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Integrating ERP and MFCA systems for improved waste-reduction decisions in a brewery in South Africa

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ABSTRACT

Most breweries implement enterprise resource planning (ERP) systems to manage their orders, inventory, and finance and customer information without integrating it with other systems. Breweries can leverage the information sharing and visibility between ERP and material flow cost accounting (MFCA) systems by integrating these disparate systems to generate waste information for improved waste-reduction decisions. Brewery waste-reduction decisions have been based on insufficient waste information with opportunities for cost saving being lost. This paper explores the integration of ERP and MFCA systems to provide waste information in support of waste-reduction decisions in a South African brewery. A case study was conducted on a South African brewery to determine the extent and adequacy of waste information generated from its ERP database system and how its integration with MFCA can support and improve waste-reduction decisions. It was found that there is lack of integration among the databases of the various divisions within the brewery. The use MFCA to capture waste cost information was absent in this brewery since existing approach was based on variable costing while other waste-related costs are classified under overhead costs. Integrating ERP and MFCA systems will result in the availability of sufficient waste cost information. This paper concludes that the integration of ERP and MFCA by breweries will decrease errors of visibility of waste cost information for improved waste-reduction decisions.

1. Introduction

Growing concerns over the increasing pressures that activities of organisations have imposed on the natural environment requires that accounting systems identify and assess a business's environmental impact in a more accurate manner. Once the most significant environmental impacts and costs of the organisation have been identified, recommendations can be made for cost savings and improvement. Accountants naturally have a direct interest in controlling and reducing business environmental costs to increase profit. Problem arises most often because environmental costs are inappropriately hidden in overhead accounts. This means that inaccurate environmental or waste cost information have been used by decision-makers to make waste-reduction decisions in the past.

Material flow cost accounting which is a tool of environmental management accounting (EMA) offers an opportunity for accountants to capture waste cost information accurately beyond that provided by conventional accounting systems. Waste generated by organisations impacts on both costs and the environment in several ways such as lost income through a combination of lost materials and disposal costs. Essentially, reducing the amount of wasted materials is an effective way of improving resource efficiency. Accounting systems such as MFCA can be used to capture and draw decision-makers attention to the full costs of waste. MFCA provides detailed and in-depth waste cost information by analysing flow of materials and energy in a production process. The MFCA system will integrate well in a brewery that already has a production information system which collects considerable detailed waste data for each process. Small businesses can also adapt a simplified application of MFCA.

By integrating ERP and MFCA systems to generate waste cost information in a brewery process, managers will have access to a transparent view of material flow (Samaranayakea et al., 2011). Brewery managers will then be able to record lower waste costs as well as improve their decision-making. Having access to accurate, consistent and timely waste cost information is possible when a centrally managed ERP system is combined with an add-on waste

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specific capturing system like MFCA. This paper explores the possibility of integrating the ERP and MFCA systems to provide waste cost information to support waste-reduction decisions in a South African brewery. It evaluates the potential benefits of such integration at improving brewery waste-reduction decisions by decision-makers. The next sections discuss major environmental impact of the brewery industry, the current status of capturing brewery waste cost information, relevance of waste data capturing through integration of ERP and MFCA.

1.1. Major environmental impact of the brewery industry

Brewing and the environment are seemingly unlikely partners. This is so because of the amount of water and other resource used in brewing processes, and the risk posed to climate change. Environmental issues associated with brewery process include energy consumption, water consumption, wastewater, solid waste and by-products, and emissions to air. Energy consumption in brewery processes is relatively intensive in terms of both electrical and thermal energy. Specific energy consumption in a brewery is influenced by process design and utility system which can vary from 100 to 200 MJ per hectolitre (MJ/hl), depending on size and sophistication (IFC, 2007).

The brewing process involves high consumption of good-quality water, considering that water is a scarce resource in South Africa. Water is used in production, heating and cooling, cleaning packaging vessels, production machinery, cleaning of delivery vehicles, and sanitation (EC, 2006). Water consumption in beer production takes between 4 and 7 L (*l*) for 1 litre of beer (EC, 2006). Also, brewery processes generates a lot of liquid waste such as the weak wort and residual beer (IFC, 2007). The main source of residual beer include process tanks, diatomaceous earth filters, pipes, beer rejected in the packaging area, returned beer, and broken bottles in the packaging area (The Brewers of Europe, 2002). Solid waste and by-products in beer production results in a variety of residues such as spent grains, which can be sold at a value to local farmers. Odour and dust are considered the most significant air emissions from breweries. The wort boiling process is the main source of odour emissions from a brewery, while the use and storage of grains, sugar, and kieselguhr are sources of dust emissions (IFC, 2007). Fig. 1 show the material and energy flow in a brewery process.

