Edited by Cezary Kochalski

Green Controlling and Finance Theoretical Framework







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The process of managing a modern enterprise with a view to achieving objectives related to the concept of sustainable development requires support from controlling, which should aim to search for solutions that use environmental and social potential for creating business value. Controlling focused on maintaining the compliance of economic relations with environmental and social requirements may be called "green controlling".

The growing demands imposed on enterprises as regards social and environmental issues cannot lead to the disruption of the bases of their financial stability. With that in mind, this paper emphasises that environmentally- and socially-oriented actions, coordinated as part of controlling, should always be considered from the perspective of finance. For this reason, the first part of the paper's title includes the word "finance", and the book's title is *Green Controlling and Finance*.

Due to the fact that green controlling is considered in relation to finance, the paper does not focus only on the quantitative aspect of social and environmental burdens caused by the operations of an enterprise. Moreover, one may not say that the main topic of the paper is the presentation of the financial consequences of social and environmental actions only. This book is an attempt to present the issue of green controlling from both the social and environmental and financial perspective. It concentrates on the financial consequences of social and environmental actions as well as the ecological consequences of business activity.

The main objective of the paper is to determine the opportunities for using controlling in order to fulfil the goals of sustainable development, in such a way

as to achieve financial results that guarantee the intended increase in business value.

In order to achieve the main goal of the paper, the authors had to tackle detailed issues, which included:

1) describing the essence of green controlling and proving that the actions related to the implementation of green controlling, on the one hand, influence the financial condition of an enterprise and, on the other hand, depend on it;

2) presenting the most important conditions for managing an enterprise focused on social responsibility;

3) highlighting the social and environmental conditions for the functioning and development of an enterprise in the context of controlling and finance;

4) presenting and locating green controlling within the context of business and value creation theory;

5) presenting the key issues related to increasing business value on the basis of determining and implementing the strategy of eco-development;

6) choosing the strategic analysis methods that comply with the requirements of the concept of sustainable development;

7) describing the most important issues of green accounting as the information database for green controlling and finance;

8) determining the significance of financial planning and characterising the methods for developing a financial plan as regards enterprises that pursue environmental and social objectives;

9) presenting the key issues related to budgeting and deviation analysis in green controlling;

10) depicting the model approach to developing the system of sustainable development measures and indicators as part of the controlling process;

11) presenting the essence of green cost accounting and the opportunities for using the modern concepts of cost accounting in green controlling;

12) presenting the system of reporting on the environmental impact of the activity conducted by enterprises, as well as their achievements related to limiting the adverse effects of using it;

13) presenting the conditions for operational eco-efficiency as well as the opportunities for improvement in this field;

14) developing the model approach to the assessment of investment profitability, taking into consideration environmental and social aspects;

15) proposing an approach to the analysis of risk and the estimation of capital cost in an enterprise managed in accordance with the principles of green controlling.

The book covers issues from the field of controlling, financial analysis, valuation, corporate finance, organisation and management theory, strategic management, accounting and standardised management systems; therefore, the book is interdisciplinary in nature. While discussing the respective issues, the authors used the national and international resources.

This book is a result of the *Green Controlling and Finance – Innovative Curriculum of Post-graduate Studies* project co-funded from the resources of the Foundation for the Development of the Education System, which plays the role of the Operator of the Scholarship and Training Fund as part of the Development of Polish Higher Education Institutions measure (Norway Grants).

The identification of the opportunities for using controlling in order to fulfil the goals of the sustainable development concept in such a way as to achieve financial results that guarantee the intended increase in business value was performed mainly by analysing the existing theoretical works. The authors intend to create another paper related to green controlling and finance, which will be based on case studies.

The book consists of the introduction and sixteen chapters. The order and content of the respective chapters have been determined in such a way as to enable finding solutions to the research problems posed and to achieve the principal objective of the work. Each chapter contains a summary, which presents the most significant findings and conclusions.

Cezary Kochalski

1 Controlling and Finance – Oriented View on the Environmental and Social Issues in an Enterprise

1.1. Introductory Remarks

Modern enterprises are carrying out more and more development activities related to ecology. To some extent, these actions result from the requirements arising out of legal regulations; however, some of them are voluntary and they are taken in order to increase the competitive advantage of enterprises. In both cases, the actions related to the protection of nature and the environment should be analysed in connection with social and economic aspects, i.e. from the perspective of eco-development, which may be understood as the synonym of sustainable development.

As modern enterprises pursue eco-development, it becomes necessary to adjust the management of such enterprises. This need becomes so significant that it is justified to use the term eco-management, which should not consider ecological issues only from the perspective of costs, but should perceive them as a factor that stimulates business growth.

The management of a modern enterprise oriented at eco-development requires support from controlling, which should be concentrated on searching for solutions that use environmental and social potential for creating business value. Controlling focused on maintaining the compliance of economic relations with environmental and social requirements may be called "green controlling".

On the one hand, the actions related to the implementation of green controlling influence the financial standing of an enterprise. On the other hand, they depend on it. The authors of this paper have assumed that ecologically-oriented actions taken by an enterprise should not disrupt its financial stability (financial liquidity) and they should enable the greatest possible management efficiency (profitability). Only then will the enterprise receive the capital for financing the implementation of sustainable development.

The goal of this chapter is to determine the opportunities for using controlling in an enterprise in order to reach the goals arising out of the principles of sustainable development in such a way as to ensure that the actions related to social and environmental goals prove effective and that the achieved economic results provide the intended increase in business value.

1.2. Sustainable Development and the Management Information Tools for Achieving it

The economic literature pays more and more attention to the sustainable development of an enterprise, which is understood not only in terms of economy, but takes into consideration the environmental and social aspects as well. Modern enterprises are supposed to pursue not only economic goals, but to devote equal space to achieving social and environmental objectives.

In a very broad sense, sustainable development means development that makes it possible to satisfy the current needs without depriving future generations of the opportunity to satisfy their needs as well. It means that the current development should not substantially and irrevocably affect the living environment of human beings.

There are numerous definitions of sustainable development. Based on the review of those definitions, it was decided to treat sustainable development and eco-development as synonyms [Bartkowiak, pp. 14–19] and, as a result, assume that sustainable development means finding harmony between the ecological aspects of business growth and the requirements of cost effectiveness and society's expectations. Sustainable development (eco-development) requires taking control over business processes while attempting to generate profit in such a way as to ensure that the engagement and consumption of resources meet the applicable or desired ecological criteria.

If an enterprise takes actions that affect the situation of other persons or enterprises but are not compensated for by a relevant payment, we are dealing with externalities. The occurrence of externalities leads to the overproduction of goods that bring adverse effects, and the underproduction of goods that have positive effects [Stiglitz 2004, pp. 254 and 256].

As regards enterprises, the problem of externalities may be resolved by introducing economic incentives (solutions based on the market mechanism), direct regulations and pressure to disclose information. The solutions to the problem of externalities based on the market mechanism may take various forms, such as penalty payments, taxes, subsidies or permits. A direct regulation may be related to the regulation of effects and outlays, and may have the form of, for instance, quality and technological standards. The disclosure of information is based on exerting pressure to disclose information concerning social and ecological responsibility to the public [Stiglitz 2004, pp. 257–275].

The occurrence of externalities resulting from business activity should be monitored not only to determine the amount of fines and taxes that have been paid, the amount of support received by an enterprise for its ecological and social activities, whether an enterprise meets quality standards and whether and how it discloses information related to sustainable development. Such monitoring should be related to the planned measures for counteracting the occurrence of externalities in the social and ecological context, as well as to informing the public about them. In other words, the monitoring of the occurrence of externalities in an enterprise should be the object of controlling.

The tendencies which are currently observed in controlling justify the idea of including the monitoring of the occurrence of the environmentally and socially-related externalities in controlling activities. Modern controlling should not be limited to "accounting control" but it should increase its influence on the development of an enterprise by searching for innovative solutions. In the case of sustainable development, it means searching for the ways to stimulate innovation that take into consideration the economic (mainly financial), environmental and social aspects as well [Kochalski 2014, p. 11].

