Information System for Global Sustainability Reporting

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Department of Informatics, Faculty of Business and Economics, Mendel University,
Zemědělská 1, 61300 Brno, Czech Republic
{ondrej.popelka, michal.hodinka, jiri.hrebicek,
oldrich.trenz}@mendelu.cz

Abstract. In the article we describe various methodologies considered for company performance assessment – such as Sustainability Assessment of Food and Agriculture systems (SAFA) by the Food and Agriculture Organization (FAO) and other standardized reporting frameworks. We analyse and consider common characteristics of the used performance indicators. We further examine different properties of the defined key performance indicators and additional performance indicators in order to propose a data model for a generic information system. The proposed data model aims to be reusable for different performance assessment methodologies. We introduce several abstractions of the assessment methodologies on the level of performance indicators and report outputs. It is important to allow the organization to use the same data in several different reports and simplify and speed-up the reporting process. The resulting core data model of the information system is described in the article, along with a brief description of the implemented prototype system.

Keywords: Corporate performance, Information system, SAFA, Corporate reporting, Performance evaluation, Performance indicators

1 Introduction

Current trends promote reporting as one of the means of ensuring sustainable production and preserving the global environment. Many experts and institutions have invested considerable effort into the development of reporting methodologies and frameworks. Special attention has been given to reporting focused on sustainable development and aligned indicators. A considerable effort has also been invested into promoting the concept of corporate responsibility and quantification methods [11].

In our research as part of the GACR No P403/11/2085 project– *Construction of Methods for Multifactor Assessment of Company Complex Performance in Selected Sector*, we concentrate mainly on the agriculture sector that has strong effects on the environment, though other fields of human activity are important too. The research is carried out by teams of Faculty of Business and Management (FBM) of Brno University of Technology (BUT) and Faculty of Business and Economics (FBE) of Mendel University in Brno (MENDELU) since January 2011. The project is being funded by

the Czech Science Foundation and solved through the years 2011-2014. The main research goals of this project are specified by its partial research targets [13], [2]:

1. Analyze the current state of corporate performance by means of research of the global information and database sources available.
2. Analyze the current implementations of the economic, environmental, social and governance reporting systems in selected business branches.
3. Assess and categorize existing characteristics of basic corporate performance pillars – economic, environmental, social and governance – in relation to the development of overall corporate performance.
4. Use Key Performance Indicators (KPIs) to identify the roles and importance of environmental, social and corporate governance (ESG) factors used in the overall company performance.
5. Construct quantitative and qualitative methods of multifactor measurement of corporate performance in the chosen economic activities with the use of ICT tools.
6. Apply the developed methods for the measurement of corporate performance into practice, and determine possible further improvements.

Further on in the article we describe the chosen KPIs and the software tools designed to support performance reporting, with special attention to sustainable reporting and corporate responsibility.

Currently, the reporting systems are undergoing a change in usage and interpretation. Starting from a specialized system designed for the use of little data, analysts are developing them further, so that their use be universal. Nearly all organization units need to take part in the reporting process and take advantage of the data reported by other company units. Our goal is to support this change especially in small to middle-sized enterprises. Such companies currently struggle even with the mandatory reporting required by law only to fulfill regulatory demands.

We aim to facilitate the mandatory reporting operations for small and middle-sized enterprises and allow them to transition into a more scalable reporting system. We see this as an important step to a more wide-spread sustainable reporting. This should both enhance strategic decision-making and planning and improve risk management and sustainability of the business. In order to fulfill this goal we propose the development of a specialized information system or of an information system module for company performance reporting [7]. Organizations would be able to use such a system to generate standardized reports and assess their performance. In the implementation details we do not focus on large corporations where an extensive reporting system is already used, though the architecture and system design still applies.

2 Current reporting frameworks

Reporting of sustainability and environmental, social and governance (ESG) performance is a crucial step towards a market that rewards the creation of long-term wealth in a just and sustainable society. Sustainability key performance indicators form the backbone of sustainability disclosure that allows for improvement of the issues most

tied to the corporation's environmental and social impact and which are most material to a company's financial performance.

The Food and Agriculture Organization of the United Nations is developing the *Sustainability Assessment of Food and Agriculture systems* (SAFA) guidelines to assist in the achievement of fair practices in food and agriculture production and trade on a local and regional level [3]. The SAFA framework is the result of an extensive iterative process. It is built on the cross-comparisons of codes of practice, corporate reporting, various standards, indicators and other technical protocols currently being used by food and agricultural enterprises that implement sustainability assessment [3].

