Corporate Environmental Management Information Systems (CEMIS) - Sustainability Reporting Tools for SMEs

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Abstract

In recent years, companies have begun to concentrate on the topic of environment sustainability. They have tried different methods and software in order to reduce their businesses’ effect on the environment, like pollution and unsustainable use of natural resources. These measures contribute to the protection of the integrity of ecosystems and human health, ensuring the sustainable use of natural resources, and guaranteeing fair competition. This paper is a literature review focusing on meanings rather than facts, so it uses the deductive research method which depends mainly on the qualitative data analysis, and it is closer to the positivism research philosophy. Within the topic environmental management information system (EMIS), we will start this paper with a theoretical part highlighting the most used terms and concepts, and then we will analyse several sustainability reporting tools, providing a comparison among four different tools against the small to medium sized companies’ requirements.

1. Introduction

The environment has been suffering from the detrimental effects of mankind’s influence, especially since the development of manufacturing and the onset of climate change and global warming. In recent years, companies have begun to concentrate on their effect on the environment. They have tried different methods and software in order to reduce their negative effects on the environment; like pollution and the unsustainable use of natural resources. These measures contribute to the protection of the integrity of ecosystems and human health, ensuring the sustainable use of natural resources, and guaranteeing fair competition. The need for such systems becomes an important part of companies’ strategies.

Environmental management information systems (EMIS) are designed to fulfill these requirements. Such systems are targeted - in addition to fulfilling legal requirements e.g. in waste management of hazardous materials - at optimizing material and energy flows, minimizing emissions and waste, and establishing production integrated environmental protection.

This paper consists of three main parts: the first section is theoretical introduction, the second section deals with the sustainability reporting tools, and the last section focuses on applying these tools in small and medium sized enterprises (SMEs), providing comparison between the sustainability reporting tools, and SMEs’ requirements. The theoretical section discusses the definitions of environment and the factors that affect it. It also includes definitions of environmental management and environmental management information systems. The second section focuses on sustainability reporting and explains some of the following available tools: SAP Carbon Impact, Enablon SD-CSR, SoFi”, and Credit360. The last section defines SMEs and their criteria for EMIS tools and provides a comparison between EMIS tools and sustainability reporting tools, in order to see whether the tools are applicable in SMEs or not.

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2. Terms and Definitions

In order to understand the term EMIS, some other terms should first be clarified for one to become familiar with the entire concept. In this section, the terms environment and environmental management will be explained to clarify the meaning of an environmental management information system (EMIS).

2.1 Environment

The environment, by definition, is all living and non-living things occurring naturally on Earth. An environment encompasses the interaction of all the living species (Johnson, 1997). In the previous definition, the non-living components of environment refer to land, water, and air, whereas the living components refer to human, plants, animals, fungi, and bacteria. Another definition states that “the environment is used to describe, in aggregate all the external forces influences and conditions which affect the life, nature, behavior and the growth, development and maturity of living organisms” (Bhatia., 2006).

According to Kurt Lewin, the environment consists of the following three categories which each influence the personality of an individual:

- Physical Environment: refers to geographical climate and weather or physical conditions
- Social and Cultural Environment: includes an individual's social, economic and political conditions in the life, the moral, cultural and emotional forces influence the life and nature of individual behavior.
- Psychological Environment: Lewin refers to the psychological environment by the term "life;" it helps to understand the personality of the individual.

There are many factors which affect the environment, but they can be divided into two main categories: included environmental factors and excluded environmental factors:

- Included environmental factors include things such as pollution of water, air, or soil, noise, electromagnetic fields, occupational risks (chemical and biological factors and related behaviors), agriculture methods, man-made climate change, and ecosystem change.
- Excluded environmental factors include things such as alcohol and tobacco consumption, drug abuse, natural environments of vectors which cannot be modified such as (rivers, lakes, wetlands), and natural biological agents, environmental degradation occupational diseases (unemployment).

