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ANALYSIS

# Concepts of efficiency in ecological economics: Sisyphus and the decision maker

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## Abstract

Efficiency forms the bedrock of policy, planning and business approaches to sustainable development. But what do ecological economists mean by efficiency? In the resource use context, efficiency has a wide range of potential interpretations, from the ratio of work output/energy inputs to Pareto efficiency. Despite the potential richness of the efficiency concept, in practice, efficiency is often narrowly conceived within disciplinary boundaries. This appears to be the case even in ecological economics, which purports to be ‘transdisciplinary’ and pluralistic. Such narrow disciplinary perspectives essentially waste the richness of the efficiency concept. This wasting could mean ecological economists and decision-makers are destined to Sisyphean toil in the pursuit of sustainable development.

This paper explores the efficiency concept and its interpretation. It then reviews ecological economic literature to find that there is much room for improvement in the way ecological economists apply efficiency. Finally, the paper presents a framework within which a truly ecological economic approach to efficiency can emerge. Armed with this framework, policy makers and planners should be better prepared to make decisions leading to sustainable development.

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## 1. Introduction

Decision criteria play an important part in the policy and planning process (Patton and Sawicki, 1993; Quade, 1982). One criterion that has tended to dominate contemporary policy development and evaluation

is efficiency — leading to what Stein (2001) refers to as the ‘cult of efficiency’. As Epstein (1984, p. 10) states, “everyone wants government policy to be ‘more efficient’.”

Examples of this efficiency cult abound. As a result of the continued call for the use of efficiency analysis in policy and planning, many texts have been written on the subject including: Williams and Anderson (1975), Epstein (1984), Nagel (2001), and Leach and Steward (1982). Epstein (1984), in particular,

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advocates efficiency measures as an essential tool for policy evaluation because “efficiency measurement can provide both external accountability and internal accountability for local government performance” (Epstein, 1984 p. 10). Even the political scientist Wildavsky (1966, p. 309–10), in his early critique of efficiency in policy analysis, acknowledges that “studies based on efficiency criteria are much needed and increasingly useful.”

‘Efficiency’ plays an important role in the New Zealand policy context. The concept of efficiency is enshrined in several of New Zealand’s core statutes, including the Resource Management Act (1991), the Local Government Act (2002), the Energy Efficiency and Conservation Act (2000), and the State Sector Act (1988), to name a few. Furthermore, efficiency is a core allocation criterion in many New Zealand resource allocation activities (see, for example, Transfund New Zealand). The use of the efficiency criterion is also advocated in many government documents (see, for example, Ministry for the Environment, 2000).

The efficiency criterion is a potentially rich concept, with a wide range of interpretations, from the ratio of work output/energy inputs to Pareto efficiency. However, in contemporary efficiency praxis, the concept is often narrowly conceived within disciplinary boundaries. Such narrow perspectives essentially waste the richness of the efficiency concept. This wasting can limit decision-makers’ ability to make ecologically sustainable decisions and can destine decision-makers to Sisyphean<sup>1</sup> toil in the pursuit of such goals.

This paper explores the efficiency concept and its interpretation in ecological economics. Its purpose is not to discuss the limitations of an efficiency focus of which there are many as is pointed out by Stein (2001) — rather, the point is that, given the dominance of efficiency in policy rhetoric, policy practitioners should be familiar with the full range of efficiency concepts. I begin with a discussion of the meaning of efficiency and its etymol-

ogical origins. The paper concludes by presenting a framework within which a multi-dimensional approach to efficiency can emerge. Armed with this framework, policy makers and planners should be better placed to make decisions to enable society to achieve the goal of sustainability.

## 2. The origins and meaning of efficiency

The English word ‘efficiency’ is derived from the Latin word ‘*efficientia*’, the present participle of the verb ‘*efficere*’. ‘*Efficere*’ means to bring about, accomplish, execute or produce (Skeat, 1961). According to Jollands and Patterson (2004), the interpretation of efficiency evolved in two directions. Efficiency was used in a theological context to refer to the action of an ‘operative agent’ — God. This use of the term is now generally obsolete.

Efficiency also came to mean “fitness or power to accomplish, or success in accomplishing, the purpose intended” (Simpson and Weiner, 1989, p. 84). The ‘fitness or power to accomplish’ interpretation of efficiency was taken from theological themes and, in the context of the rationalist spirit of the Enlightenment and the commercial activity of 18th century Europe, applied more widely to the transient world (Jollands, 2003). In doing so, the centre of gravity of the meaning of efficiency shifted from a theological basis to a logical–positivist perspective.

In this new approach to efficiency, the concept was increasingly applied to the ‘productive machine’. In 1827, Gilbert used the word efficiency in relation to physics — the work done by a force in operating a machine or engine (Simpson and Weiner, 1989). He stated, “therefore a machine is efficient in producing duty, or effect, in proportion to the force applied, multiplied into the space through which it acts, I propose to denominate this function ( $f \times s$ ) *efficiency*.” Similarly, ‘efficiency’ was used in relation to the ‘organic machine’ in biological literature as early as 1925 (Lotka, 1925).

Efficiency also came to be commonly applied to the economics of resources and welfare. Fawcett (cited in Simpson and Weiner, 1989) stated in 1863 that “nothing more powerfully promotes the efficiency of labour than an abundance of fertile land.” The most widely used contemporary interpre-

<sup>1</sup> In Greek mythology, Sisyphus is the cruel King of Corinth who is condemned forever to roll a rock up a hill in Hades only to have it roll back down again upon nearing the top. The gods thought, with some reason, that there is no more dreadful punishment than futile and hopeless labour.

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