



ISO 14051: A new era for MFCA implementation and research



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ABSTRACT

Material flow cost accounting (MFCA) is a tool designed to encourage eco-efficiency in organizations by focusing on a reduction in use of materials and related improvements in economic performance of corporations. It provides a way to identify win–win situations where monetary and environmental performance can both be improved. But take-up by business is slow, which seems to go against the notion of strong competition driving economic performance. A recent standard, ISO 14051, has been produced by the International Organization for Standardization, and could bring substantial change to MFCA implementation and research. Drawing on Rogers (2003) theory of diffusion of innovation, and with a focus on the first two stages of the innovation–decision process, knowledge and persuasion, this study sought to analyze MFCA and predict how the 2011 release of ISO 14051 might be expected to influence take-up of MFCA by business, and what this might mean for future research. The analysis revealed that, when combined with ISO involvement, MFCA is well placed in terms of Rogers' theory, with the future likely to see increased diffusion of MFCA and, as adoption rates increase, more opportunities for research in this area. Specific areas identified as a result of the analysis include: the introduction of new research methods, the need for theoretically informed research, and the potential to address new research questions previously considered impractical.

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ISO 14051: una nueva era para la aplicación e investigación sobre MFCA

RESUMEN

La contabilidad de costes del flujo de materiales (MFCA) es una herramienta diseñada para fomentar la eficiencia ecológica en organismos al centrarse en una reducción del uso de materiales y en las mejoras relacionadas con el rendimiento económico de las empresas. Permite identificar las situaciones beneficiosas para ambas partes en las que puedan mejorar tanto el rendimiento monetario como el ambiental. La Organización Internacional de Normalización ha creado recientemente el estándar ISO 14051, que podría suponer un cambio sustancial en la puesta en marcha de la MFCA y la investigación. Basándose en la teoría de difusión de la innovación de Rogers (2003) y centrando la atención en las primeras 2 fases del proceso de innovación–decisión, conocimiento y persuasión, el presente estudio pretende analizar la MFCA y predecir cómo se espera que el lanzamiento del ISO 14051 influya en la implantación de la MFCA por las empresas, y lo que esto significaría para las futuras actividades de investigación. El análisis reveló que, en combinación con el ISO, la MFCA está bien posicionada respecto a la teoría de Rogers, con una tendencia en el futuro de ver una mayor difusión de la MFCA y que, a medida que las tasas de puesta en marcha sean mayores, surgirán más oportunidades de investigación en este campo. Entre las áreas específicas identificadas como resultado del análisis se incluyen: la introducción de nuevos métodos de investigación, la necesidad de una investigación teóricamente informada y el potencial de enfrentarse a nuevas cuestiones de investigación anteriormente consideradas inviables.

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Introduction

Material flow cost accounting (MFCA) is an environmental management accounting (EMA) tool with the introduction of a new international standard, ISO 14051, likely to increase its take-up in the near future (ISO, 2011). EMA is the term used to describe the integration of physical and related monetary environmental information into the management accounting system (Jasch, 2006). EMA incorporates a variety of tools that can be physical or monetary; past or future-oriented; routinely generated or produced on an ad-hoc basis; and finally, they can have either a short or long-term focus (Burritt, Hahn, & Schaltegger, 2002). ISO 14051 defines MFCA as a “tool for quantifying the flows and stocks of materials in processes or production lines in both physical and monetary units” where ‘materials’ include energy and water (ISO, 2011, p. 3). These flows and stocks of materials are important because they pervade business practice (Jasch, 2006). The aim of MFCA is to provide information to management about opportunities for reducing materials use and improving monetary performance of businesses at the same time, an irresistible opportunity.

To date the potential implications associated with the release of ISO 14051 have gone almost unremarked within the literature. Given the contemporary nature of the topic it can be argued this is not unexpected. Nonetheless there is reason to believe this event could bring about substantial change for both MFCA application and research. Drawing on an analysis of extant literature and informed, in part, by Rogers' (2003) theory on diffusion of innovation, it is the purpose of this paper to examine this potential and to identify related areas of importance for future MFCA practice and research. With especial focus on the innovation-decision process and, in particular, the importance of knowledge and persuasion to the diffusion of MFCA in the business population, the paper provides an in-depth analysis of MFCA and ISO 14051. In addition, by applying Rogers' (2003) theory prospectively the paper demonstrates the potential for diffusion of innovation to be applied for analysing and predicting diffusion rates associated with new innovations, as well as those where the diffusion process appears to have stalled (Dunne, Helliard, Lymer, & Mousa, 2013).

