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REVIEW ON IDENTIFYING ENABLERS AND BARRIERS OF MATERIAL FLOW COST ACCOUNTING (MFCA) IMPLEMENTATION IN INDIAN SMALL AND MEDIUM-SIZED ENTERPRISE (SME)

R. R. CHARTHAD¹

1. Assistant Professor, Mechanical Engineering Department, IBSS college of Engineering, Amravati, MH, India.
2. Assistant Professor, Mechanical Engineering Department, IBSS college of Engineering, Amravati, MH, India.

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Abstract: This paper highlights the experience of one of the companies, emphasising how one can leverage enablers and also overcome barriers to implementing MFCA in a small and medium-sized enterprise (SME) in India. Driven by the diffusion of innovation (DOI) theory, the case company found most of its enablers within MFCA's own attributes. Additionally other factors such as the team composition, interpersonal communication, and efforts of the change agents were instrumental in the success of the MFCA implementation. However, the company was also constrained by its suppliers. More importantly, it is envisaged that a potential hurdle for MFC. An advancement is when performance management issues are not addressed by higher management. Drawing upon the company's experience and the theoretical literature, other barriers that may also be encountered by SMEs in India. MFCA is one of the major tools for environmental management accounting and promotes increased transparency of material use practices through the development of a material flow model that traces and quantifies the flows and stocks of materials within an organization in physical and monetary units.

Keywords: Failure analysis, Hydraulic press, Cotton bale. FEA, ANSYS, Frame structure, Optimization

Corresponding Author: MR. R. R. CHARTHAD



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INTRODUCTION

Background of MFCA

The basic concept of material flow cost accounting is that after the amount of material introduced into the production line and the change in the generated products and waste are measured, the total introduced raw material costs are allocated and material loss is determined. MFCA represents a different way of management accounting. In conventional cost accounting, the data are used to determine whether the incurred costs are recovered from sales. MFCA first achieved practical relevance and large scale application in Japan. Now there is even an ISO standard on the method. It is a method of environmental management accounting that simultaneously achieves “reduced environmental impacts” and “improved business efficiency. “The method was originally developed in Germany and has been further developed in Japan. The inclusion of MFCA in the International Organization for Standardization (ISO) was an initiative from Japan. ISO 14051 was issued in 2011.

MFCA measures the flow and stock of all materials in the manufacturing process in both monetary and physical terms. The materials include raw materials, parts, and components. MFCA analysis provides an equivalent comparison of costs associated with products and costs associated with material losses. It does not require determining whether material is transformed into products, or disposed of as waste. In conventional accounting, even if waste is recognized in terms of quantity, the costs to produce “material losses” are included as part of the total output cost. On the other hand, MFCA focuses on identifying and differentiating between the costs associated with “products” and “material losses.”

The prototype of MFCA was developed in Germany. Japanese versions of MFCA are modified for increased facility of use, by segmenting materials into raw materials and energy sources, as well as measuring them by process for easier improvement plans. Material Flow Cost Accounting (hereafter referred to as “MFCA”), a method of Environmental Management Accounting, was developed in Germany. Along with study on the MFCA’s approach and its effectiveness, MFCA has been introduced into industries The Ministry of Economy, Trade and

Industry initiated MFCA- related measures in FY1999, followed by a series of model projects. The ministry has bolstered the promotion measures since FY 2006. In order to familiarize MFCA with various types of manufacturing industries, easy-to-understand cases were selected from wide varieties of industries and fields such as those from manufacturing activity, supply chain, logistics, construction and distribution service MFCA focuses on environmental aspects, aiming at substantial cost reduction. Materials generating the output of wastes and emissions should

not Quantify and evaluate all material and energy flows of a defined production system, first in kilograms and then tying them to the existing cost accounting.

In addition, “residual material cost accounting” was developed, which adopted similar approach and aimed to record the costs accumulated in the residual substances from production. This too worked on the basis of quantities expressed in kilograms. In addition to the actual costs of disposal, the residual substance costs also include the material value resulting from the price of the raw materials purchased, the costs of the value adding component that has accumulated in the materials, costs of storage, handling of the residual materials and environmental protection activities.

1.2) Objectives:

Improving the transparency of material flows and energy consumptions as well as related costs and environmental aspects,

Support of decisions within organizations in fields of process technology, production planning, quality management and supply chain management.

Improving the coordination and communication regarding material consumptions within the organization.

Improve environmental and economic performance

Material:

- Material loss during processing, defective products, impurities
- Materials remaining in manufacturing equipment following set-ups
- Auxiliary materials such as solvents, detergents to wash equipment, water
- Raw material that becomes unusable for any reason

Flow:

MFCA traces all input materials that flow through production processes and measures products and material loss (waste) in physical units using the following equation:

Input = Products + Material loss (waste)

Calculated based on the amount of total input and products in a selected part of a process in which the inputs and outputs are quantified. This part of the process is defined as a quantity center in MFCA.