2.2 Environmental Management

Environmental management, by definition, is a purposeful activity which aims to maintain and improve the state of environmental resources such as water, energy, and raw materials, which are affected by human activities (Pahl-Wost, (2006)). Environmental management can refer to the management of all environmental components including biotic (living), and abiotic (non-living) components (Muller, 2010).

Environmental management information systems (EMIS) consist of formalized steps to capture information, as well as fixed procedures to retrieve this information. In general EMIS covers the gathering of all relevant information for the Environmental Planning and Management (EPM) Process (Habitat, 2000)) such as archives, documentation, address recording, and mapping. However, the focus is on the mapping part of the information system.

In this paper, the focus will be on the corporate management information systems (CEMIS) which refers to the term EMIS but qualified as corporately used software tools. CEMIS, by definition, is regarded as an organizational and technical system that offers the possibility of systematically covering, analyzing, processing, appraising and archiving all environmentally relevant information (Rautenstrauch, 1999).
systems support a strategic as well as an operative management style through planning, control, and trans-
action of an organization’s environmental-issue measures (Muller, 2010).

3. CEMIS Tools

This section briefly explains the corporate environmental information systems tools. According to (Straßenburg, 2009), there are nine different tools for CEMIS which are as follows:

- Reporting and information systems for external reporting
- Eco-controlling systems for internal operations research
- Life cycle assessment systems
- Key performance indicator based systems
- Sustainability reporting systems
- Input-oriented systems
- Output-oriented systems
- Process-oriented systems
- Production related CEMIS

The focus of this paper will be on the sustainability reporting systems and their tools.

3.1 Sustainability Reporting

There are many definitions for the word sustainability. One of them Sustainability seeks to provide the best outcome for the human and natural environments both now and into the indefinite future (White, 2009).

Sustainability reporting, according to the global reporting initiative (GRI), is the practice of measuring, disclosing, and being accountable to internal and external stakeholders for organizational performance towards the goal of sustainable development (GRI, 2006)

Sustainability reporting is a non-financial reporting method started in the late 1980s by companies in chemical industries, and it has expanded over the last twenty years. It has followed a development path towards the concept of balanced reporting, usually communicating the three pillars of environmental, social, and economic performance. Its mutual interrelations, in business terms, are often called the triple bottom line approach (Elkington, 1997)

Many companies now produce an annual sustainability report in order to be "vessels of transparency and accountability" (Bristow, 2011 ). Often, they also intend to improve internal processes, engage stakeholders, and persuade investors.

There are many standards for creating sustainable reports, but the most important one is the global reporting initiative (GRI), founded in 1997 by the coalition for environmental responsible economies (CERES) and the United Nations Environmental Programme (UNEP). The first GRI guidelines were published in 2000, and the current version of the guidelines (GRI-G3) was published in 2006 (Quaddus, 2011). GRI guidelines are intended to serve as a generally accepted framework for reporting on an organization’s economic, environmental, and social performance. They were designed for use by organizations of any size, sector, or location ( (GRI, 2006). Most of sustainability reporting tools use GRI as reporting standard, there are also other reporting standards like the EU Eco-Management and Audit Scheme (EMAS).
3.2 Sustainability Reporting Tools

There are many tools available for sustainability reporting that are concerned with carbon management, energy management, and greenhouse gas emissions, in addition to the generation and creation reports. Many software companies have entered this field, and the number of emerging companies is increasing every year. In this section we will discuss the following software:
1. Enablon SD-CSR
2. SAP Carbon Impact
3. SoFi
4. Credit360

**Enablon SD-CSR:**

Enablon provides four kinds of software solutions: Corporate Responsibility, QEHS (Quality, Environment, and Health & Safety) Management, Risk Management, and Corporate Governance (SD-CSR, 2011). Corporate Responsibility has five kinds of software systems:
- Enablon IDM (Initiatives & Donation management)
- Enablon RSC (Responsible Supply Chain)
- Enablon SD-SR (Social Reporting & Human Capital Management)
- Enablon ABS (Anti-Bribery Solution)
- Enablon SD-CSR (Sustainability Reporting & Management) which will be presented in this section.

