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# Value drivers of corporate eco-efficiency: Management accounting information for the efficient use of environmental resources

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### ABSTRACT

Eco-efficiency is oftentimes considered the gold standard for managerial decision making in an environmental context because it seemingly reconciles the efficient use of capital and the efficient use of environmental resources. We challenge this view by disaggregating eco-efficiency to provide an in-depth analysis of corporate eco-efficiency and to identify the drivers of an efficient use of environmental resources. By building on the value-based approach in financial management, we extend the rationale of economic value drivers to develop drivers for the efficient use of environmental resources. We apply this logic to analyze the carbon-efficiency of major car manufacturers worldwide. The analysis clarifies the conceptual relationship between the use of economic and environmental resources by firms. The analysis shows that the drivers of capital efficiency and eco-efficiency are not fully congruent. These findings underpin critical voices that question the supposedly unproblematic link between corporate eco-efficiency and economic value creation. We illustrate that the efficient use of environmental resources is complementary rather than instrumental to capital efficiency. Consequently, the challenge of managing eco-efficiency is to unshackle it from the current capital-oriented domination. The findings provide managerial guidance on the value-creating use of environmental and economic resources. Conceptually, our argument contributes to the debate between critical and managerial perspectives on environmental accounting and helps to address the current standoff between these two camps.

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## 1. Introduction

The growing importance of sustainability issues for private companies calls for an integration of environmental aspects into corporate decision making. As management accounting “measures and reports financial and nonfinancial information that helps managers make decisions to fulfill the goals of an organization” (Horngrén et al., 2000, p. 888) it stands to reason that environmental aspects should

be systematically integrated into management accounting systems (Bennett and James, 1997; Burritt et al., 2002; Milne, 1996). However, the management accounting literature has only sparsely adopted sustainability issues (Thomson, 2007). Even the widely popularized notion of eco-efficiency has only received limited attention in management accounting research (see for instance Burritt and Saka, 2006). In addition, critical voices assert that accounting research is infused with “implicit assumptions about the primacy and desirability of the conventional business agenda” (Gray and Bebbington, 2000, p. 1) so that the latter systematically dominates over environmental concerns. In this paper, we disentangle the notion of eco-efficiency and its relation to capital efficiency, in order to provide managers a meaningful tool to support decision making for a

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more efficient use of environmental resources in its own end rather than as a means to drive capital efficiency. At the same time, our driver analysis allows for an integrated assessment of corporate environmental and economic performance. Our contribution here is to offer a tool that facilitates integration into everyday decision making as it is based on the well established notion of value-based management without, however, undermining environmental performance aspects under economic outcomes. Therefore, we contribute to resolving the standoff between critical and pragmatic perspectives on sustainability performance assessment.

Eco-efficiency is one of the most popular concepts for the integrated measurement of corporate environmental and financial performance (Callens and Tyteca, 1999; Ciroth, 2009; Hupples and Ishikawa, 2005a, 2005b, 2009; Lambertson, 2005). While the World Business Council for Sustainable Development has coined and popularized the notion of eco-efficiency in the early 1990s (Schmidheiny, 1992), academic concepts of environmental efficiency in economics and management date back to the 1970s (Freeman et al., 1973; McIntyre and Thornton, 1978). Proponents of eco-efficiency posit that environmental resources are scarce and call for their efficient use. Hence, generally speaking, corporate eco-efficiency indicators show how efficiently companies use scarce environmental resources. Scholars and practitioners have suggested different kinds of eco-efficiency indicators, which relate desirable outcomes of economic activity to undesirable environmental impacts or resource use (DeSimone and Popoff, 1998; Hahn et al., 2010; Hupples and Ishikawa, 2005a, 2005b; Reijnders, 1998; Saling et al., 2002). Oftentimes, eco-efficiency is discussed as an important element of corporate contributions to sustainable development. Arguably, sustainable development is more inclusive than eco-efficiency and captures a wide range of objectives that go unnoticed by eco-efficiency considerations (Gladwin et al., 1995), for instance environmental concerns that are hard to quantify such as biodiversity or social aspects many of which are qualitative in nature. In this paper, we use eco-efficiency as an important subset of corporate sustainability issues as it links quantifiable environmental issues to corporate decision making.

Efficiency considerations are not limited to environmental contexts. Many financial management and economic performance indicators are based on efficiency considerations, such as return on capital or economic value added. According to the concept of value-based management, outperformance in terms of efficiency is a sign of value creation (Martin and Petty, 2000; Stewart, 1991). The logic of financial and value-based management also gains increasing importance for management accounting systems (Ittner and Larcker, 2001; Malmi and Ikäheimo, 2003; O'Hanlon and Peasnell, 1998; Weißenberger and Angelkort, 2011; Will, 2010). Companies create shareholder value (Rappaport, 1986) when they use economic capital more efficiently than their peers. The assessment logic of economic capital in value-based management has also been applied to the notion of eco-efficiency, i.e. the efficiency of the use of environmental resources. From this perspective, using environmental resources more efficiently

than the market leads to the creation of Sustainable Value (Figge, 2001; Figge and Hahn, 2004, 2005).

The popularity of eco-efficiency as the dominant buzzword in the corporate environmental performance debate is due to its linking environmental issues to standard efficiency consideration in business decision making. In this context it is oftentimes assumed that eco-efficiency indicators provide “information about actions that will benefit the environment [and] the monetary bottom line” (Burritt and Saka, 2006, p. 1266). This popular win–win assumption implies that the efficient use of capital (and the creation of economic value) and the efficient use of environmental resources (and the creation of Sustainable Value) are congruent (DeSimone and Popoff, 1998; Orsato, 2006; Porter and van der Linde, 1995). Consequently, if the creation of economic value on the one hand and the efficient use of environmental resources on the other hand are indeed in harmony then they should share the same value drivers. However, such an assumption is not unproblematic and uncontested. Rather, there is an ongoing debate whether a shareholder value orientation is compatible with the need to “acknowledge the rights of other interests—such as employees and the environment” (McSweeney, 2007, p. 325). In this paper, we argue that this debate requires a better understanding of the drivers behind an efficient use of capital on the one side and the efficient use of environmental resources on the other side. The identification and comparison of the drivers of capital efficiency and eco-efficiency provides deeper insights into the relation between the use of economic and environmental resources in firms.

In value-based management and performance assessment researchers and practitioners have long identified and defined the drivers of a more efficient capital use (Ittner and Larcker, 2001; Malmi and Ikäheimo, 2003). A common way of identifying such drivers is to disaggregate efficiency ratios to increase their explanatory power. The most popular example in the context of the efficient use of economic capital is the so-called DuPont analysis (Keown et al., 2007), which disaggregates capital efficiency ratios into the three components sales margin, capital turnover and financial leverage. This paper follows and further develops this logic to propose a similar analysis of the efficient use of environmental resources. For doing so and in line with the Sustainable Value approach (Figge, 2001; Figge and Hahn, 2004), the argument adopts a value-based perspective on the use of economic and environmental resources. The argument thus builds on a strong analogy to proponents of value-based management that propose shareholder value drivers (Rappaport, 1986). We apply and extend the rationale of defining value drivers to develop and propose drivers for the efficient use of environmental resources. Furthermore, to demonstrate its feasibility we apply the analysis to the carbon-efficiency of major car manufacturers worldwide.

While the drivers of capital efficiency and hence economic value are well-established, the drivers of the efficient use of environmental resource and hence eco-efficiency have not yet been developed. By addressing this gap, this paper provides three main contributions. First, by disaggregating eco-efficiency into its components, the

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