Tools for sustainable business management

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Abstract

In this paper challenges for the economy due to environmental problems and the raising intensity of competition will be discussed. Sustainable Development is shown to be a suitable vision for corporations. Integrated (Generic) Management Systems are introduced as a useable way for implementation of Sustainable Development in order to meet ecological and economical goals. These systems are administrative tools for managing environmental, quality and risk work in business. Four principles of Sustainable Development are presented and linked with business strategy. In order to meet the requirements of sustainability specific tools are necessary. The sustainability balanced scorecard is the central tool for the development and implementation of sustainable business strategies. A tool to identify the position of an enterprise in relation to sustainable development is the sustainability cube, where the social, economical and ecological dimension of sustainable development of an enterprise can be measured. A tool within the process of designing a new product or service, where the needs of the market and customers can be combined with the principles of sustainable development, is the sustainable orientated quality function deployment.

1 Principles of Sustainable Development

The concept of Sustainable Development has been developed in forestry and came in mind by the Brundtland report [1]. The definition of Sustainable Development in this report is an ethical standard, which has to be translated into a manageable standard. The concept of Sustainable Development consists of ecological, social and economic sustainability. Ecological Sustainability deals with the mechanism and conditions that natural life sustaining systems can be maintained and their destruction can be prevented. Social Sustainability would be to meet human needs within the frame set by the conditions set for Ecological Sustainability. Economic Sustainability describes the important role of economy,
in particular of industry and commerce, in order to meet ecological and social sustainability. Economic success of industry and commerce is a precondition for a sustainable transition.

The objective of sustainable development is sustainability, which is characterized by four principles, so called system conditions [2]:

1. Eliminate contribution to systematic increase in concentrations of substances from the Earth's crust. This means substituting certain minerals that are scare in nature with others that are more abundant, using all mined minerals efficiently, and systematically reducing dependence on fossil fuels.

2. Eliminate contribution to systematic increases in concentrations of substances produced by society. This means systematically substituting certain persistent and unnatural compounds for ones that are normally abundant or break down more easily in nature, and using efficiently all substances produced by society.

3. Eliminate contribution to the systematic physical degradation of nature through over-harvesting, introductions and other forms of modification. This means drawing resources only from well-managed eco-systems, systematically pursuing the most productive and efficient use both of those resources and land, and exercising caution in all kinds of modification of nature.

4. Contribute as much as we can to the meeting of human needs in our society and worldwide, over and above all the substitution and dematerialization measures taken in meeting the first three objectives. This means using all of our resources efficiently, fairly and responsibly so that the needs of all people on whom we have an impact, and the future needs of people who are not yet born, stand the best chance of being met.

These four principles list the objective of the Brundtland Definition of sustainable development in detail. To meet these principles two general mechanisms can be used, such as dematerialization and substitution. Dematerialization deals either with resource productivity or reduction of waste. Substitution differs from system condition to system condition. For condition 1 and 2 substitution means using more abundant materials from the Earth's crust or compounds that are occurring naturally. For system condition 3 substitution of certain activities, which are identified as nature destructing, is the task. And condition 4 includes health aspects through ecological pollution, availability and distribution of resources [2]. These presented system conditions describe the objective, sustainable development is the process to reach this objective.

2 Sustainable Business Management – integrated management systems

In order to serve sustainable development within an individual company, Sustainable Business Management is a practicable tool. It combines challenges and requirements of market conditions, of shareholders and stakeholders with the
principles of sustainable development in order to meet operative and strategic objectives in a way that contributes to goal of sustainability. It coordinates, controls and moves the organisation, it sets standards, defines objectives and tasks and creates the organisational strategy in order to meet sustainability requirements within the frame-set fixed by the market situation. To reach these tasks, Sustainable Business Management should be designed as Generic Management Systems.

Usually companies have lots of restrictions, objectives and tasks. Stakeholders like employees, customers, worker unions, non-governmental organisations, legislator or owner have their individual demands. The concept of sustainable development gives the possibility of a balance of economical, ecological and social standards and objectives which have to be reached. In history separate business solutions were built up, for quality, environment, or safety – additionally to relevant laws and legal standards. The standards for quality management are ISO 9001 or in Europe the EFQM-model, for environmental management ISO 14001 or the EMAS scheme in Europe. Industrial health and safety standards are regulated by national law in Europe, additionally management standards like OHSAS 18001, SCC (= safety contractor certification) or BS 8800 are in use (see Table 1).

This conglomerate of fragmented system constructions has been developed in consequence of the classical management understanding. A specific demand or problem has to be solved with a specific problem solution – customer demands through quality management, health and safety issues through safety management systems or environmental problems through environmental management systems. They are implemented next to each other as independent systems, causing problems during business operation like increased complexity by additional interfaces between separate systems, overlaps and redundancies between separate systems or concurring goals of separate management systems.

These problems result in the need of Generic Management Systems, where requirements of separate systems and of sustainable development have to be integrated. The structure of a management system has to be as complex as the surroundings of the company, so that external and internal requests can be managed accordingly [3].