The structure and methodology of the SAFA Guidelines is built upon: ISO 14040:2006, the ISEAL Code of Good Practice [12], the Reference Tools of the Global Social Compliance Programme, the Sustainability Reporting Guidelines [6] and its Food Sector Supplement of the Global Reporting Initiative. The SAFA Guidelines – currently in the testing version – will be revised and finalized in 2013 in order to improve their practicality and applicability.

The guiding vision of SAFA is that food and agriculture systems worldwide are characterized by *environmental integrity, economic resilience, social well-being* and *good governance*. In recent years, there has been some progress in the realization and acknowledgement of sustainable development, which is summarized [9], [14] and [17]. Many stakeholders in the agriculture sector have contributed to this progress by improving agricultural productivity, protecting natural resources and human resources by implementing standards for assessing and improving sustainability across the agricultural sector [5], [9].

Currently the feedback summarized at the *Workshop of SAFA Practitioners and Partners* held in March 2013 in Rome is being evaluated for the purposes of implementation. The draft of finalized version of the guidelines is available since June 2013 [4]. Apart from the methodology strengths, there are also a number of weak spots in the SAFA framework which have been identified during the evaluation process by the test practitioners. These include: unclear language in some parts of the guidance, definitions that are too complex, and problems with measuring the actual performance, etc., all of which is to be addressed in the revised guidelines. The positive elements of the framework are mainly the completeness of the framework and an overall full, complex coverage of various themes [5].

The SAFA guidelines consist of three core sections – *the SAFA framework*, *SAFA implementation* and *Sustainability dimensions*. In the following chapters, we describe a specialized information system, whose role should cover the following operations necessary for sustainable reporting:

- data collecting including data normalization;
- standardized reporting for company stakeholders;
- required regulatory reporting depending on the current law in the current country;
- reporting in standardized interchange XBRL format;
- customized reporting for the purpose of ad-hoc reports;
- evaluating company performance by means of computing standardized performance indicators.

These operations correspond to the last four steps of Section 2 of the SAFA framework implementation (select a tool, collect data, aggregate the results, and perform reporting) (see

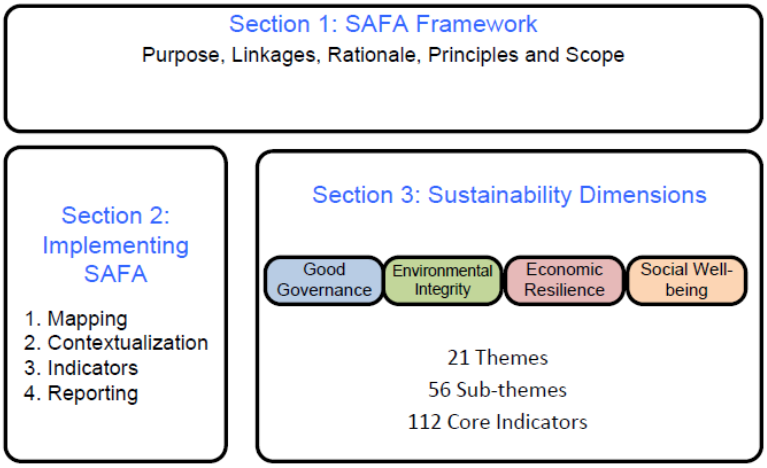

Fig. 1). Covering the first two steps (setting goals and checking compliance and relevance) seems impractical at present, due to the highly specific nature of the problem for each reporting corporation. Therefore, these steps are not considered a part of the proposed system, although there is some demand to provide as much automation as possible [10].

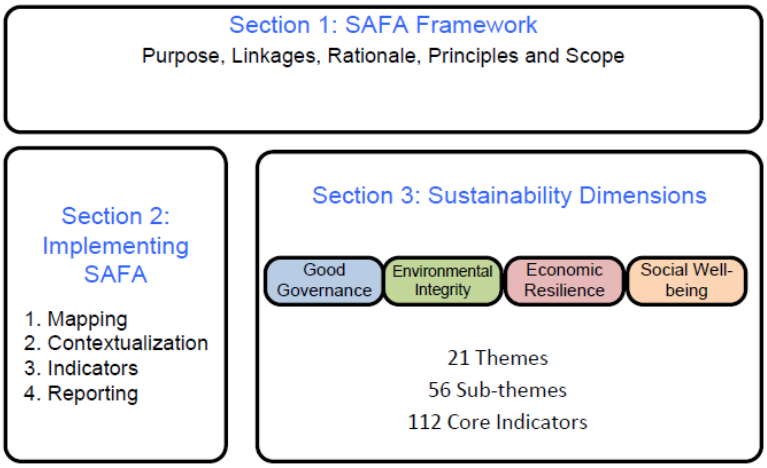

Fig. 1. SAFA Guidelines structure version 2.0 [3]

