Master's Thesis

Exploring the potential of Green Chemistry in the chemical industry in Austria

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Abstract

The chemical industry has long been recognised as a major contributor to environmental problems such as resource depletion, pollution and climate change. The resource-intensive processes and high emissions associated with this sector have a significant impact on our environment, highlighting the need for sustainable practices. The 12 principles of Green Chemistry, formulated by Anastas & Warner (1998), provide an overarching framework for sustainable production in the chemical industry. Although previous evidence suggests that Green Chemistry practices are of increasing importance, the level of implementation is varying.

This thesis aims to address the following research question: *What are the experiences of industry and academia representatives with implementing Green Chemistry practices in the chemical industry in Austria?* In sub-questions, barriers, facilitators and management approaches for the further implementation of Green Chemistry in the chemical industry are explored. To answer these questions, a qualitative study was conducted in the form of semi-structured interviews with 13 experts from academia, industry and consultancy. The interviews were analysed by means of a thematic analysis as per Braun & Clarke (2006).

The experts' experiences with the implementation of Green Chemistry showed that initiatives are mainly focused on the areas of waste prevention, the use of saver solvents and auxiliar substances in chemical reactions and increasing energy efficiency. However, differences in the implementation of initiatives across companies and sectors within the chemical industry were observed. Identified barriers were related to organisational, technical, cultural, economic & financial, ethical and regulatory factors and facilitators to research, cost-savings, policy & legislation, market dynamics, public awareness, collaboration and management commitment. Green Chemistry is often implemented in companies as part of broader sustainability initiatives, although there are differences in management and organisational structure. Some companies have dedicated sustainability departments or sustainability representatives, while others follow less structured approaches to implementing sustainability initiatives. Top-down leadership commitment is considered important for implementation, as is bottom-up commitment from employees. Employee support, communication and collaboration between departments further enables the implementation of organisational change management processes with regard to sustainability. The findings are based on a wide range of experiences from experts and their differing backgrounds.

An up-to-date definition of Green Chemistry, as proposed by the Austrian *Plattform Grüne Chemie*, could be beneficial for a common understanding of the concept and could serve as a basis for future quantitative investigations regarding the implementation of Green Chemistry in the Austrian chemical industry.