

# Chapter 3

## Innovation and Sustainable Development: From Mainstream Innovation Theory to Sustainable Innovation Research

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### ABSTRACT

*Many economic roundtables have proclaimed innovation as the key to economic growth. The theoretical basis for this view is amply demonstrated by today's modern innovation theory. However, the fact that innovation also carries ecologic risk was, until recently, largely ignored. The potential for ecologic risk occurs when technologies are developed that threaten environmental damage that perhaps, does not become significant until well into the future. Risk may also occur indirectly when new technologies generate higher productivity but are also responsible for an additional burden on the environment. In principle, within the context of the sustainable development paradigm, innovation must be compatible with the three dimensions: Ecology, Economy and Society. The aim of this paper is to discuss the deficits of the mainstream innovation theory in the context of sustainability in addition to the role and significance of innovation in environmental engineering. This especially includes the opportunities and limitations of eco-innovation with respect to the current environmental policies for sustainable economic growth. A future challenge for research from a business perspective is to align eco-innovation as an integral component of an environmental management information system (CEMIS). In this context, eco-innovation can make a major contribution to environmental protection. However, within the scope of this paper, the focus is primarily on the rationale for sustainable innovation, in particular, eco-innovation.*

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## **INTRODUCTION**

Innovation is desirable from both an economic mainstream perspective as well as in the interests of sustainable growth. Nevertheless, each of these perspectives stresses the importance of innovation for vastly different reasons. Innovation per se is good from the economic perspective as long as it fulfills the following condition: if an invention brings success in the market, the innovation is deemed positive. However, from the perspective of sustainable development the positive effects accrue only if all three dimensions, i.e., ecologic, economic, and social are considered in the development of the innovation. Consequently, the manner in which innovation in the economy has been discussed and classified until now is the subject of further review in this paper. However, within the scope of this paper only a few important justifications for innovation research can be adequately discussed. A comprehensive overview of the study of innovation is provided by Welsch (2005) and Corsten (2006).

Innovation has a special significance in economics. It is often viewed as the result of technological progress. Technological progress, in turn, is seen as the motor of economic growth. This implies that the competition to be innovative in a market economy is a major determinant in the dynamics of growth. In a narrow sense, innovation is described as any technical advance that improves the production output. However, a fact that frequently goes unnoticed from the perspective of sustainable growth is that the innovation can also have a negative effect, for example, on the environment or on the health of the population.

In the study of innovation, the examination or analysis of an individual innovation is increasingly seen as insufficient because the situation during the early development and realization of the innovation is not considered. The modern study of innovation, which had its origins in 1980s, has attempted to point out that to fully understand an individual innovation and its development, it

is necessary to consider it as part of an innovation system. Although there is still question as to whether innovation systems in the context of sustainable development can be more easily judged as negative or positive based on their impact.

The paradigm of sustainable development presents specific requirements, which naturally apply also to innovation. Innovation has to be integrated in the triad of ecological, economic, and social considerations. However, in a review of past sustainable innovation studies, it must be noted that the focus has been on the ecological sustainability. The chief concern has been on the progress in environmental engineering or eco-innovation. An Environmental Management Information System can be of major importance for the strategic promotion of eco-innovation: CEMIS, as a special kind of information system, promotes strategic goals which seek to integrate economy and ecology. The optimization potential is to a large extent related to the system boundaries.

In contrast to the focus on the relationships between ecology and economy, it appears that the conceptual linking of all three dimensions in the study of sustainable innovation is at a very early stage. The general challenges for sustainable innovation are presented in the next section along with a discussion of the distinctions between the two theoretical approaches to sustainable innovation and a review of the contrasting positions. The conclusion is concerned with the resolution of this controversy. A summary of the major findings is presented in the concluding section.

## **INNOVATION AND SUSTAINABILITY**

Sustainable innovation is a new paradigm in the study of innovation. Consequently, we first look at the mainstream economic research concerning innovation and then list the specific requirements for sustainable innovation.

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