Among other deficiencies of the current SAFA framework are the challenges which are faced by smallholders, relative to implementing this framework. These include the

lack of appropriate user-friendly tools, limited existing data, lack of capacity to obtain the data or of reporting indicators, the values of which are costly to obtain [10]. It was agreed that the measurement of key performance indicators is a must; there may be, however, other types of indicators, the inclusion of which might prove necessary– e.g., practice-based indicators. There is a strong demand for the improvement of reporting tools. The current SAFA reporting tool is presented on an excel sheet; this is found to be insufficient by the participants. Other types of data-collection tools such as questionnaires are being proposed and more automation is required [10].

2.1 Overview of existing performance indicators

Because we concentrate mainly on agricultural organizations, the SAFA methodology is highly important to us. Therefore we closely follow the results of SAFA pilot testing and the feedback obtained from it. The proposals and remarks mentioned in the previous chapters are of great importance and we have considered them in the proposal of the system described further in this article. Also, to allow a greater generality of the information system, we have also considered other performance methodologies and their indicators because these may provide us with other points of view [16].

In June 2013, the GRI released the G4 Sustainability Reporting Guidelines [19] updating the G3.1 Guidelines from 2011 [6] and updating and completed the G3 Guidelines from 2006. The new G4 Sustainability Reporting Guidelines (the Guidelines) [19] offer *Reporting Principles*, *Standard Disclosures* and an *Implementation Manual for the preparation of sustainability reports* by organizations, regardless of their size, sector or location.

There are a number of other alternative reporting methodologies. An example is AEI EU (Agri-Environmental Indicators), whose indicators [1] are not yet generally usable in practical generic reporting. Some of the indicators cannot be computed because of missing data, sometimes the data required are not homogeneous enough [8], [10]. The main reason for the evaluation of these AIE indicators is that it is highly desirable to develop tools, which will be capable of producing required values of these indicators if necessary.

2.2 Key performance indicators

Within the solution of the GACR 403 project, we have proposed a minimalistic set of key generic performance indicators [14] applicable to a wide range of enterprises. The latest version of these indicators is listed in **Table 1** and they form one set of indicators considered for implementing and validating the information system prototype. Second set of testing indicators are those described in *Methodology for assessing the sustainability of crop production systems for the conditions of the Czech Republic* [15]. The rationale behind these choices is that we want to test both simpler (and generic) reporting systems such as the one listed in **Table 1** and complex reporting systems of indicators such as SAFA or [15] and [18].

Table 1. ESG indicators proposed for manufacturing enterprises

Measurable	Performance Indicator	Scale and (Unit)
Environmental indicators		
Investment	**EN01 – Environmental protection investments**	Total investments to environmental protection / value added [%]
	EN02 – Environmental protection expenditures	Cost of Environmental protection expenditures /value added [%]
Emission	**EN03 – Total air emissions**	Total direct and indirect emissions to air / value added [t / CZK]
	EN04 – Total greenhouse gas emissions	Direct and indirect emissions / value added [t / CZK]
Resource Consumption	**EN05 – Total annual energy consumption**	Direct and indirect energy consumed / value added [MWh / CZK]
	EN06 – Total renewable energy consumption	Energy from renewable resources * 100 / total energy consumption [%]
	EN07 – Consumed materials	Consumption of materials by weight / value added [t / CZK]
	EN08 – Recycled input materials	The share of raw materials from recycled materials, percentage of total input materials [%]
	EN09 – Total annual water consumption	The total volume of water removed / value added. [m³ / CZK]
Waste	**EN10 – Total annual waste production**	The total amount of each type of waste generated by operation of the company / value added [t / CZK]
	EN11 – Total annual production of hazardous waste	The total amount of hazardous waste generated by operation of the company / value added [t / CZK]
Social indicators		
Company	**SO01 – Community**	Social investment to local communities * 100 / value added [%]
	SO02 – Contributions to municipalities	Monetary value of projects of municipalities * 100 / value added [%]
Human rights	**HR01 – Discrimination**	Number of discriminatory cases * 100 / number of employees [%]
	HR02 – Equal opportunities	Number of women * 100 / average number of employees [%]
Labor relations	**LA01 – The rate of staff turnover**	Terminated employment relationships * 100 / average number of employees [%]
	LA02 – Expenditure on education and training	Total expenditure on education * 100 / value added [%]

