploration of improvement potential existing at the level of product life cycle. Presented research also justifies a need to further work on development of need driven diagnosis in this area and provides a theoretical framework to do so.

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1. Introduction

Widely recognised experiences from implementation of projects within the broad area of Cleaner Production have shown that there are many barriers for identification and implementation of eco-efficient strategies and measures despite their multiple benefits within enterprises (Bastein et al., 2014; Czech Cleaner

Production Centre, 1999) leaving many opportunities unexplored for desirable and economically beneficial solutions to environmental and social problems. At the same time the pressure to increase resource efficiency and to obtain absolute reductions in natural resource usage is increasing (Angrick et al., 2014).

Prior research revealed substantial drawbacks of the traditional Cleaner Production Assessment (CPA) in causing the anticipated integration of the cleaner production strategy into business operations (Boons and Huisingh, 1992; Dobes, 2013; De Palma and Dobes, 2010; Stone, 2000). In particular, it was concluded that CPA, if implemented on its own, is lacking tools for organisational learning. This observation led to development and utilisation of

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combined approaches linking CPA with other tools for promotion of Sustainable Consumption and Production (SCP) in industry. In particular, the integration of CPA with environmental management systems, the environmental management accounting and sustainable enterprise strategy approaches were studied within the TEST project (De Palma and Dobes, 2003). Practical applications of TEST approach showed effectiveness of an integrated approach not only in optimisation of CP interventions, but also in identification and exploration of broader SCP opportunities. Further research was conducted on ways to support organisational learning in CP through establishment of an information system for management of resource efficiency for important material and energy flows (Dobes, 2013). This research showed that appropriate tools are often not utilised to address specific problems and opportunities within a given company (De Palma and Dobes, 2010). Enterprise leaders are seldom sufficiently aware of the potential CP benefits and where and how to start the exploratory process to find and quantify those options for improvements. Consequently, they do not even initiate the search for CP initiatives.

Critiques of the traditional CPA approaches were published by (Stone, 2006a. and 2006b). Silva et al. (2013) who highlight an opportunity to improve those methods by enriching them with quality management approaches similar to the CP Excellence Model described by Murga et al. (2007). Several researchers highlighted the importance of planning as an integral step of CPA (Silva et al., 2013). The finding that the planning phase brings the main value added from the CPA was documented by De Palma and Dobes (2015).

The insights about these limitations and barriers led this article's author to the conclusion that one of the most important drawbacks in traditional promotion of CP was the prevailing supply-driven process of selection of tools and measures for improvement (selection is based on expertise of the service provider or of the specific available solution rather than on an independent analysis of needs and potentials of specific company). The CP promoters frequently have limited focus determined by their professional experiences and, to their business interests. As a result, enterprises often utilise their limited human and financial resources on efforts that do not address the most promising improvement potentials within their companies. This author built upon the need to rethink the approaches to promote CP so that the limited attention companies can give to CP will be utilised in the best way to obtain results at the company level and maybe also at the supply chain level etc. This was driving the expansion of the research focus from traditional CP approach dealing with management of flows at the level of industrial processes to the broader area of SCP which address the whole system of consumption and production.

In recognition of this problem, this author posed the **research question** on the need for an integrated diagnosis tool in the area of SCP in industry: **Will we have increased effectivity in the implementation of CP by firstly surveying the potentials for improvements within the specific company, as a whole and, subsequently, by selecting appropriate tools for the most effective set of interventions based on an integrated initial assessment in broader area of SCP?**

Research to address this question was started by deepening the theoretical model utilised for development of combined approaches for implementation of CP through stimulating organisational learning as described in the following section. This approach provided criteria for desk research focused on analysis of the existing tools for exploring the potentials for improvements in resource efficiency and/or in sustainable consumption and production. A new tool for an integrated initial review (IR) was developed based on previous applied research in industry, in

particular that reported by De Palma and Dobes (2010, 2013) and on additional in-depth desk research. The resultant integrated tool was tested on 57 pilot projects. Practical experience from these projects is presented and analysed in this paper.

The research was completed by reflection on the use of the theoretical model and experiences gained from applying it in the real world.

2. A systemic model for designing an integrated enterprise diagnosis

On a voluntary basis, an enterprise leader may be interested to explore only the most promising opportunities, which will significantly reduce their business risks and which will increase enterprise value. While searching for approaches utilised by other scholars for linking optimal solutions to the existing potentials, two basic directions of research were used. The first one could be characterised as the learning approach, which highlighted the need for creating learning conditions, through a comprehensive learning approach (Senge et al., 1999), through promoting an effective dialogue (Wals and Schwarzin, 2012) at an internal level or through facilitating integration of scientific and tacit knowledge through proper policies and procedures (Isaksen and Nilsson, 2012). The importance of framework conditions for facilitation of organisational learning was highlighted by Vickers and Cordey-Hayes (1999). Additionally, Isaksen and Nilsson (2012) documented that enterprises which combined the Science, Technology, Innovation (STI) based approaches with the Doing, Using, Interacting (DUI) experience-based DUI modes of innovation were more efficient in improving innovation capacity and competitiveness. The second direction is characterised as system-oriented. Some researchers focused on different parts of the organisational system (Gallagher (2005) with different types of environmental management systems and related framework conditions. Corral (2002) explored firms' willingness to innovate in a broader context. Other researchers focused upon parts of the system of production and consumption and of their impacts on needs and values (Cucek et al., 2012). Additionally, some researchers focused upon intervention tools designed to facilitate desired changes (Robèrt et al., 2000).

Several approaches for integrating learning and system perspectives were reported by Staniškis et al. (2012) and Soonsil (2000). Their approaches were complimentary to the experiences of this author with regard to observing that the learning and the system perspectives in successful programmes must be closely linked. The literature analysis supported the idea to explore the question of how to decide which intervention tools can bring optimal results at the company level through use of the integrated diagnostic tool model. The model was first presented within a paper based on experiences from an integrated approach towards sustainable interventions in industry, which described among others, the core intervention tools (De Palma and Dobes, 2010) and it was, subsequently, utilised in designing a new approach for promotion of CP on a no cure, no pay basis (Dobes, 2013).

The model presented in Fig. 1 was based on 'systems theory' by (Meadows, 1997) and on 'learning theory' by (Senge et al., 1999) and was built upon the management pyramid inspired by ITT Flygt (2005). The management pyramid shows how particular levels of a business are built from the system perspective. The management pyramid is reversed within the presented model compared to the model prevailing in general management theory (governing levels on top, process on the bottom). The reason is that real systems are based on the opposite logic (as showed by Meadows, 1997) and a business is built on interests of its stakeholders, not on processes.

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