Enablon SD-CSR is an integrated web-based solution software that collects, reports, and manages sustainable development. Companies use this software to improve reporting and management of their environmental and social performance and to meet their corporate social responsibility (CSR) challenges (SD-CSR, 2011). This program offers four different features: data collection, consolidation, reporting, and management. For data collection, Enablon SD-CSR uses the following methods to collect and handle the data:
- Qualitative and quantitative data
- Automated questionnaire generation
- Individual and personalized questionnaire
- System interfacing when required
- Data validation workflow

Enablon SD-CSR enables the consolidation of the collected data throughout all the management levels in the company representing its organizational structure. The software allows the creation of the automated or customized reports using several standards such as GRI and NRE, and it also offers advanced analytical functions. The last feature of this tool is management; Enablon SD-CSR offers additional functions using processed data such as performance dashboard, benchmarking, goal management, action plan module, notification, and alerts (SD-CSR, 2011).

**SAP Carbon Impact**

SAP entered the sustainability reporting market in 2009 (SAP, 2011), when it produced SAP Carbon Impact solution, which focuses mostly on carbon management. SAP Carbon Impact was originally developed by Clear Standards, an American software company specializing in solutions for cutting CO2 emissions, and has been part of the official SAP portfolio since the acquisition in June 2009. The software focuses on carbon emissions, and, according to SAP, it enables companies to reduce carbon-based emissions by the following three methods:
1. Establishing an inventory of emissions
2. Comparing energy intensity across operations
3. Managing a portfolio of actions

Recently, SAP Carbon Impact has been updated to be able to monitor energy usage, waste and emissions, and supply chains for the long term, so companies can benefit from SAP Carbon Impact through analysing and reducing their worldwide energy and greenhouse gas emissions (GHG).

When using Sap Carbon Impact, data is collected from various sources using web surveys, plant systems, or the ERP system. In addition, data collection can be done manually, and after collecting the required data calculations will be run, consolidation will be done, and the data will be analysed. After analyzing data, the software generates reports while applying global reporting initiative (GRI) standards (Graf, 2010).

SoFi

SoFi is a software system developed by PE International, which also developed GaBi software. PE International is considered as the first Carbon Calculation Partner of the Carbon Disclosure Project. SoFi-Software provides data collection supported by interfaces to ERP systems and carbon footprint measurement in compliance with requirements of EMAS and the ISO 14064 standard. It standardizes data collection from different sources, reduces the need for manual data input, and eliminates error or duplicate effort (SoFi, 2011).

SoFi has many features that can improve corporate sustainability performance in an organization, which are as follows: carbon management, corporate carbon footprint, CSR and sustainability strategy, energy management, environmental management, sustainability reporting, sustainability supply chain, and water footprint (SoFi, 2011).

Credit 360

Credit 360 is a web-based data management system that facilitates data collection and aggregation for reporting and communication purposes (Credit360, 2011). It is an integrated solution to collect and manage data regardless of what the meaning of sustainability to any organization from carbon reporting to donations tracking.

Unlike the previous tools, the user does not need to install any software to his infrastructure; the entirety of what the user needs is a web browser. Credit 360 was designed by CR (Corporate Responsibility) and sustainability system specialists. It is a web-based data management and communication system, it collects information, analyses it, interprets it, and then communicates it to all stakeholders of the organization. In contrast to other systems, it allows clients to focus on the issues important to them, ranging from carbon emissions and waste management to employee diversity and human rights or to any combination of issues. This single system seamlessly aggregates your data for analysis (Credit360, 2011).

According to the Credit 360 website, the software is based on five features:

- Energy and carbon management
- Compliance
- Supply chain management
- Environment health and safety
- Corporate social responsibility
4. **Sustainability Reporting and SMEs**

This section focused on small and medium enterprises (SMEs). It begins with a definition of the term SME, then explains the requirements of SMEs to apply the sustainability reporting, and finally presents a comparison between these requirements and the tools that have been mentioned in the previous section.