	LA03 – Occupational Diseases	Occupational illness * 100 / average number of employees [%]
	LA04 – Deaths	Number of fatal accidents * 100 / average number of employees [%]
Responsibility for products	**PR01 – Customer Loyalty**	Number of customers at the end of the year – the newcomers during the year * 100 number of customers at the beginning of the year [%]
	PR02 – Marketing Communications	Communications – website, etc. [y/n]
	PR03 – Health and safety of customers	The total monetary value for non-compliance * 100 / value [%]
Corporate Governance (CG) indicators		
Monitoring and reporting	**CG01 – Company Information**	Information about the objectives and strategy of the company [y/n]
The effectiveness of CG	**CG02 – CG Responsibility**	Collective agreement [y/n]
	CG03 – CG Standardization	Publishing of standardized (GRI,CSR) reports [y/n]
	CG04 – Ethical behavior	Code of ethics [y/n]
	CG05 – CG Codex	Code of corporate governance [y/n]
CG Structure	**CG06 – CG Remuneration**	Amount of remuneration of board of directors and the supervisory board * 100 / Annual labor costs [%]
	CG07 – CG Membership	Number of independent members of the CG * 100 / number of top management members [%]
	CG08 – Equal opportunities	Number of women in the total number of members of CG [%]
Compliance	**CG09 – Compliance with regulatory standards**	Monetary value of fines for non-compliance * 100 / value added [%]
Economic indicators		
Value added	**EE01 – Value added per employee**	value added * 100 / average number of employees in the year [%]
	EE02 – Value added to personnel costs	value added * 100 / payroll costs [%]
Market position	**EE03 – Market Share**	turnover size in manufacturing * 100 / turnover [%]
Efficiency	**EE04 – Profit EAT**	Earnings after taxes – EAT [CZK]
	EE05 – Profit EBT	Earnings before taxes – EBT [CZK]
	EE06 – Profit EBIT	Earnings before interest and taxes – EBIT [CZK]
	EE07 – ROE Performance	ROE = EAT / Equity [CZK]

	EE08 – ROA Performance	Return on assets ROA = EBIT / Total assets [CZK]
	EE09 – ROS Performance	Return on sales ROS = EAT / Total sales [CZK]
	EE10 – ROI Performance	Return on invested capital ROI = EBIT / Total equity [CZK]
	EE11 – ROCE Performance	ROCE = EBIT / Equity + Long-term liabilities [CZK]
	EE12 – Turnover size	Sales of own products and services * 100 / value added [%]
Cash Flow	**EE13 – Operating Cash Flow**	Total cash resources of the company * 100 / Total operating costs [%]
Additional indicators	**EE14 – Expenses on R & D**	Total costs * 100 / value added [%]
	EE15 – Number of employees	Average number of employees in the year (persons) [number]

3 Reporting information system

Our goal is to provide an architectural proposal generic enough to contain all of the above-described methodologies. To implement such a system successfully, several abstractions are required. These need to be carefully constructed to ensure that they are hidden before the end-use and that they do not add any more complexity to the reporting itself [20].

3.1 System requirements and goals

In our vision, we foresee two main goals of the reporting information system. A company may use such a system to create various reports and share data with both its stakeholders and in the future, with state institutions. The second goal is company performance assessment performed by evaluating key performance indicators by means of one of the proposed methodologies. This way, the company can share its performance with the public, or check performance development.

The reporting system should include a flexible layout design, rich visualization, business requirements and data logic definition. In addition, there is a need for translation or of publishing requirements, the central deployment and customization of interactive reports. These primary functions represent good a reporting system with strong delivery capabilities of relevant reports.

For all the use-cases of the generic actors – *reporter* and *company performance evaluator* – we consider two scenarios. The system may be used either on a regular basis (*registered company scenario*) to generate scheduled company reports (annual, quarterly ...) of performance, and to check trailing company performance and its development. A second scenario (*anonymous company*) represents the case when a company wants to generate an ad-hoc report. This can occur, e.g., when a company is

applying for a subsidy or grant or when a company is evaluating changes in company operation (e.g., restructuring) where a report would be generated for the period before the change and for the period after the change. The second scenario can also be seen as an entry point into the reporting system for companies that do not use it regularly.

