Safety Science 71 (2015) 151–159

Contents lists available at ScienceDirect

Safety Science

journal homepage: www.elsevier.com/locate/ssci

A management accounting perspective on safety

S. Tappura [a,*], M. Sievänen [a], J. Heikkilä [b], A. Jussila [b], N. Nenonen [a]

[a] Industrial Management, Tampere University of Technology, P.O. Box 541, FI-33101 Tampere, Finland
[b] VTT Technical Research Centre of Finland, P.O. Box 1300, FI-33101 Tampere, Finland

ARTICLE INFO

Article history:
Available online 16 February 2014

Keywords:
Management accounting
Cost–benefit analysis
Safety investment
Safety costs
Balanced Scorecard

ABSTRACT

Management accounting supports decision making in organisations by providing managers with relevant information and analysis on the performance, costs, and benefits of a certain operation. For safety-related issues, cost-based calculations dominate practice, and typical measures include cost per injury or the total cost of accidents. Monetary information is needed to guide safety-related decision-making. Besides focusing on financial information, management accounting should also focus on non-financial information, such as safety improvement, strategic safety objectives and employee relations.

In safety-related investments, the monetary costs of an investment are usually well known, but the monetary value of the benefits is hard to calculate. Thus, there is a need for cost–benefit evaluation methods, including the non-financial benefits and value created though preventing accidents. In addition to calculating the safety investment costs, the efficiency of the improvements, such as productivity improvements, quality and the value of safety goodwill, should be evaluated as well.

The objective of this paper is to chart current management accounting practices related to safety issues on the basis of findings from relevant literature. Moreover, we discuss the applicability of certain management accounting methods for safety-related decision-making and how these can be used to improve current practices further. The relevant methods include the Balanced Scorecard approach, the payback period, the simple rate of return, and the benefit-to-cost ratio. They all offer means of calculating the cost and benefits of safety if the basic problems of uncertainty, valuation, perimeter of analysis, and quantification of costs and benefits are perceived. Valuing human life in cost–benefit analyses is also discussed.

1. Introduction

1.1. Background

Successful management requires relevant information guiding decision-making in organisations. This also applies to decision-making related to safety. From a safety management viewpoint, information is mainly needed to: (1) decide where to focus actions, such as safety interventions and their nature; (2) monitor the level of safety and (3) motivate those in a position to take the necessary action (see e.g. Hale, 2009). Furthermore, more precise cost calculations result in more realistic bids, customer profitability and project cost calculations (Rikhardsson and Impgaard, 2004). In responsible safety-critical organisations, safety-related objectives, such as minimising accidents, are often also strategic objectives. Decisions made in organisations affect the achievement of these objectives; hence, understanding the decision-making context is essential. However, the safety management perspective is generally absent in management studies and literature. There is a call for a more multidisciplinary approach and engagement with safety issues in management research (Zanko and Dawson, 2012).

The role of management accounting (MA) is to provide information for internal decision-makers, typically managers. Unlike financial accounting (FA), which provides information for external users such as investors, creditors and tax officers, MA is not regulated by mandatory rules such as accounting standards and generally accepted accounting principles. For credibility reasons, the information generated by MA must be in line with FA. Typically, MA obtains data from FA. Moreover, MA information is quite often used in FA, such as in inventory valuation. Thus, although there are no strict rules for MA, the four main ethical accounting rules—prudence, consistency, objectivity and relevance—should be kept in mind.

MA information is also needed for safety-related investments and interventions. Nevertheless, the tradition of utilising methods of MA is not well-established in safety-related decision-making. Safety indicators traditionally used to provide this information

* Corresponding author. Tel.: +358 40 849 0365; fax: +358 3 3115 2027.
E-mail address: sari.tappura@tut.fi (S. Tappura).

http://dx.doi.org/10.1016/j.ssci.2014.01.011
0925-7535/

include, for example, output indicators, such as the accident rate and lost days, and intermediate indicators, such as safety climate scores and safety training.

For safety-related issues, cost-based calculations dominate practice, and typical measures include cost per injury or the total cost of accidents. A typical problem in safety-related investments is that the monetary costs of an investment are usually well known, but the monetary value of the benefit is difficult to calculate. This is true, for instance, when trying to define the value of a company's safety reputation with respect to its employees or customers. Thus, the need for cost–benefit evaluations of safety investment is recognised. From the MA perspective, the value lost through accident costs and created through preventing them is interesting. However, comparing certain investment costs with uncertain benefits (e.g. the avoidance of accident cost) is problematic (see e.g. Aven and Flage, 2009). In addition to calculating safety investment costs, the efficiency of the improvements should be evaluated. Quite often, only cost savings are measured, but productivity improvements and even the values of safety goodwill should be measured as well. Besides focusing on financial information, MA currently also focuses on non-financial information, such as project evaluation, strategic planning and stakeholder relations (Rikhardsson, 2006). Corresponding information is also required to guide safety-related decision-making. The efficiency of the improvements can be enhanced by collaborating with occupational health and safety (OHS) professionals in planning and decision-making activities (Grant et al., 2003).