In literature a wide range of integration approaches are proposed [4, 5, 6, 7]. Principally the integration can be done by addition, fusion or integration. In the case of addition the subsystems remain existing next to each other, the respective specialists keep their function of the subsystem optimisation. They are obligated to proceed and come to an agreement uniformly. In the case of fusion an established subsystem is determined as basic system. Into this basic system the demands and flows of the other topics are built. In the case of integration the separate management systems become almost invisible. The system responsibility changes on a person, also the respective single structures merge into a total structure.
Table 1: Objectives of special management systems.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Quality Management</th>
<th>Environmental Management</th>
<th>Safety Management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ISO 9001</td>
<td>ISO 14001</td>
<td>OHSAS 18001</td>
</tr>
<tr>
<td></td>
<td>EFQM</td>
<td>EMAS</td>
<td></td>
</tr>
<tr>
<td>Profit, Time, Costs</td>
<td>•</td>
<td>•</td>
<td>•</td>
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<tr>
<td>Process-Orientaion</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Audit</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>External Certification</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Continuous Improvement</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Qualifying of Employees</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Public Acceptance</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Legal Compliance</td>
<td>•</td>
<td>•</td>
<td></td>
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<tr>
<td>Documentation</td>
<td>•</td>
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</tr>
</tbody>
</table>

The practical implementation is based on different integration levels [8]. On the strategic level aspects of quality, environmental protection and health and safety issues are considered equivalently with other central topics of interest. The reference of the strategy development bases itself on a normative basic structure including the vision of the corporation. On the process level the creation of process structure transparency forms the basis for the integration of quality, environmental, health and safety aspects on the operational levels. This organisational aspect has to be supported through an appropriated information system which delivers data and requirements about health, quality, environmental and sustainability aspects for process owners and management. The document level builds the basis for the controlling of the Generic Management System. Oriented at a corporate policy, which treats quality, environmental and health and safety aspects integrated and equivalently with other enterprise emphasis, the management manual has to be created, which creates system-spreading descriptions of processes as well as the work instructions locally on the basis of comprehensive aspects.

3 Tools for Sustainable Business Management

Specific tools for translation of general requirements of sustainable development into manageable demands are necessary. The sustainability balanced scorecard is the central tool for the development and implementation of sustainable business strategies. In order to identify the position of an enterprise related to sustainable development the concept of sustainability cube is discussed. With this instrument the social, economical and ecological dimension of sustainable development within an enterprise can be measured. A tool for sustainable design of new products or services is the sustainable orientated quality function deployment. This concept combines the needs of the market and customers with the principles of sustainable development.
3.1 Sustainable cube

In order to determine organisation's position in the light of sustainable development the "sustainable cube" can be applied [9]. This tool contains the three perspectives of sustainable development – the economical, the ecological and the social one – and proposes a metric system for each of them. The position within the cube allows one to define strategies for further sustainable management. The cube can be used for the whole organisation, for parts of an organisation or for individual products or services.

The economic perspective can be measured with common economic concepts like economic value added, option pricing theory, shareholder value, contribution accounting, target costing or product profit/loss accounting. Economic value added, shareholder value, options price theory and contribution accounting can be used to analyse the whole organisation. Target costing is a tool for product-specific questions. Meanwhile specific variations of shareholder value or contribution accounting were developed including ecological requirements (spec. ecological shareholder value [10], environmental contribution accounting [11]).

The ecological perspective can be measured by life cycle assessment resp. environmental performance measurement and indicators. The chosen method should refer to principles of sustainable development, the methods suitably are assessing not-monetary and quantitative. The methods Sustainable Process Index (SPI) [12], Material Input per Service (MIPS) [13], Ecoindicator 99 [14] and Eco-Points [15] are in discussion.

![Sustainable cube](image)

Figure 1: Sustainable cube.
These methods allow the measurement of ecological effects of products, processes or organisations. Application is usually complex, and the methods are debatably. If environmental effects can be evaluated by experts, also indicators combined with ABC-analysis can be used [16].

Social perspective can be measured by indicators. Questions of legal compliance of social standards and laws, of human rights and of gender mainstreaming, to give a few examples, are here in focus.

For practical use, the relevant indicators for each perspective have to be defined for a specific organisation. The next step is measuring and collecting the needed data, due to evaluate and calculate each indicator. The sustainable cube is an instrument used in organisational decision making processes – therefore evaluation is of a relative characteristic. The organisation starts in the centre of the cube and can derivate strategies for each sustainability perspective to improve the position. The cube can be used for benchmarking purposes, too, but in this case all partners of the benchmarking process have to use the same criteria, indicators and methods. The lettering of the axis is characterized by “G”, “S” and “EP” and is measured through specific criteria valid for the organisation. The ideal position of measurement point within the cube would be the top of each perspective, economic realistic, social ideal, with high environmental performance. An unalterable demand for the position of each organisation is section with G > 0, otherwise they lose money. In this case the organisation has no economic perspective, and there is no continuous success in the ecological and social perspective.