While the state tries to take control over externalities by employing solutions based on the market mechanism, direct regulations and the disclosure of information, enterprises, or rather their executives, try to achieve that by applying the relevant management tools as part of controlling. Such management tools include economic analysis and managerial accounting.

For an enterprise, sustainable development means balancing three areas: the economic, the environmental and the social one. Having that in mind, one can adopt various approaches to interpreting the results of such balancing. One possible interpretation is that profit should not be the primary objective of an enterprise. Another possible interpretation is that the actions taken in the environmental and social area may, in the long term, influence the process of building profit. The first interpretation seems to be close to the viewpoints that emphasise the urgent need to treat financial and non-financial objectives equally. On the other hand, the second interpretation, which is typical for financiers, assumes that profit should be the main objective of an enterprise, as it is necessary for its development and the increase in its value. Due to the fact that countries put more effort into encouraging, if not forcing, enterprises to focus on ecological and social issues, there is no need to determine which approach is more appropriate. While taking more intense actions related to ecological and social issues, enterprises should always look at them from the financial perspective. After all, such issues influence costs, revenues and the overall market situation of a given enterprise. Based on the definition of sustainable development, it can be concluded that the set of economic, social and environmental goals may not be consistent. In such an event, they should be aligned; this means that the implementation of the concept of sustainable development may not consist of a simple addition of social and environmental objectives to the economic ones. It also requires reaching consensus [Marciniak 2008, p. 248]. The attempt to achieve the economic, social and environmental objectives while applying the rules of consensus requires the coordination of actions (processes) in an enterprise. The types of coordination of the actions and processes aiming at achieving the objectives of sustainable development are presented in figure 1.1.





Source: developed on the basis of [Nowak 2011, p. 22].

In order to achieve sustainable development, enterprises must be able to identify, as part of controlling, the appropriate directions for the development, as well as their *modi operandi*. The lines of action should be determined by the business strategy, while the *modi operandi* – by the strategy implementation plan.

As part of the processes of formulating and implementing the strategy of business eco-development, it is essential to evaluate the occurring phenomena from the economic, social and environmental perspective. In order to do that, it is necessary to identify the factors (reasons) that shape such phenomena and to determine their effects. In other words, the necessary information is provided by means of economic analysis.

The economic analysis of an enterprise covers two areas: financial analysis as well as technical analysis. In the recent years, economic analysis has put special emphasis on financial analysis. The development of the concept of sustainable development should encourage greater interest of economic analysis, including in particular financial analysis, in social and environmental issues. If the main goal of financial analysis is to identify the causes of the change in the asset and capital standing as well as profitability of an enterprise, the causes of such changes undoubtedly include the social and ecological activity of a given enterprise.

In an enterprise oriented at sustainable development, economic analysis should be treated as a method for developing information, which measures the economic, social and ecological characteristics of phenomena, as well as identifies their mutual relations and interactions. From this perspective, economic analysis stresses the presentation of the mutual relations and interactions among the aforementioned phenomena on the basis of numbers.

Another tool for business management used in order to achieve economic, social and environmental objectives is management accounting (or economic balance), which compares numerous variants of future actions that include the outlays and effects, and chooses the best variant. The presented essence of management accounting emphasises the fact that it is oriented at *ex-ante* accounts. It focuses on the measurement and comparison of the effectiveness of alternative variants of the future activity in order to choose the best of the considered variants.

As management tools, economic analysis and management accounting are closely connected with economic control. Economic control should be understood as the comparison of performance with the desired state in order to determine whether or not there exist any deviations. In the case of an enterprise that endeavours to reach economic, social and environmental objectives, the essence of economic control is to compare two states of sustainable development where one is a point of reference for the evaluation of the other.

At this point, it should be added that the comparison of two states in the analysed period or between enterprises constitutes an economic analysis. The authors of this paper find the differentiation between economic control and economic analysis worth emphasising. Furthermore, it should be added that the core of economic analysis and economic control is to find the causes of deviations between the actual state and the desired state in order to improve the effectiveness of management and, as regards sustainable development, to improve eco-efficiency.

Without planning, effective control and the informative support from economic analysis and management accounting, it is rather impossible to achieve the objectives of sustainable development related to the economic, social and ecological issues specified in the business development strategy. In other words, an enterprise that craves for coordinated development should employ planning that takes into consideration economic, social and ecological aspects, as well as control that makes it possible to compare the desired state with the actual one.

Steering and regulating should be secondary to control. Steering means future-oriented actions which should ensure that an enterprise functions in accordance with the strategy and without any disturbances. Regulating is related to the actions oriented at the past for the purpose of achieving the planned objectives by eliminating any disturbances [Nowak 2011, pp. 26 and 27].

1.3. The Notion of Controlling

It is easier to define controlling after presenting its origins and the most significant stages of its development. The majority of works related to controlling pay attention to the following events:

• in the 15th century, the function of "controllour" was established on the English royal court; the role of "controllour" was to verify reports on the inflows and outflows of goods and monies;

▶ controlling as understood today emerged and developed in the United States; in 1778, the function of "comptroller" was established as part of public administration; a committee was also appointed that supervised the balance between the inflows and outflows related to the US budget; • controlling first became part of enterprises in 1880 when the position of comptroller was established in the American Association of Iron Railway Atchison;

• General Electric was the first industrial company to have a controlling position (1892);

▶ the Controllers Institute of America (CIA) was established in 1931 in the United States; it dealt with the methodology and tasks of controlling (controlling ceased to be perceived through the prism of the function of control);

• controlling reached Europe in the 1950s thanks to the German subsidiary companies of US corporations;

▶ at the beginning (in the 1950s), controlling focused on cost calculation, tax policy and economic consulting, and in the 1960s – on reporting, budgeting and budgetary control;

▶ in 1962, CIA changed its name to the Financial Executives Institute, which specified the tasks of controlling.

The analysis of the development of controlling leads to two conclusions, which are of special importance both for this chapter and the entire monograph. Firstly, from the very beginning, controlling was closely and inseparably connected with finance. Secondly, controlling was soon applied in enterprises.

The interconnections between controlling and finance can be noticed in both the American and European controlling. The American approach to controlling places it directly in the field of finance, giving it advisory functions in the management process. On the other hand, European controlling exhibits the relation with finance from the perspective of all functional areas; therefore, it supports finance management by focusing on all actions taken by an enterprise.

The use of controlling in an enterprise is connected with conducting controls and coordinating the activities of various units. However, control has to be conducted in line with a plan. In other words, in the case of controlling, control is not possible without planning. The starting point for defining controlling should be the treatment of planning and control as inseparable.

Until now, a commonly accepted definition of controlling has not been developed. The subjective understanding of this concept does not make it easier. As a result, the understanding of controlling sometimes stems from personal beliefs and knowledge; for some people, controlling does or does not exist, while as regards practical management, it is understood and applied in the form arising out of internal compromises [Wiśniewska and Antczak 2014, p. 86].

Regardless of the subjective understanding of controlling, it is essential to consult the literature from the field and to analyse the proposals of definitions

in order to establish the conceptual framework for the considerations made in the subsequent parts of the paper. The selected definitions of controlling found in the literature are presented in table 1.1.

Table 1.1. Selected definitions of controlling					
AUTHOR	DEFINITION				
R. Anthony	Controlling is a tool to facilitate the management process, which leads an organisation towards the set objectives, supports the attainment of competitive advantage, ensures the effective performance of the strategy and the achievement of success.				
Ch. Horngren	Controlling is a method of gathering and using information in order to support and coordinate the planning and control processes in an entire enterprise. The objective of controlling is the constant improvement of all decisions taken in an enterprise.				
R.J. Mockler	Controlling is a process that consists of making a systematic comparison between plans and their actual performance, which makes it possible to take quick corrective actions. These actions are supposed to make full use of all resources of the enterprise in order to achieve the set goals in an effective and efficient manner.				
P. Horvath	Controlling is a sub-system of management that coordinates planning, control and the provision of information, and, in turn, supports the adaptation and coordination of the entire system. These actions are oriented at the set goals, i.e. at achieving the pre-defined effects.				
P.R. Pressler	Controlling targeted at accounting should make it possible to create a set of instruments that support the process of providing information as well as gathering and processing data. This set of instruments should ensure the achievement of the objectives of a given enterprise. Understood this way, controlling is a certain "economic conscience of an enterprise."				
J. Weber	Controlling supports the executives (from the managers of responsibility centres to the management board) in performing their tasks. The most important aspects of controlling include: 1) providing access to reliable information, 2) the form of managing that ensures the effective achievement of the objectives of an enterprise, 3) coordinating all areas of enterprise management; this improves the effectiveness of decisions and facilitates the implementation of strategies.				