3.2 Indicator abstraction

To encompass the different methodologies described in first chapter we propose the following abstraction of performance indicators (applicable universally to both key performance indicators and additional performance indicators). For the prototype application, we have used a relational database as a storage system. Hence, the following description uses relational database technology. The basic indicator abstraction entities are: *indicator group*, *indicator*, *indicator item*, *indicator item aspect*.

The entities described above define the core of the data model of the information system. The following scheme (**Fig. 2**) shows further details with associated entities. Here we defined a report type, which represents an instance of a given methodology e.g. SAFA version 1.2. We also introduce a report instance that represents a concrete filled report for a specific company for a specified time period. The indicator value, which is an actual value entered by the end user, may be bound to either an indicator item or indicator item aspect but not both. Note that indicator value is not actually related to the report instance. This is intentional, so that a single indicator value may be reused in several report instances. As long as the period is the same, the value should be reused. This is crucial to maintain a consistency of data across different reports and it is a highly important feature to make reporting as easy and quick as possible.

There is also an indicator report group entity, which defines grouping of indicators in the defined report types. The linkage is provided by the indicator report types association table which assigns indicators to specific groups in specified report types. Note that it is possible that an indicator is used in more than one report definition, which is desired behavior.

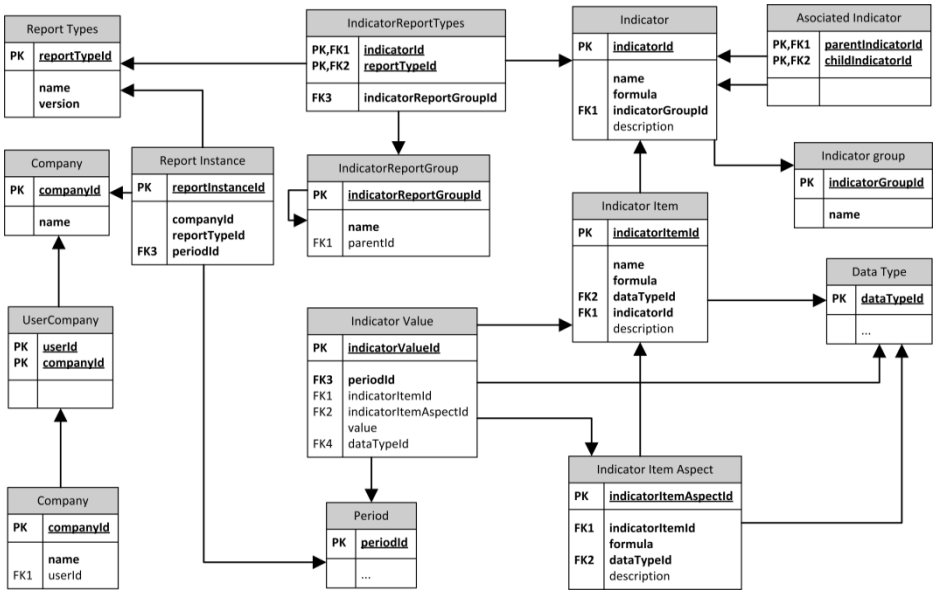

Fig. 2. Core data model of the reporting system

Closely linked to indicator value computation is the *Associated Indicator* table. This is used to track dependencies between indicators in a case when one indicator is used for the computing of another indicator. A concrete example can be seen in the methodology enterprises [14] where there is an indicator *EE14 – Expenses on R&D*, which is computed as *Total costs of R&D* divided by *Value added* and expressed in per cent. The *value added* is another indicator, although it is not directly expressed in the report. There is only *EE01 – value added per employee* and *EE02 –value added to personnel costs*. Both of which are computed as *value added*, divided by the *average number of employees* for the former and by *the payroll costs* for the latter.

4 Conclusions

In the article we describe the data model for an information system for sustainable reporting. We have implemented a prototype of the described specialized information system. There are two primary goals of the prototype implementation: to verify that the proposed indicator abstraction can be implemented successfully, and to verify the usability of the system for end-users. This is in accordance with the SAFA framework testing. As we have shown in our previous research, the critical issue in data-processing and data-analysis tasks is to get the right information quickly, nearly in real-time, in a targeted way, and effectively, and the future will be extended with a more flexible report-generation and other features adding to the end user experience.

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