Enhancement of Environmental Compliance Management by a Risk Profiling Information Service

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ABSTRACT

Companies are obligated to assure that at any time they comply with all relevant regulations in all relevant subject areas of environmental law. Because this requires compliance management activities that are largely performed by humans, one needs to consider that a company, due to human errors, may unintentionally violate environmental regulations. A novel enhancement for Environmental Compliance Management Information Systems is proposed. The suggested Risk Profiling Service continuously evaluates data about compliance management activities in order to determine activity failures. The risk of non-compliance implied by every failure is estimated and a risk profile is generated by an aggregation of the single risks. A model to investigate non-compliance and to establish a foundation for the targeted information service as well as the required data processing steps are described. Furthermore, an overview of the major building blocks and the central processing principles of a corresponding research demonstrator is given.

KEYWORDS

Environmental Compliance Management, Environmental Health and Safety Systems, Environmental Information Systems, Environmental Regulations, Human Activity Monitoring, Workflow Failure Detection

1. INTRODUCTION

In companies the work area of environmental compliance management is often delegated to specialists from multiple different disciplines such as occupational safety, hazardous material management, fire protection, and transportation safety (Gunningham, 2011) (Thimm, 2015a). The compliance management team, together with employees from other corporate areas, is obligated to enforce environmental compliance. More precisely, it is the obligation of the compliance managers to assure that at any time all regulations of the different subjects of environmental law that are relevant for the company are fulfilled. Activities that are required in order to enforce environmental compliance can be oriented at many company aspects including product properties, production and logistic processes, corporate infrastructure, and the workforce’s level of competencies and skills (Thimm, 2015a). In the event of a breach of a relevant regulation, instantaneously the company moves into a state of non-compliance (Gunningham, 2011). When the non-compliance state is detected by corresponding authorities, sanctions are threatening ranging from fines, withdrawal of licenses and even permits to mandatory closures and shutdowns.

The enforcement activities that are required in order to assure environmental compliance can be disturbed and even aborted by uncertain events. Considering general risk management paradigms and best practices such as given in the ISO 3100 standard (ISO, 2009) it can be recommended to solve this
problem – i.e. “the effect of uncertainty on objectives” – through an extension of corporate compliance management by risk control measures (IMA, 1995). Supporting evidence for this recommendation can be found in the body of international environmental policies and governmental practices that are traditionally promoting environmental risk control aspects (IMPEL, 2012) (Gunningham, 2011) (Nicolson, 2016).

In the light of the enormous amount of regulations and the severe potential sanctions for non-compliance, two surprising facts can be observed about today’s corporate environmental compliance practice. First, there still exist companies that show a limited awareness of the risk of non-compliance and therefore do not address this risk systematically (Walker, 2008). Second, the compliance management tasks are often completed with assistance of rudimentary IT solutions, such as spreadsheet software (McKeiver C., 2005) (Walker, 2008), that bear many inherent problems like a low efficiency and a high probability for data inconsistencies.

The research presented in this article aims on the development of a novel enhancement for environmental compliance management information systems (ECM IS) (Freundlieb, 2009) (Teuteberg & Straßenburg, 2009) (NAEM, 2015). So far in the literature ECM IS are mostly characterized as traditional business information systems that support the administration, analysis, and reporting of business data and also enable the automation of business processes by support of application-specific functionality. The described research targets to evolve ECM IS into more active assistance systems that perform novel data processing operations in order to effectively address the non-compliance risk. It is drawn on the fact that successful corporate compliance enforcement largely depends on carefully chosen and managed human-lead enforcement activities (Gunningham, 2011) (Tarantino, 2008) (Welch, 1997). Especially, we address that these activities bear many risks for environmental compliance such as wrong decisions, incorrect judgments, health problems of people, communication problems, group problems, and failures in compliance enforcement plans. The proposed approach especially takes these risks of human performed compliance management activities into account. To this end the approach is specialized to trace compliance management activities and to detect activity failures that already occurred and also to predict failures that are likely to occur in the near future.

From each failure that is found based on meta data about activities (i.e. activity templates) and logging data about proxies of real world activities, the non-compliance risk is estimated. The entire set of risks are aggregated to a risk profile. From the risk profile, users can obtain a complete picture of the company’s current risk situation. It is expected that through the service problems with compliance enforcement activities can be detected in an early stage. By reacting to these problems appropriately, it is possible to prevent future non-compliance states.

Following this introduction, in Section 2 a summary of related research work is given. Section 3 contains an overview of the field of corporate environmental compliance management including a list of typical compliance management tasks. In Section 4 an analysis model to systematically investigate non-compliance and to establish a foundation for the intended risk profiling approach is described. The central data processing steps to obtain risk profiles are introduced in Section 5. Also in Section 5, the major building blocks of an implementation approach of a corresponding research demonstrator are described. Concluding remarks are given in Section 6.

2. RELATED WORKS

In the literature not a lot of work can be found that is especially focused on the use of information technology in order to support corporate environmental compliance management. Some similarities can be observed between the work presented in this article and the reference model for Environmental Management IS by Freundlieb and Teuteberg (Freundlieb, 2009). However, the latter reference model is based on a data warehousing approach and therefore especially geared at providing reporting and analysis capabilities that are useful for environmental management. Furthermore, the reference model does not address the risk of non-compliance.
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