1.2. Objectives

The primary objective of this article is to chart current MA methods on the basis of findings from relevant literature. The focus is on methods suitable for evaluating the safety investments and interventions and defining the value of safety. As we discuss MA methods, we recognise that a company's view on a topic, even the cost and benefits, can be a burden to different stakeholders, such as like individuals and society. Moreover, we discuss the applicability of these MA methods for safety-related decision-making and how they can be used to improve current practices further. In addition, weaknesses in the literature are identified as topics for further research.

2. Materials and methods

This paper is based on a literature review compiled through a Finnish multidisciplinary research project, Safety Valu€, which aims to promote economic measurement and indicators of safety. The literature review and related workshops were conducted by a multidisciplinary group of safety and accounting researchers from the Tampere University of Technology, the VTT Finnish Technical Research Centre and the Finnish Institute of Occupational Health. The objective of the literature review and workshops was to investigate the current state of the research concerning the value of safety, safety performance measurement and management accounting methods suitable for safety investments and interventions. In the multidisciplinary workshops, the study was directed and outlined according to the objectives of the Safety Valu€ project. This study forms the basis for the forthcoming safety performance measurement concepts and models of the Safety Valu€ project. The literature searches were carried out in English with multidisciplinary databases and portals such as Compendex and Elsevier Science Direct. Former systematic reviews on OHS and safety intervention topics and reviews on economic analysis were taken into consideration. The relevant peer-reviewed scientific articles, review articles, conference papers and books were chosen by the researchers. The relevance of the information was discussed within the research group to achieve a solid consensus.

The entire literature review is utilised to extend appropriate from the viewpoint of the objectives of this paper. The observations made on the basis of the literature review are supplemented with authors' experiences in previous work. This paper will serve as a basis for the future development of a vision and a roadmap for measuring the financial effects of safety and related tools according to the Safety Valu€ project's research plan.

Many different definitions of safety exist. How safety is understood and defined directs what factors are taken into account and when decisions related to safety are made. The concept of safety in this paper is defined as it has been defined in the Safety Valu€ project. The focus is on industrial branch and organisational safety. The concept of safety has been defined by 11 researchers in Safety Valu€ project workshops: ***organisational safety*** *is the capability of the organisation to manage the operations to sustain economic, social and environmental well-being.* Based on the findings of the literature review, many relevant articles deal with OHS. In this paper, OHS is seen as an essential element of organisational safety.

3. Theory

3.1. Performance measurement and the Balanced Scorecard approach

There are many reasons for performance measurement. Uusi-Rauva (1996) points out the following reasons: guiding, planning, controlling, alarming, diagnosing, learning, informing and rewarding. Ingalls (1999), on the other hand, finds that measures first indicate where priorities are placed. Moreover, measuring enables reasoned decisions and assessments and provides the basis for comparison with previous performance or planned performance. Fig. 1 illustrates how individual key performance indicators (KPIs) may be derived top-down starting with the strategy (de Waal, 2007). This top-down direction is essential (see e.g. Kaplan and Norton, 2004; Uusi-Rauva, 1996). Individual measures should be based on important factors, preferably on critical success factors (CSFs). Boynton and Zmud (1984) define CSFs as follows: "*Those few things that must go well to ensure success for a manager or an organization, and, therefore, they represent those managerial or enterprise areas that must be given special and continual attention to bring about high performance.*"

Organisations often successfully use business performance approaches such as the Balanced Scorecard (BSC) (Kaplan and Norton, 1996a) to develop and align their organisational strategies. The BSC is one of the most widely used performance measurement frameworks (Tung et al., 2011). The concept was developed because

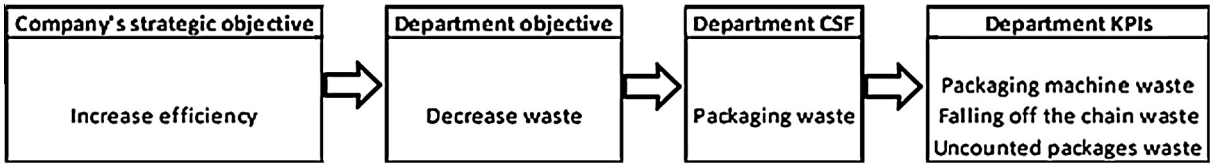

Fig. 1. Deriving KPIs from strategic objectives (adapted from de Waal, 2007).