Source: developed on the basis of [Nowak 2015, pp. 23-27].

Given the possibility of implementing the concept of eco-development in an enterprise, particular attention should be paid to the definitions of controlling that put emphasis on: 1) the goal-oriented controlling, 2) the coordination of processes in an enterprise, 3) the significance of information for the decision-making process. Taking the above into consideration, the definitions of controlling proposed by P. Horvath and J. Weber have been deemed the most appropriate; they are also commonly recommended in the Polish literature on the subject. The definitions of controlling chosen for this paper stress the functional aspect of controlling. Therefore, the paper does not treat controlling merely as accounting that includes management, which is typical of the instrumental approach. From the functional perspective, controlling is presented as a process directed at achieving goals, performed by means of planning, control and reporting. The graphic representation of the notion of controlling is shown in figure 1.2.





Source: author's study.

Coordination is especially significant for the functional approach. The graphic representation of coordination in the system of controlling is shown in Fig. 1.3.





Source: developed on the basis of [Nowak 2011, p. 21].

Controlling may be considered in a broad or narrow approach. In a broad sense, controlling may be understood as a certain philosophy that uses economic analysis and management accounting in planning, control and provision of information in order to achieve the set financial and non-financial objectives to the greatest possible extent. In a narrow sense, the purpose of controlling is to ensure the information security of the planning, control and reporting process [Brzezin 2001, p. 23].

In its essence, controlling should not be perceived as a synonym of control focused on the past. Unlike control, controlling focuses on steering the processes es in the future. These processes should ensure the long-term development of an enterprise. If an enterprise is to develop in an eco-friendly manner, controlling must adjust its tools for planning, control and the provision of information accordingly.

Professional organisations make significant remarks that help to understand what controlling really is. These organisations include: Internationaler Controller Verein eV (ICV) and International Group of Controlling (IGC). According to them, the starting point for deliberations on controlling should be an assumption that modern controlling is oriented at achieving objectives, performing control and management functions and referring to both "hard" analytics and soft factors. The new tasks allocated to modern controlling include support for strategy implementation, risk management and support for sustainable development [Ganslen, Losbichler, Niedermayr, Rieder, Schaffer, Weber 2012, p. 2].

In a metaphorical sense, ICV and ICG treat controlling as goal-oriented thinking and the goal-oriented decision-making process. If one assumes that the objectives to be achieved stem from the adopted strategy, controlling should be closely related to the strategy. One can say that today's controlling cannot be performed without a strategy.

1.4. Classifications of Controlling

Depending on the classification criteria, there can be distinguished numerous kinds of controlling, which prove the dynamic development of this concept. Examples of controlling classification criteria are presented in table 1.2.

Author	Criteria for distinguishing the types of controlling
S. Marciniak	 objects of the business activity time horizon scope idea/objective
S. Nowosielski	significance of supported decisionsareas of enterprise functioning
J. Nesterak	 management level scope of activity function area scope of competence form of organisation
M. Sierpińska, B. Niedbała	 scope of activity management level function area

Table 1.2. Controlling classification criteria

Source: developed on the basis of [Marciniak 2008, p. 56; Nowosielski 2002, pp. 10–12; Nesterak 2015, p. 41; Sierpińska and Niedbała 2003, pp. 50–52].

The analysis of the controlling classification criteria presented in table 2 shows that the commonly used and, at the same time, the basic division of controlling is the division based on the management level¹. According to this criterion, controlling in an enterprise is divided into strategic and operational controlling. Strategic controlling refers to processes with a long time horizon (exceeding 1 year) and it is related to ensuring their proper direction. Operational controlling refers to processes with a short time horizon (up to 1 year) and it is related to the achievement of the current goals. Figure 1.4 presents the actions related to strategic and operational controlling.

The basic tools of strategic controlling include the strategic analysis methods. The main tools of operational controlling include cost accounting, budgeting, ratio analysis and reporting.

Another controlling classification criterion commonly presented in the literature is constituted by function areas. From the perspective of this criterion, there can be distinguished: financial controlling, production controlling, personal controlling, sales and marketing controlling, research and development controlling, investment controlling and materials management controlling.

¹ The division based on the management level is closely related to the time horizon of a decision.

The latest literature extends the division of controlling under the functional criterion by ecology controlling [Nesterak 2015, p. 41; Chomuszko 2015, p. 23].



Fig. 1.4. Actions in strategic and operational controlling

Source: developed on the basis of [Nowak 2011, p. 24].

The scope of controlling also constitutes a significant classification criterion. From the perspective of the scope of controlling, complex controlling, production and finance controlling, and financial controlling can be distinguished. Complex controlling covers all function areas of an enterprise and the full impact of the external environment on a given enterprise. If controlling includes the external environment to a limited extent but covers all function areas of an enterprise, we are dealing with production and finance controlling. Financial controlling covers all function areas, with special emphasis on financial functions, and it takes the external environment into consideration to a limited extent [Sierpińska and Niedbała 2003, pp. 50–51].

Having in mind that the paper highlights green controlling as the type of controlling that is currently undergoing dynamic development, and that it tries to emphasise the significance of financial issues as well as changes in business environment pertaining to environmental and social aspects, it seems that in the future it will be possible to distinguish a new type of controlling, i.e. green and financial controlling. This type of controlling considers the external environment in relation to environmental and social aspects as well as all areas of an enterprise that are related to finance.

1.5. The Essence and Role of Green Controlling in an Enterprise

Modern enterprises need to improve the ways of coping with market mechanisms, direct regulations and the disclosure of information related to ecological and social issues. One should remember that, apart from various regulations and disclosures, also the growing competition and consumer requirements are putting more and more pressure on sustainable development.

Changes that occur in the business environment force enterprises to put more effort into pursuing quality development in which environmental and social losses will be limited. Enterprises should introduce the systems of planning, control and the provision of information in order to prevent the damage of the elements of the environment, to prevent the counter-productive consumption of natural resources, as well as to ensure that it is possible to reuse waste, that the working conditions are not excessively harmful to one's health, and that the investment activity of an enterprise and its region is not reduced.

The systems of planning, control and information provision should bring numerous environmental and social benefits, such as improvement of the quality of society's life and health, improvement of water quality, increase in crops, slower depletion of natural resources, and extension of the economic useful life of fixed assets [Tyrała and Stęplewski, pp. 173 and 174].

Green controlling is the planning, control and information provision system whose goal is to derive environmental and social benefits. On the one hand, green controlling should lead to the reduction of costs in an enterprise; on the other hand, it should lead to the fulfilment of social expectations (e.g. as regards the materials used and waste handling). The achievement of these objectives depends on numerous factors, such as the current financial condition of a given enterprise, skills related to financial planning and skills related to taking eco-friendly actions as part of all business processes.

Green controlling is the newest kind of controlling. In the literature, it is regarded as the "new wave" of controlling [Radzikowski, Wierzbiński 1999, p. 80]. It mainly consists of determining the ecological objectives of an enterprise, planning and control of the use of resources and the environmental and social burdens, as well as providing ecological and social information [Nesterak 2015, p. 46].

Three groups of benefits related to green controlling in an enterprise can be distinguished. They include reduction of costs, improvement of relations with stakeholders and increase in market opportunities. The reduction of costs pertains to the reduction of outlays on raw materials and energy, the recovery and recycling of waste, as well as the use of the production and protective equipment. The improvement of relations with stakeholders is related to the establishment of trust relationships with the authorities, consumers, banks, insurance companies, ecological groups, as well as greater identification of employees with the enterprise's ecological and social objectives. The better market opportunities are related to the creation of new sources of competitive advantage, the use of market niches, the provision of the quality of products and technological processes, the stabilisation of products in a longer perspective and the penetration of new market segments.