### 4.1 Small and Medium Sized Enterprises (SME's) Definition

According to the EU definition in 2003 small and medium sized enterprises have:

- No more than 250 employees;
- No more than 50 million Euros in turnover or a balance sheet total of less than 43 million Euros.
- No more than 25% of shares of such an enterprise are in the ownership of another enterprise.

(Eurobean-Commission, 2005)

SMEs’ definitions vary from country to country. For example, in Canada they use SEM for companies which have fewer than 500 employees and in New Zealand it has to be 19 employees or fewer.

### 4.2 SMEs’ Requirements for Sustainability Reporting Tools

The needs of applying environmental management information systems (EMIS) are increasing, so SMEs should apply such systems, but they need special requirements to be able to use these systems and benefit from them, so we defined the criteria which are needed to decide whether EMIS are applicable in SMEs or not. These criteria are:

- Low price: one of the most important things for SME owners applying EMIS in their enterprise. SMEs find difficulties in financing CEMIS (Gómez, 2010).
- No need for professional operators: this means no additional costs for the enterprise.
- No training cost: this also eliminates additional costs.
- No need for special hardware
- Competitive advantage: EMIS should encourage customers to deal with the company because SMEs are not forced to apply such systems without gaining benefits from them. This factor is the most important because, if there are no competitive advantages to be gained by applying such system, there is no need to apply it.

In order to see if the previous criteria suit the tools mentioned in the previous section, we have to choose case studies and survey SME owners to get a good idea about whether the sustainability reporting tools are applicable in SMEs or not. However, according to the restricted time, the comparison will be based on the available information of the tools. By comparing these criteria with the tools which are mentioned in the previous section we can notice the following:

1. It is difficult to apply these tools in the SMEs: all the mentioned tools have high prices (especially SAP and Enablon) except "Credit360" because it is an open source tool, but it is not enough.
2. Additional costs: If the enterprise was able to buy the software, it will face additional obstacles such as the cost of training employees, the cost of new hardware, and the cost of maintenance. We have found that SAP Carbon Impact, Enablon SD-CSR, and SoFi have additional costs beside their high prices, as we will see in the next table.
3. Although applying EMIS tools in SME’s give the enterprise competitive advantages among other competitors, and encourages stakeholders, applying these tools is difficult. However, we have to keep in mind that using environmental management information systems should not only be for large and multinational enterprises, but also for SMEs, even though this issue requires a lot of work to make EMIS suit SMEs. To help illustrate, we have created a table simplifying the above discus-
The scoring depends on the available information of the previous tools, and we have used the following two measurements:

- True
- False

Table 1 clarifies the comparison between the tools mentioned above and the SME's requirements:

<table>
<thead>
<tr>
<th>Criteria\Tool</th>
<th>Enablon SD-CSR</th>
<th>SAP Carbon Impact</th>
<th>SoFi</th>
<th>Credit360</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low price</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>True</td>
</tr>
<tr>
<td>No professional users</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>True</td>
</tr>
<tr>
<td>No training costs</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>True</td>
</tr>
<tr>
<td>No special hardware</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>True</td>
</tr>
<tr>
<td>Competitive advantage</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td>True</td>
</tr>
</tbody>
</table>

### 5. Conclusion

We have created a theoretical review about the whole concept of the sustainability reporting EMIS. We began by defining environment in general, explained some factors affecting the environment, defined the environmental management information systems, and talked briefly about its tools. After that we explained the concept of sustainability reporting and presented some of its tools, focusing on the SAP Carbon Impact, Enablon SD-CS, SoFi, and Credit 360 software tools with the information that we with information from their official websites. We faced difficulties finding additional information.

Finally, we defined some criteria for applying these tools in SMEs and compared the requirements of SMEs with the tools’ features. We noticed that it is difficult to apply EMIS in SMEs, and the main reason was related to financing said software.

We discussed applying EMIS in SMEs in a general sense, without going into detail. For further information, interested parties should choose case studies and get more information, either using surveys or questionnaires, about the obstacles that SMEs faced in applying EMIS. Focus should be on how SMEs can apply the environmental management information systems and how they could benefit from using its tools.

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### Bibliography

   - https://www.credit360.com/credit/site/what_we_do.acds.