Although, brewery process waste can be considered a good source of nutrients for agriculture, it is a potentially harmful environmental pollutant. The vast majority of waste from breweries is organic. Organic by-products from brewing can be used as a useful resource; however, opportunities in this area are yet to be exploited to the fullest in South Africa. Breweries in South Africa should intensify effort to reduce negative environmental impact from beer production not only in the way it is packaged, but in the entire brewing process. These efforts should include reduction in water used to grow the crops used to make beer, and reduction in emissions from transporting the end product. Within the South African brewery industry, a brewery like the SAB Ltd. have undertaking some projects aimed to reduce the impact of water used in the beer-making process through partnership with the World Wildlife Fund (WWF). These include 'Let the River Flow' Project' or 'The River Trust' that intends to rehabilitate the Wilge River in the Free State Province of South Africa; and the Project Eden, an SAB partnership with the Rhodes University to treat wastewater for re-use.

Certain barriers to achieving and implementing a successful waste-reduction strategy exist in organisations. These barriers are sometimes related to administrative preferences for different information needs. Different managers prefer certain source of information to others to the effect that all available information sources are not fully exploited. Some managers regard accounting information as only limited to generating financial statements and preparation of budgets, but not useful to environmental issues. Decision-makers often wait to assess waste information at the end of a batch before initiating corrective measures. This has led to substantial losses occurring which could have been prevented if a more waste specific waste data capturing tool had been applied to provide waste information. Moreover, conventional cost accounting system in use in some of the breweries provides waste information based on variable costing system thereby ignoring vital waste costs that are hidden in overhead accounts such as fixed costs.

1.2. Current status of capturing brewery waste cost information

The increasing demand for ecologically compatible production process has made it imperative for breweries to properly quantify and capture waste related costs incurred to determine its profit (Dimitroff-Regatschnig and Schnitzer, 1998). The lack of data

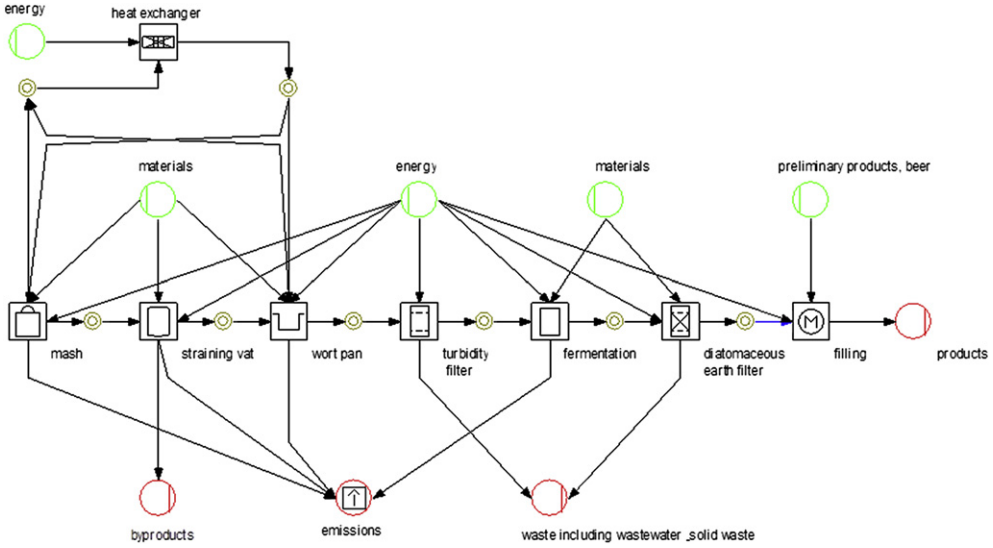

Fig. 1. Material and energy flow in a brewery. Source: Umberto's e!Sankey diagram.