Green controlling may perform various functions in an enterprise. The basic roles include the role of a consultant, the role of a change agent, the role of an advisor and the role of an information database. The graphic representation of the role of ecological controlling is shown in figure 1.5.



Fig. 1.5. The role of green controlling in an enterprise Source: author's study.

Figure 1.5 shows that if green controlling is the tool that supports the management in changing the business model, it takes the role of a consultant. In the event that green controlling plays an important role in the decision-making process related to the change of the business model, we are dealing with the role of a change agent. The advisory role means supporting the decision-making process in the ecological and social aspect and, at the same time, improving the current practices. The role of gathering information is related to the use of the green controlling tools in order to improve business processes.

1.6. Green Controlling and Finance Management

Each enterprise needs capital and has to manage capital. One of the areas of such management is constituted by finance, which pertains to such issues as shaping the company size and structure of assets, determining the directions and forms of investing the capital of an enterprise, evaluating and choosing investment projects as regards the implementation of the business strategy, forming the size and structure of capital and formulating recommendations related to the distribution of profit. In other words, corporate finance is responsible for the reliable sourcing of capital from various sources and the effective use of the capital in the current business activity and business development.

The fulfilment of finance-related tasks in an enterprise requires the coordination of decisions pertaining to the management of current assets, financial planning, capital expenditure and financial accounting, financial analysis and audit [Nesterak and Kowalik, p. 11]. Knowing that the decisions and actions related to sustainable development influence the aforementioned areas of corporate finance, the relationship between green controlling and finance management seems obvious.

The controlling and financial view on environmental and social issues in an enterprise means that while attempting to ensure the sustainable development of an enterprise, it is also necessary to control its financial condition. The above means that, firstly, green controlling cannot be separated from the assessment of profitability, financial liquidity, efficient asset management, indebtedness, situation on the capital market, investment profitability, capital risk and cost, and secondly, green controlling requires support from financial controlling.

The assessment of profitability, financial liquidity, efficient asset management, indebtedness, situation on the capital market, investment profitability, capital risk and cost is performed by means of the financial analysis of an enterprise. The purpose of financial analysis is to recognise changes and identify the causes of changes in the analysed areas over the period. The implementation of green controlling in an enterprise is about showing how environmentally and socially-oriented actions taken by an enterprise, related to the reduction of costs, the improvement of relations with stakeholders and market opportunities, influence the asset and capital standing as well as the results of the enterprise from the point of view of increasing its value.

While implementing sustainable development, the task of financial controlling is to support the finance management personnel in such a way as to ensure that the economic processes are not interrupted and that the set cost-efficiency goals are reached. Therefore, it should be expected that financial controlling will be oriented at reaching environmental and social objectives.

The basic tools of green controlling, with particular reference to corporate finance, include: 1) in the strategic aspect – SWOT analysis, strategic gap analysis, scenario analysis, strategic balance, analysis of key success factors, benchmarking, analysis of financial ratios, technical and economic analysis, portfolio analysis, analysis of stakeholder expectations, cross-impact analysis; and 2) in the operational aspect – budgeting, short-term cost accounting, ratio analysis and reporting.

1.7. Final Remarks

The basic role of modern controlling is to support the development of an enterprise. If an enterprise is to develop in accordance with the principles of sustainable development, controlling must look for innovative solutions, which will ensure the parallel and coordinated integration of economic, social and environmental aspects into the processes of planning, control and information support. If controlling is presented with such a challenge, the concept of sustainable development should include the functional aspect of controlling.

The system of planning, control and providing information in order to derive environmental and social benefits constitutes green controlling, which cannot be separated from corporate finance. Decisions and actions related to sustainable development influence profitability, financial liquidity, efficient asset management, indebtedness, situation on the capital market, investment profitability, as well as capital risk and cost.

The basic tools of green controlling, applied mainly in economic analysis and management accounting, which are related to corporate finance, are: in the strategic aspect – SWOT analysis, strategic gap analysis, scenario analysis, strategic balance, analysis of key success factors, benchmarking, analysis of financial ratios, technical and economic analysis, portfolio analysis, analysis of stakeholder expectations, cross-impact analysis; and in the operational aspect – budgeting, short-term cost accounting, ratio analysis and reporting.

2 Management of an Enterprise Oriented at Environmental Objectives

2.1. Introductory Remarks

The assumption that organisations are systems that interact with their external environment brings significant consequences to their functioning; in order to survive, organisations must maintain proper relations with the external environment. Therefore, the external environment constitutes a certain metasystem linked to the organisation by means of bilateral interrelations [Krzakiewicz, Cyfert 2013a], and this significantly influences the management process. The relations emerging between the organisation and the external environment, analysed from the perspective of the environment, constitute a special object of interest of the corporate social responsibility (CSR) concept.

The underlying assumption of the CSR concept, which refers to the principle of corporate rights, is that the organisation must take responsibility for the impact of its actions and decisions on society and the environment. Corporate social responsibility is a strategy according to which enterprises voluntarily take into consideration social interest, environmental issues and the expectations of various groups of stakeholders. Stakeholders more and more often expect that the enterprise will conduct its business activity responsibly and will engage in the life of the community and the environment in which it operates [Wachowiak 2011] In most cases, enterprises referring to the concept of social responsibility treat it as "fashionable", and they do not actually attempt to redesign the business model and change their ways of functioning. However, a large number of entities treat the principles of social responsibility and environmental management in a responsible manner [Cyfert, Hoppe 2011]. The purpose of this chapter is to take a stand in the discussion concerning the conditions for performing the management process in enterprises focused on environmental objectives, which are components of the goals of social responsibility. The starting point for the chapter is the specification of environmental objectives within the system of the business goals. In the subsequent part, it serves as the basis for defining the conditions for the management processes in enterprises oriented at environmental objectives, and for describing the basic mechanisms that support the focus on environmental objectives.

2.2. Environmental Objectives as Part of the System of Objectives of an Organisation

The structure of an enterprise as a system is determined by a set of objectives established during the decision-making process, which specifies the condition or effects to which enterprises are heading, and the achievement of which will ensure the survival and development of a given enterprise [Famielec 1997]. In each enterprise, the basic arrangement of the objectives can be specified by referring to the goals of the members of the organisation or by taking the essence of strategy as the starting point.

The starting point for defining the arrangement of corporate objectives through the prism of the goals of the organisation's members is the assumption that the functioning of each organisation includes actions that lead to the fulfilment of various needs of numerous interest groups or the dominant coalition [Cyfert, Krzakiewicz 2009] This assumption was used in the theory of organisational balance created by Ch. Barnard [1997], and later developed by J. March and H. Simon [1964]. For J. March and H. Simon, the starting point for the deliberations on the nature of organisations is the definition of organisation, which they perceive as a system of mutually related social behaviours of a certain number of people, who are called members of the organisation. Therefore, behavioural approach departs from the concept of hierarchical organisational structure, whose goals are identical to those of an entrepreneur, which means that the organisation is perceived as a coalition of units or coalition groups. The coalition includes all persons that have any reasons to expect anything from the company. However, due to the turbulent external environment and volatility of the internal components of the organisation, one cannot establish any fixed borderlines or the composition of the coalition. One can only specify some classes of coalitions.

The compliance of the respective members' actions with the objectives of the organisation is ensured by payments (remuneration and dividends) and the so-called "incentive payments" (rewards and other benefits) made by the organisation. The objectives of the organisation are aspirations rather than imperative determinations. Each member makes a certain contribution, which is valuable to the organisation in some way and influences the fulfilment of its goals. The organisation provides the member with an incentive, which is useful and satisfies the member's specific need. As a result of these actions, it can be assumed that each member will belong to a given organisation as long as the incentive received by the member remains equal or higher than the required contribution.