The analysis and conclusions are expected to be of interest to practitioners, environmental accounting and management researchers, and those academics concerned about the interplay between movements towards sustainability and business.

The remainder of this paper is arranged as follows. The section “MFCA – a brief overview” provides a brief introduction to MFCA as a research topic. This is followed by “ISO 14051: implications for MFCA” which reflects upon the release of ISO 14051 and the ways in which this might influence MFCA take-up in practice. “A new era for MFCA research – directions and opportunities” considers areas for future research after which conclusions of the paper are drawn.

MFCA – a brief overview

Material flow cost accounting (MFCA) has been described as one of the most basic and well-developed EMA tools (Schaltegger & Zvezdov, 2015; Sulong, Sulaiman, & Norhayati, 2015). Given cost accounting is itself one of the most fundamental facets within contemporary management accounting it can be argued this observation is unsurprising. Notwithstanding this position a recent review undertaken by Christ and Burritt (2015) revealed poor take-up of MFCA by business, even though case-based research has consistently shown MFCA implementation to be associated with positive outcomes in a growing number of case organisations (for example, see Jasch & Danse, 2005; Scavone, 2006; Schaltegger, Viere, & Zvezdov, 2012).

As with EMA in general, MFCA is currently an unregulated activity. Hence it is up to individual organisations to determine the practices that are most appropriate to their operations. Case-based research has routinely revealed MFCA to provide a means to identify areas of inefficiency relating to material quantities and costs and, by doing so, make visible potential for cost reductions and eco-efficient outcomes. Thus, it is somewhat surprising evidence indicates few organisations are availing themselves of the practice. There are several potential reasons for this observation.

First, to date, MFCA literature has been largely driven by action-based case studies in which experienced academics have played a leading role in facilitating the implementation process (Heupel & Wendisch, 2003; Jasch, 2006; Schaltegger et al., 2012). Whether the case organisations would have engaged with MFCA in the absence of such involvement is unclear. Furthermore, the level of MFCA knowledge within organisations prior to involvement with this type of research remains unknown in most cases. In the absence of academic guidance and drive extant knowledge within the management group is likely to be very important when assessing the potential benefits of MFCA, given this can be expected to influence the implementation decision. Research has demonstrated MFCA to have substantial potential to lead to tangible economic and environmental improvements in a large range of organisations; however, if managers are not familiar with this research the sum of these benefits is likely to remain unnoticed.

Prior research has shown that even in Germany and Japan, two of the prime instigators responsible for early development of the MFCA tool, many companies remain ill-informed with regard to the MFCA process and few elect to implement the practice fully within their operations (Burritt & Tingey-Holyoak, 2012; Kokubu & Nashioka, 2005; Schaltegger, Windolph, & Herzig, 2011; Schmidt & Nakajima, 2013). Drawing on a study of sustainability management tools used in large German companies, Schaltegger et al. (2011) present evidence that the more well-known an environmental accounting tool is, the more likely it will be adopted in practice. Hence communication channels and publicity are important, and this is an area with regard to which the release of the ISO 14051: Material Flow Cost Accounting standard can be expected to be of great assistance. In light of this development it is the purpose of this paper to consider the following research question:

(RQ) Given the recent release of ISO 14051, what is the likely future for MFCA research and implementation in practice?

The following section will commence this analysis by considering the release of ISO 14051 and why this event might be expected to impact MFCA practice and research.

ISO 14051: implications for MFCA

A recent development that is likely to alter current perceptions and take-up of MFCA by business is the 2011 release of ISO 14051: Material Flow Cost Accounting by the International Organization for Standardization. The aim of this standard is to:

[...] offer a general framework for material flow cost accounting (MFCA). MFCA [being] a management tool that can assist organizations to better understand the potential environmental and financial consequences of their material and energy use practices, and seek opportunities to achieve both environmental and financial improvements via changes in those practices (ISO, 2011, p. v)

Despite limited evidence supporting its usefulness beyond manufacturing settings (Christ & Burritt, 2015; Papaspyropoulos, Blioumis, Christodoulou, Birtsas, & Skordas, 2012), the standard advocates MFCA as a tool that is applicable “to any organization that

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