### 3.2 Sustainability balanced scorecard

In order to put a given corporate strategy in work, the concept of Balanced Scorecard (BSC) has been developed [17]. Long term business success is based on long term orientated strategy and organisational vision. BSC is an established tool in industry and broadly implemented. 12% of larger German companies have already implemented this strategic tool, 45% are planning or just in the process of employment [18]. The BSC supports the implementation of a given strategy, but not the deduction of a strategy. The focus is not only on financial aspects but also on important non-financial aspects and criteria. Usually BSC consists of a financial perspective (strategy for growth, profitability and risk viewed from the perspective of the shareholder), a customer perspective (strategy for creating value and differentiation from the perspective of customer), an internal perspective (strategic priorities for various business processes, which create customer and shareholder satisfaction) and a learning and growth perspective (priorities to create a climate that supports organisational change, innovation, and growth) [19].

These perspectives are given by the framework of the concept, which can be individually adopted. Important is, that within and between the perspective cause and effect concerns have to be created. Each perspective is measured by indicators, practical experience shows that 12 – 15 measures are the manageable maximum on the top-level. Referring to the measures we can distinguish between leading indicators and lagging indicators. Leading indicators are used...
for managing the preconditions for the strategic objectives, lagging indicators measure the success. BSCs can be implemented in each organisational unit if the unit has its own customers, processes and strategy.

The aim of a Sustainability Balanced Scorecard (SBSC) is the integration of all three aspects of sustainable development – economy, ecology, social – in order to implement successful organisational strategies. Ecological and social tasks with strategic influence can be identified and management with a SBSC. Social and ecological aspects can be integrated in different ways into a BSC [20]. In the case of partial integration sustainability issues are considered in one or more conventional perspectives. Some companies integrate indicators for efficient use of energy or material, for example, as leading indicators into the Internal Process Perspective. In cases of strategic relevance of social and ecological issues for all perspectives of a BSC, an integration of relevant indicators into the Internal Process Perspective, the Learning and Growth Perspective, the Customer Perspective and the Financial Perspective would be the right option. If sustainability aspects without any market relevance are strategic important for the organisation, an additional perspective would be suitable. Creation of a separate SBSC based on existing BSC in order to summarize especially leading indicators from an existing BSC is an option for a central environmental management or sustainability department within a greater organisation. This type fulfils a coordinative function and does not cause additional or new contents.

3.3 Sustainability quality function deployment

Quality Function Deployment (QFD) is an established tool in Total Quality Management (TQM) and has been developed 1966 in Japan as a tool for product development. Task and objective of QFD is to transfer customer requirements into product features [21]. The QFD – Concept consists of four steps with a specific matrix for each (see Figure 2) [22]. On the left of each matrix the “Whats” are placed. “Whats” is a term often used to denote benefits or objectives wanted to be achieved. On the top of the matrix the “Hows” are placed. Most commonly, the “Hows” are technical measures of performance of the proposed product or service [23].

<table>
<thead>
<tr>
<th>Step</th>
<th>Matrix</th>
<th>What</th>
<th>How</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>House of Quality</td>
<td>Voice of the Customer</td>
<td>Technical Performance Measures</td>
</tr>
<tr>
<td>2</td>
<td>Subsystem Design Matrix</td>
<td>Technical Performance Measures</td>
<td>Piece-Part Characteristics</td>
</tr>
<tr>
<td>3</td>
<td>Piece Part Design Matrix</td>
<td>Piece-Part Characteristics</td>
<td>Process Parameters</td>
</tr>
<tr>
<td>4</td>
<td>Process Design Matrix</td>
<td>Process Parameters</td>
<td>Production Parameters</td>
</tr>
</tbody>
</table>
Figure 2: QFD – interrelated matrices and impact of sustainability criteria.

Sustainability requirements can be included on all steps of the QFD process. For the House of Quality (HOQ), the subsystem design matrix and the piece part design matrix the relevant criteria can be derived from the principles of eco-design as well as from criteria’s concerning social resp. health and safety issues. Eco-Efficiency Criteria and principles of Cleaner Production can be integrated into the process design matrix, but it has to be noted, that these principles will also have an impact to matrix 1 – 3 (see Table 2).

Eco-Efficiency means creating more value with less impact [24]. The goal of the concept of Cleaner Production are environmental sound processes, in order to avoid harmful emissions and waste which have to be cleaned up with so called end-of-pipe technologies. The objective of Eco-Design is to maximize the benefit and to minimize the environmental impact of a product or service. Additionally requirements of corporate strategy are important. Therefore tool employment has to be seen in the light of the general objectives which are management for example with a SBSC within a Generic Management System.

4 Summary

The translation of the macro economical principles and objectives of sustainable development into the micro economical level of commerce and industry has been presented, and the concept of Sustainable Business Management has been proposed. Sustainable Business Management meets the objective and the challenges through higher competitive markets, globalisation, requirements from
customers, stake-holders and legislator. The problem of separate management systems have been discussed, their integration into Sustainable Business Management has been suggested. Specific tools to support Sustainable Business Management for measuring the actual situation (sustainability cube), for implementing sustainable strategies (SBSC) and sustainable design of products and services (S-QFD) have been presented in detail.

References