A correlation similar to the internal relations established between the members of the organisation and the organisation can be seen in the external relations between the organisation and its external environment. These relations are described by the population ecology theory. The population ecology theory assumes that, due to the limited access to resources, there emerges a correlation between the organisation and its external environment, and the external environment consciously selects some of the competing enterprises, choosing those that can satisfy its needs to the fullest extent. In relation to organisations, the external environment uses three mechanisms: differentiation, selection and takeover of resources from the external environment [Hatch 2002]. At this point, one can refer to environmental objectives, which are strongly highlighted by entities these days. The failure to fulfil such objectives by the organisation will lead to its negative verification by the external environment and, in turn, to its fall.

The second method for defining the arrangement of objectives in an organisation is based on the assumption which refers to the essence and nature of strategy. According to this assumption, strategy is a conceptual model of the organisation functioning in the changing external environment. The acceptance of the above imposes the necessity to answer the question about the methods for implementing the model, i.e. the question about the arrangement of strategic objectives carried out by the enterprise. The basic goal of each enterprise seems to be survival and safety – in order to achieve any objectives, the enterprise must exist; however, it can survive in the long-term perspective and fulfil its goals only if it undergoes permanent growth and development. Therefore, the arrangement of goals which include survival (or rather safety in the broader sense) and growth is extended by one more objective: profit, which is the basic condition for and essential means of ensuring safety and growth [Banaszyk 1998].

2.2.1. Objective: Profit

In an enterprise, profit is used to measure the level of completing the set financial objective. The assessment of achievements always takes into consideration the value of the generated financial result. Profit shows the recovery of the outlays made as part of the economic process and the potential benefits derived by owners from the capital contributed to the enterprise. Due to such perception of the nature of profit, in practice, profit is the basic measure of the management's ability to use and transform resources into the objectives of the enterprise [Sierpińska 1999].

In the neoclassical enterprise theory, it is assumed that the enterprise chooses the arrangement of variables under its control in such a way as to maximise the financial profit measured in a certain manner.

The basic condition for the maximisation of profit is the equation of the marginal return (MR) with the marginal cost (MC) so that:

MC = MR

which means that profit is defined as the difference between global revenues and global costs. This definition is obvious and commonly accepted; however, it has a serious limitation – it is not unambiguous. In the literature, there occurs a division into economic profit and book profit.

In the neoclassic model, it is assumed that enterprises maximise economic profit, which is not really true. The economic choice of a company must include the total costs of using all production factors; therefore, the lost profits and risk related to the use of production factors must also be taken into consideration.

The traditional model of a company is all about the total costs and the profit calculated taking into consideration the total costs. However, at this point, there emerges a problem as we do not know all alternative costs which are subjective, based on prognoses and which pertain to alternatives that had never been carried out. As a result, the practical application of the principle of profit maximisation facilitates accounting, as the companies calculate the easily identifiable costs, i.e. book costs. However, such substitution is prohibited according to the profit maximisation model. This is the way to maximise book profit, and not economic profit. Therefore, it is impossible to determine whether the company has generated economic profit and, in turn, to maximise such profit [Gruszecki 1994].

The proponents of treating profit as the basic measure of the functioning of the organisation claim that profit is the most general (it offers the so-called broadest reception field concerning the events that occur in a given enterprise), durable and strong motive that governs the actions of an enterprise. Therefore, even if, as part of its activity, the enterprise takes into consideration any other objectives, their role is decidedly less important, as they allow for lesser explanatory opportunities related to the behaviour of the enterprise, and they highly influence the complexity and illegibility of analysis [Noga 1994].

P. Drucker believes that an enterprise cannot and should not maximise profit, and he justifies this point of view in the following way: if an average businessman is asked what business is, he will probably say that it is an organisation that is supposed to generate profit. The same answer will probably be given by each and every economist. However, it is a false answer; and what is more, it is irrelevant to the topic. It does not mean that profit and profitability are not important. It means that profitability is not an objective of an enterprise or business activity, but their limiting factor. Profit is not the explanation, cause or raison d'être of business actions and decisions, but the test of business value. The problem of each business is not to maximise profit but to achieve the sufficient profit that will cover the risk of economic activity and make it possible to avoid losses. Why cannot profit be the only and dominant objective? As P. Drucker continues his line of reasoning, he proves that managers will contest the future for the sake of the current profit. They will gain as much as possible from the products that are sold most easily at a given moment, and they will neglect the products that constitute the market of the future. They will favour research that brings quick results, promotions and other investments which could be successfully postponed. But most of all, they will avoid expenditure on new equipment because it raises the capital basis to which profit is compared. In other words, it will push them towards the worst management practices [Drucker 1994].

2.2.2. Objective: Growth

The assumption that safety is the basic objective of an enterprise and, at the same time, the acceptance of the assumption that the satisfaction of the needs of the external environment and the expectations of the organisation's mem-
bers are the basic measures of this objective, create the grounds for putting forward a thesis that an enterprise can fulfil the objective of safety only by means of permanent growth and development. The survival-oriented approach leads to counteracting risks and gaining temporary benefits, without changing the internal state and the position in the external environment. However, the development and growth of an enterprise is related to increasing the scale of activity and production factors, introducing technological changes and boosting effectiveness.

This need for growth and development stems from the constantly changing needs of the external environment and the volatility of the members' needs. If an enterprise wants to exist, it has to change, at least to the same extent as the external environment. Furthermore, it has to create opportunities for satisfying the members' needs, which are becoming more and more diverse. This means that the enterprise needs to develop. Failure to pursue development (obviously, in the long-term perspective) is the same as the decision on the self-destruction of the enterprise.

So far, a common approach to defining development and growth has not been established in the literature. According to B. Karlöf [1992], corporate growth means coordinated changes of corporate systems that adjust them to the constantly changing external environment. This adjustment to the external environment is effective only if it provides the enterprise with competitive advantage and ensures that such advantage is maintained.

A slightly different approach to the interpretation of the notion of development, or rather to the nature of development, can be encountered in the works of K. Fabiańska [1991] and J. Rokita [1991]. According to them, development pertains to the process (i.e. the line of the successive and interdependent states of affairs) that occurs over time, in which the successive changes are ordered and remain relatively constant until a crisis occurs.

Development means especially qualitative changes that involve introducing product, process, systemic and structural innovations, whereas growth is a quantitative category. Development is treated as the synonym of growth only when changes in the enterprise are of both qualitative and quantitative nature. In relation to an enterprise, development means the increase in the enterprise's resources, which extends the scale of its activity, generally increases its share in markets and leads to greater diversification of the structure of its activity. Corporate development is measured based on the dynamics of sales value, the dynamics of market share, the dynamics of the increase in asset value, the dynamics of employment and skills potential. As a result of accepting the above, development is equated with growth whereas development strategies are perceived as the synonym of growth strategies.

The relationship between development and growth may be defined on the basis of the correlation: objectives – means of achieving the objectives. Drawing on the definition of development, it can be noticed that the basic condition for the growth of an enterprise is its permanent development. On the other hand, corporate growth creates better conditions for adapting the enterprise to the external environment, and, in turn, it creates better conditions for development. It means that there occurs feedback between growth and development. Due to the specific role of growth, the growth of enterprises is considered the immanent feature of development. The increase in the resources of an enterprise makes it possible to compete in other areas, which means that quantity transforms into quality. According to literature, there is no growth without development. Therefore, it can be assumed that the notion of development includes growth as well [Famielec 1997].

Corporate development is not the objective of an enterprise but it is merely a means of achieving the corporate objective of growth. Growth, on the other hand, has a double role: it is the basic method for achieving goals, because it creates competitive force; in addition, it constitutes a goal of an enterprise.