Cost Accounting:

Under MFCA, the flows and stocks of materials within an organization are traced and quantified in physical units (e.g., mass, volume) and then assigned an associated cost. Under MFCA, four types of costs are quantified: material costs, system costs, energy costs, and waste management costs. Each cost is defined as follows:

Material cost: Cost for a substance that goes through a quantity center (measurement unit of input and output for MFCA analysis). Typically, the purchase cost is used as material cost.

Energy cost: Cost for energy sources such as electricity, fuels, steam, heat, compressed air.

System cost: Cost incurred in the course of in-house handling of the material flows, excluding material cost, energy cost, and waste management cost.

Waste management cost: Cost for handling material losses.

Following identification of a physical unit for material flow data, material costs, energy costs, and system costs are subsequently assigned or allocated to quantity center outputs (i.e., products and material losses) based on the proportion of the material input that flows into product and material loss.

1.4) Implementing MFCA in organization :

Implementation of MFCA requires application of Plan-Do-Check-Act Cycle to clarify direction, increase learning, aligning efforts and improving results to achieve the overall MFCA goals of “reduced environmental impacts” and “improved business efficiency.”

PDCA Cycle for MFCA Implementation

PLANNING:

Getting started for MFCA

DO:

Journey for MFCA starts now

As the first “DO”-step, for each quantity centre inputs (e. g. materials, energy) and outputs (products, material and energy losses) have to be identified.

ACT:

Conduct Loss analysis to identify the negative product cost by following breakdown:

Type of negative product: At each individual quantity center

Type of losses

Theoretical losses: Design, Solvent Medium, Edge of Jumbo Roll, etc

Normal Losses: Set-up, Trial Running, Cleaning, Sample, etc

Avoidable Losses: Poor Workmanship, Spoilage, Spillage, Defective Unit, Rework, etc.

2) MFCA enablers:

The literature outlines the following enablers or facilitating factors for MFCA implementation:

Firstly, the technical advantages of MFCA (2010); secondly, data availability thirdly, top management commitment (Lee et al., 2005); and, finally, compatibility with existing management systems (Nakajima, 2008). The specific technical advantage of MFCA as an accounting tool is the main enabler. MFCA recognizes waste as a non-product output or negative product which has its own costs (Jasch, 2009).

The second enabler is the availability of data. Jasch (2009), Nakajima (2008) and Strobel and Redmann (2002) found that the

The third enabler, top management the final enabler, compatibility of MFCA to the existing management systems, facilitates smooth implementation. In his study, Nakajima (2008) found that MFCA supplemented the company's existing system of Total Productive Maintenance (TPM) and Total Quality Management (TQM). This, in fact, allowed the company to implement MFCA more easily.

3) MFCA barriers:

Implementation issues for MFCA also involve barriers. These mainly relate to perception challenges team cooperation (Lee et al., 2005), performance appraisal and technical knowledge and training.

The first of the barriers is perception challenges in two aspects. The first aspect is in terms of the perception organizations may have towards the uniqueness of MFCA. In other words, how is MFCA different from other tools already used in the company (Nakajima, 2004) and the “way of seeing things, making decisions and acting” (Jasch, 2009, p. 119). MFCA is clearly different from conventional cost accounting and other tools, but there is a tendency for business enterprises to misunderstand and become confused with its concept and practical functionality (Nakajima, 2004).

The second aspect of the perception challenge is the view that the primary corporate objective is profit-seeking (Kokubu and Kitada, 2010). This is typically because the economic objectives of companies are perceived to be in conflict with environmental objectives. Study faced challenges in encouraging the accounting departments to be actively involved in the EMA project, while in relation to team cooperation.

The third barrier revolves around performance appraisal. Performance appraisal of both the individual and departments involved in EMA generally excluded environmental impacts (Burritt, 2004, 2005). It was also too narrow and too short-term focused, which resulted in the manipulation of material cost data (Burritt, 2004, 2005). Additionally, performance appraisals which did not include environmental impacts were not be able to produce behavior particularly that related to environmental issues, desired by top management (Burritt, 2004, 2005). Kokubu and Kitada (2010) highlighted the controllability issue The final barrier to be discussed here is the lack of technical knowledge and training. Challenges which have risen include the inaccurate identification of environmental costs

Conclusion:

SMEs in India the traditional view that investment in environmental initiatives will reduce financial performance may hinder these SMEs from doing so. Managerial innovations such as MFCA may help solve this problem. As experienced by Indian SME. MFCA has helped to generate significant cost savings and waste reduction. MFCA was smoothly implemented in Indian SME due to MFCA's own attributes such as its dual goal advantage, compatibility, lower complexity, trialability and observability. One key factor that may hinder the smooth implementation of MFCA is vendor constraints. Companies wanting to implement MFCA need to be well aware of this issue. Companies wanting to embark on MFCA should also provide a link between the performance measurement system and the MFCA and Kaizen activities so as to reward employees accordingly. Finally, to be proactive on environmental issues companies must realize that there is a need to put in place a tool such as MFCA so that good

environmental management can provide opportunities for reducing costs, enhancing environmental performance and improving the bottom line.

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