Referring to I. Ansoff's model and assuming that the development of an enterprise requires making outlays as part of the process of the mutual interaction of the structural elements of the production cycle, two basic types of growth can be distinguished [Fabiańska, Rokita 1991]:

▶ internal growth, which is the consequence of the development of an enterprise, the achieved financial results and economic condition. Internal development means the internal expansion achieved by diversifying business activity; therefore, it is related to intense development oriented at using mostly the already existing potential. In the case of internal growth, starting from the product-market formula, enterprises seek the opportunities for achieving their objectives by intensifying or improving their activity in the market and/or product area. Actions oriented at internal growth on the market may consist of intensifying market penetration or attempting to extend it. In relation to product, internal growth is connected to product modification and development. We encounter internal development in the following situations:

 liquidating narrow cross-sections, using reserves, making the production organisation more efficient, changing the production structure, introducing new products, technologies and machinery; - extending the shift system;

 developing production potential by making new investments and establishing branch offices;

- increasing employment level;

➤ the external growth, sometimes referred to as the external expansion, is ensured by means of the external actions of an enterprise oriented at various kinds of mergers with other entities. In general, we encounter the external growth when the management of an enterprise concludes that the gap in the enterprise development, identified between the line of the assumed strategic objectives and the line of the achieved results, cannot be filled with the actions related to the internal expansion, and therefore that it is justified to go beyond the existing fields of activity. It should be noted that, from the point of view of enterprises, mergers mean the widespread diversification of business activity. Such an observation allows for making an assumption that diversification is the basic method that enables continuous growth.

2.2.3. Objective: Safety

The starting point for deliberations on the essence of safety as the key strategic objective of an enterprise is the assumption that in order to pursue any objectives, as well as in order to function, a given organisation must exist [Obłój 1987, p. 5]. This existence is linked to the need to fulfil objectives which, first, satisfy the requirements of the external environment, and second, satisfy the members of the organisation. While reconstructing the system of corporate goals, it should be noted that it reflects the interests of the enterprise related to shaping both its internal relations and relations with the external environment.

In some cases, the objective of safety has been promoted to the position of the primary goal of companies. J.O. Shaughnessy [1971, p. 26] claims that corporate objectives form a certain line, and the final objectives are always safety and survival, whereas other objectives, which may be called intermediary, take the next positions in the line. J.K. Galbraith suggests that it is natural for each organisation, just like for each organism, to treat safety as the dominant objective [Galbraith 1967]. One may also look for some principles of the concept of prioritising safety in the bounded rationality theory formulated by H. Simon. According to this theory, the decision-maker is looking for satisfaction and not the optimal results; therefore, the decision-maker will put greater emphasis on safety than on maximising the result. A similar viewpoint is expressed by K. Rotschild, who suggests that the desire for safe profit is probably as important as the desire for maximum profit, which means that, in some respect, these two objectives are competitive [Wiszniewski 1994]. Safety assumes that risk should be avoided, while profit maximisation entails the need to carry out projects with enhanced risk level. However, safety is not only about avoiding risk. To a large extent, safety is connected with the search for permanent organisational balance, including balance with the environment.

In order to maximise the level of safety and secure the possibility of reaching environmental objectives, the persons that manage enterprises act based on the assumption that it is necessary for an enterprise to take into consideration social interest and environmental protection issues and, at the same time, attempt to increase its goodwill, strengthen its reputation, develop new products and services, as well as make relations with stakeholders more efficient. According to the concept of social responsibility, as enterprises endeavour to reach their economic objectives, they are required to care for ethical standards, respect the employee and human rights, as well as care for society and the environment [Cyfert, Józefczyk 2013]. Therefore, the concept of social responsibility refers to the principle of the rights of corporation, according to which a corporation and its managers should not violate the right to decide about one's own future [Freemena, Evan 1999]. The above assumption is often denied in literature; some authors question the legitimacy of pursuing social and environmental objectives at the owners' cost, pointing that the basic task and obligation of an enterprise is to increase profit, which is proven in the following way [Black, Wright, Bachman 2000, p. 25]:

▶ in the market economy, which respects the right to private ownership, the only social responsibility of an enterprise is to create value for the shareholders in a legal and ethical manner. Social issues, such as education, health protection, drug abuse and environmental protection, constitute a huge challenge. However, those who manage enterprises have neither political legitimacy nor knowledge to decide what is compliant with social interest and what is not. The fulfilment of social objectives by managers representing the enterprise would mean that they spend somebody else's money for the purposes related to social interest. This would also cause the reduction of shareholders' income. Shareholders or other groups that incur loss due to such policy conducted by managers ers could spend their own money on some special actions if they wanted to do

that. As a consequence of these actions, managers, on the one hand, impose taxes on the shareholders or other interested groups and, on the other hand, decide on spending the revenues from sale on social purposes and therefore, carry out actions reserved only to the government and state;

➤ the postulates connected with balancing the interest of all entities related to the enterprise make it easier for managers to justify uneconomic diversifications or excessive investments in the basic activity which is heading towards its end, because such actions will be assessed by persons other than shareholders. For employees, it means more jobs in the short term; suppliers have the opportunity for additional and continuous supplies, and the local community gains a greater tax base resulting from the growth of the enterprise [Friedman 1970]. However, in the long run, such actions must lead to the fall of the enterprise;

• while highlighting the profit-objective imperative, the critics of the stakeholders theory do not claim that managers who represent enterprises should not fulfil the objectives of their stakeholders. They may achieve their goals provided that such actions maximise profit or increase the value for shareholders. They support this view stating that the prioritisation of the value for shareholders does not result in ignoring the interest of other interested parties. Personnel will leave their job if they do not earn enough or are not treated well, clients will go somewhere else if they are not pleased, and also suppliers must be satisfied. By applying measures that maximise the value of the company, the enterprise may also promote the interests of other interested parties and shareholders. At the same time, it adds value to the society in which is functions. The enterprise will become useless to its employees, or society in general, if it is not able to earn money, regardless of what it is doing.

The provision of the safety objective requires the persons that manage organisations to strengthen the links between economy, society and the environment [Kronenberg 2010]. Each product is manufactured on the basis of resources obtained from the natural environment. Also intangible services require the use of resources, such as transport. After the use, products become waste and return to the environment. The environment provides resources that are indispensable for the production of goods, both directly and indirectly. Therefore, economy and society constitute elements of the environmental system and depend on it. In order to ensure sustainable development, enterprises must use natural resources in a way that does not violate the environment's ability to provide such resources in the future [Józefczyk 2014].

2.3. Conditions Related to the Management Processes in Enterprises Oriented at Environmental Objectives

The behaviour of modern organisations is determined by the increasing complexity of phenomena and processes occurring in the external environment. In order to survive and develop on the competitive market, organisations must change in the pace that is at least similar to that of the external environment in which they function, and integrate the postulates brought by the environment in which they function into their system of objectives. It means that while optimising the management processes, organisations should pursue the harmonisation of their actions with the requirements imposed by the external environment. The adoption of the above assumption makes it necessary to search for the answers to the question about the components of the management system which have the greatest influence on the effective implementation of a new solution.

Based on the research conducted by V. Józefczyk [2014], one may conclude that the critical factors related to the effectiveness of implementing the concept of sustainable development, as well as potentially significant barriers to its implementation, are the variables regarded as the soft management factors. In order to describe the configuration of these soft management factors more precisely, one may point to the attitude of the management board (leadership), cultural variables and the organisational learning processes. If these variables are redesigned and the solutions used in the organisation are adjusted to the performance of the set social and environmental objectives, the enterprise is bound to achieve the optimally effective strategy. The above results constitute the basis for a conclusion that the implementation of environmental objectives in the organisation management system requires developing a long-term action plan and focusing on the long-term benefits rather than on the short-term ones [Cyfert, Józefczyk 2013].

2.3.1. Cultural Determinants of the Management Processes in Enterprises Oriented at Environmental Objectives

Actions taken within the organisation are harmonised when all members of the organisation understand the mission which specifies the goal of the organisation and shows the manner of conducting the process of allocating resources within the enterprise. In the event that the mission, the actual scope of the organisation's activity and the system of the members' behaviour models are coherent, an integrated model of organisational culture is developed. This model sets the decision algorithm that gives sense to the actions performed by the members of the organisation and constitutes the basic indicator in the decision-making processes [Krzakiewicz 2009]. The level of coherence between the individual value system, the perception of employees and the applicable model of organisational culture constitutes the factor that determines the effectiveness of the organisation's functioning [Nogalski 1998]. Organisational culture understood this way, i.e. as a set of standards and values that determine the way in which the organisation's members act, specifies the features that distinguish a given organisation from others [Hofstede 2000; Sikorski 2002].

D. Teneta-Skwiercz [2013] points that enterprises' involvement in solving social and environmental problems is enhanced by:

▶ the focus on rewards and acknowledgement; strengthening the employees' involvement in the implementation of the concept of social responsibility by means of a system for identifying, implementing and rewarding bottom-up CSR initiatives; the proper rewards and acknowledgement increase the employees' motivation for the systematic implementation of the principles of social responsibility in the current decision-making processes;

▶ learning and change management; the organisation oriented at the fulfilment of postulates of social responsibility requires a strong focus on constant learning, tolerance for mistakes, acceptance of risk, openness to external ideas, as well as constant improvement;

▶ awareness and involvement; in order for the organisation to succeed, it is important not only to know the stakeholders of the enterprise and their problems; most of all, the employees should be devoted to solving problems;

▶ curiosity as well as identifying and solving problems; the management system can undergo further improvements if the employees may express their opinions and doubts related to the objectives, standards and practices of the enterprise. In the short term, the lack of discussions and the failure to encourage employees to analyse the ways and directions of the organisation's activity will promote the coherence of the organisation; however, in the long run, such a situation will turn against the organisation.

▶ respect; in order to fulfil the goals of the organisation, it is necessary to give due attention to the postulates of all stakeholders, promote tolerance of

new ideas, improve the credibility and effectiveness of the communication system as well as boost pride in the individual and organisational successes.

While attempting to change the organisational culture in such a way as to support the performance of environmental objectives, one should remember that the change of the character of the organisation and its cultural background is an especially complex undertaking. In order to avoid the decrease in the organisation's effectiveness during the process of changing the organisational culture and giving prominence to environmental objectives, it becomes necessary to take actions that build trust as well as increase the activity of all members of the organisation. Obviously, such actions always entail some problems and failures, but leaders must have the courage to formulate the general principles of action which will serve as points of reference for employees. Leaders must create the feeling of dynamism and simultaneously pay much attention to those that want to develop and accept the mission of the company [Cyfert, Krzakiewicz 2013b]. The key success factor is the creation of the proper organisational culture, which may be compared to a building constructed brick by brick. The process of creating organisational culture is not a "huge event" but rather a set of minor undertakings carried out over a long period of time. These positive undertakings integrate the members of the organisation and create the proper atmosphere.

2.3.2. Leadership as the Determinant of Management Processes in Enterprises Oriented at Environmental Objectives

If enterprises want to create long-term competitive advantage, they need to devote their attention and energy not to the inside and the internal demonstration of productivity, but to the outside – to the market, competition, recipients and environment. Simultaneously, due to the new reality and the fact that the organisational development is based on intangible factors, traditional leaders are not able to ensure the success of the organisation. Therefore, organisations need innovative leaders whose characteristics are different from those that used to be the basis for establishing competitive advantage. Instead of managers that administer the resources and endeavour to optimise the processes of obtaining and allocating tangible resources, organisations need leaders that have an explicit vision of the directions for the organisation's development and the internal authority that will enable them to make their visions come true. In this

context, D. Teneta-Skwiercz [2013] defines the characteristics of an effective leader, who is also an ethical leader. These characteristics include: the sense of personal responsibility, which results in strong involvement; analytical skills necessary to make proper decisions; interpersonal skills that make it possible to encourage others to act; moral bravery, which means choosing a less popular path; respect of personal property, which excludes any form of discrimination; honesty, which means providing the workers with true information about the situation of the enterprise and the leader; distributive justice, which means making impartial assessments and granting rewards based on merits. D. Teneta-Skwiercz refers to the research by A.H.B. De Hoogh and D.N. Den Hartog that shows that the attributes of the social responsibility leader are positively correlated with ethical leadership and negatively correlated with despotic leadership. The researchers prove that ethical leadership increases the effectiveness of the management board's actions and influences the employee' positive thinking about the future, whereas despotic leadership exercises negative influence on both the actions of the management board and the employees' optimism.

There's one more important characteristics that needs to be discussed as regards the features of the leader focused on the achievement of environmental objectives. Most managers change the management style in a reactive manner, concentrating on specific tasks, and they believe that leadership should be focused on solving the emerging problems. In the new conditions, this assumption seems to be incorrect. Effective leadership should be oriented at the creation of problems, and not their reduction and elimination. The role of a leader is not to petrify the methods and techniques currently employed by the company. On the contrary, leaders should stimulate the organisational imagination and allow for experiments [Northouse 2012], at the same time strengthening the pressure on fulfilling environmentally-oriented objectives. The task of managers is to challenge the organisation, and not to control its functioning. While formulating a task for employees, it is necessary to make them face a certain challenge, force them to act on the verge of their skills, and show them problems without indicating ready solutions or modes of action. Sometimes, while proving the legitimacy of the explicit specification of leadership, it is assumed that the lack of leadership leads to chaos. A counter-argument for the aforementioned assumptions is the fact that the lack of a leader most often causes the repetition of the current state, as a result of which the organisation becomes static and conservative. This means that the basic role of leaders is to integrate chaos and order - to stimulate employees to resign from routine and destroy the schemes of actions

that currently generate profit, and then to create new schemes in lieu of the old ones [Cyfert, Krzakiewicz 2013b].

2.3.3. Influence of the Organisational Learning on the Efficiency of Management Processes in Enterprises Oriented at Environmental Objectives

Effective leadership is based on the continuous search for new ideas related to the implementation of actions focused on the increase in the employees' engagement in decision-making processes. Searching for new ideas and ensuring the employees' involvement in organisations oriented at environmental objectives will be effective only when enterprises are able to transform themselves into organisations that learn, generate and generalise productive ideas. Organisations oriented at the fulfilment of environmental objectives should endeavour to become the idea leaders in their industries, to determine the rules and impose them on others, and not to limit their opportunities by following somebody else's strategic choices. The members of such organisations must be able to "get rid of" the outdated knowledge in order to gain new knowledge, and they should resign from their methods of acting in order to embrace new models and be ready to face challenges and carry out continuous experiments. At the same time, managers should work in the conditions that enable them to constantly search for new approaches, solutions and working methods. Knowledge is the only resource that should reproduce itself. The depreciation of knowledge leads to the erosion of the organisation's value system. And when knowledge is developed, the value system becomes stronger [Cyfert, Krzakiewicz 2013c].

Obviously, the construction of the learning organisation cannot be limited only to providing conditions that enable managers to make decisions. The successful implementation of the concept of the learning organisation to a large extent depends on creating the atmosphere of trust and co-participation. The learning organisation is a significant problem for the traditional organisation. The managers of learning organisations are researchers and constructors, and not controllers and supervisors. Their role is to develop the employees' openness to new ideas, readiness for open interpersonal cooperation, profound understanding of the operating methods applied in their company, as well as readiness for joint work with a view to achieving the joint objective [Cyfert, Krzakiewicz 2009].

The attempts to transform enterprises into learning organisations made it possible to identify a number of challenges. The basic problem is that managers do not want to resign from the traditional functions of control and authority to make decisions, which they should delegate to their subordinates. Furthermore, organisations often ignore the principle according to which the members who are learning should have the right to experiment and make mistakes. Given the currently predominant orientation, which is characterised by the search for someone to blame for the occurring problems, the new approach requires wide and complex changes. The application of the management system that allows for mistakes, engages employees in decision-making processes and forces them to constantly develop and search for the external opportunities, will facilitate the implementation of environmental objectives. The properly motivated employees who are aware of the objectives of the organisation, which are explicit and determined in cooperation with the employees, will undoubtedly constitute a significant factor influencing the effectiveness of implementing the principles of the organisation oriented at environmental objectives.

2.4. Mechanisms Supporting the Focus on Environmental Objectives

New technologies and the unlimited access to information have changed the shape and character of the modern work processes, markets and lifestyle. The elements listed above can be modelled or designed, but the attempts to mechanically adjust and transform human resources are bound to fail; you cannot program a person who is a member of the organisation. In the processes of managing modern organisations, the basic problem is to obtain, select and allocate information, which leads to stressful situations and causes chaos. Therefore, it becomes indispensable to shape new communication systems that will lead to a breakthrough in the production of goods, services and the use of human resources.

The successful implementation of environmental objectives requires the transformation of the communication system so that it would inspire the members of the organisation to become involved in the change process and encourage them to take challenges. The attempts to involve employees may lead to the "rediscovery" of the significance of interpersonal contacts. In most organisation, the modern systems that underlie the communication systems, i.e. the Internet

and Intranet, are rather attractive than effective mechanisms for exchanging information, while their use requires substantial outlays. Although such actions should be deemed proper, managers very often do not realise the difference between the methods and instruments of communication. The Intranet is only an instrument of communication. The Intranet does not communicate with people - communication takes place between people. Even the best system based on electronic channels will not guarantee effective communication. The employees' emotional engagement in the communication process, and then in the management process, is extremely important for the proper implementation of environmental objectives. For this reason, the management system employed in the organisations focused on environmental objectives should be based on soft components, and trust should be one of such significant components. There is a huge difference between acceptance and trust. Nowadays, leaders often make an error of shaping the organisational culture which has the acceptance but not the faith of the employees. The establishment of the management system of the organisation oriented at environmental objectives requires atmosphere in which the members believe in the efficiency of the strategy, trust in the management's decisions and believe in the sense of the work they do.

The success in the implementation of the environmentally-oriented organisation is strongly dependent on the employees' acceptance of change processes and the ability to reformulate goals in a flexible manner. In the new conditions, managers and employees must understand the significance of using past experience, both positive and negative. Failures teach us how to succeed in the future and for this reason employees have to analyse the processes from the previous decades.

Management cannot be based on the assumption that people in the organisation can be assigned to given positions in the organisation connected to the predefined units, and that the organisation is a relatively stable and, in principle, hierarchical structure of positions. Employees should be given substantial autonomy in creating teams or working groups, which should be able to communicate and integrate. This will ensure the maximum contribution to the effective functioning of the organisation. The processes of team development should be based on moving the members of the organisation in a way that will ensure their effective cooperation on searching for new opportunities and mastering the ways of using them in an effective manner.

The incentive system represents another area that needs to be changed as part of the process of transforming an organisation in a way that incorporates environmental objectives. It is important to create a special incentive system for teams that will develop and implement pioneer environmental programmes and initiatives related to them. A reward system should be created that promotes cooperation between teams and activities that strengthen the sources of competitive advantage.

2.5. Final Remarks

The management of environmental objectives means not only the fulfilment of all formal and legal requirements pertaining to the functioning of the enterprise, but it has to be related to putting proper emphasis on investments in human resources, environmental protection and care for the relations with the external environment, arising out of the voluntary involvement [Józefczyk 2014]. One should also remember that responsible business and sustainable management constitute a systemic approach based on the principles of social dialogue and the search for solutions that are beneficial both to the enterprise and its external environment [Cyfert, Józefczyk 2013]. The performance of the management process based on the principles of responsible business requires the proper distribution of emphasis in the respective components of the process, as well as strong support for actions which are favourable to the environment in which a given organisation functions. To a large extent, the success of an enterprise that makes an attempt to re-orient the management system towards strengthening environmental objectives is contingent upon the involvement of employees, the ability to manage knowledge and build a learning system, as well as the remodelling of communication.

3 Ecological Conditions of the Functioning and Development of an Enterprise

3.1. Introductory Remarks

The purpose of this chapter is to indicate the ecological conditions of environmental management tools applied in organisations that affect the functioning and development of enterprises within the context of controlling and finance. The chapter contains description of legal aspects of environmental protection, including the functioning of enterprises, in particular reporting on environmental protection, and basic tools contributing to the improvement of the actions in the scope of management of the areas affecting the environment and the society. The chapter contains definition of effectiveness and efficiency of the environmental activity of an organisation and indicates standardised tools of the evaluation of its environmental performance. Apart from that, attention has been paid to the role of audits in environmental management in the aspect of controlling and finance.

3.2. Legal Aspects of Environmental Protection in the Activity Conducted by an Organisation

The activities connected with the fulfilment of legal requirements in the scope of environmental protection are a considerable challenge to many organisations. Many economic operators do not realise how many requirements in the field of environmental protection have to be met by an organisation operating on the market. This is the reason why the economic policy of many countries and the strategies adopted by organisations take into account the issues that do not only relate to the improvement of the quality of products but also to the minimisation of the adverse environmental impact and the improvement of the corporate image. Stricter legal requirements in the scope of environmental protection and greater competition are becoming more and more significant. Therefore, organisations should apply different tools to increase productivity and recycling, to minimise the quantity of the generated waste and to limit the energy intensity and material consumption. The implementation of the aforementioned activities depends on many factors, including an enterprise's policy and objectives stemming from it that take into account the ecological, economic and social aspects [Kulczycka 2011]. Furthermore, the activities should be supplemented with financial reporting that also includes the aspects related to environmental protection and identification of costs of environmental protection in particular processes, an investment feasibility study that includes the environmental life cycle of a product and taking into consideration the environmental aspects in the design of a product and possibilities of incurring higher costs of research and new implementations, innovative solutions and launching new products on the market. What constitutes the basis in the performance of the afore-mentioned activities is the fulfilment by organisations of legal requirements in the field of environmental protection. In many cases, this poses an enormous challenge to entrepreneurs.

Conducting business activity requires obtaining permits and decisions, not only for conducting operations, but also for the generation of waste, emissions to the air, consumption of water in the case of using a well, discharge of effluents or other emissions. What should be also emphasised is that in the event that a system in a given organisation has a considerable environmental impact, the organisation has to obtain an integrated permit¹. Charges for the commercial use of the environment, constituting the basic form of reporting in the scope of environmental protection connected with the financial instrument of environmental protection are another problem tackled by economic operators. Many of them do not realise that such charges should be settled on an annual basis or at

¹ Integrated permit – a formal and legal instrument introduced to the Community law under Council Directive 96/61/EC of 24 September 1996 concerning Integrated Pollution Prevention and Control (the IPPC Directive).

least should be calculated on the basis of the Ordinance of the Minister of the Environment on charges for the commercial use of the environment. Despite the fact that the charges are to be paid only if their annual value exceeds PLN 800, the reporting obligation is of general nature and does by no means depend on the value of the charge. Pursuant to the Ordinance, reports are maintained in paper or electronic form, in a tabular layout. Organisations should maintain a register, updated on an annual basis. Their register should include:

• information on the quality and quantity of surface water and groundwater abstraction;

▶ information on the quantity, condition and composition of effluents discharged into waters or the ground;

• information on the size, type and manner of management of the area from which effluents are discharged;

▶ information on the production volume of fish other than salmonids or any other aquatic organisms and the usable space of ponds operated in the production cycle in the fish or organism raising and breeding facilities.

The general obligation of an entity that maintains a system and a device user in the scope of reporting on measurement results is imposed under Article 149 Section 1 of the Act – the Environmental Protection Law of 27 April 2001. If measurements are of considerable significance due to the need to ensure systematic control of the emission volume or other conditions of use of the environment, such entities are obliged to present them to the authority responsible for environmental protection and the Provincial Inspector for Environmental Protection. The issue of reporting in the scope of emission of gases and dusts to the air is the subject of the regulations imposed under the Act on Managing Emissions of Greenhouse Gases and Other Substances of 17 July 2009 (Dz.U. (Journal of Laws) of 2013, item 1107, as amended). What should be also highlighted is that many economic operators have not yet been registered with KOBIZE (the Polish National Centre of Emission Balancing and Management)². Each entrepreneur that takes advantage of the environment should submit an annual report on emissions of greenhouse gases and other substances with KOBIZE. Ultimately, such reporting is to replace the charges calculated so far for the commercial use of the environment.

Reporting in the scope of products, packaging and waste management is of informative and control nature. Annual reports on products, packaging and

² KOBIZE – the Polish National Centre of Emission Balancing and Management.

management of waste generated from products and packaging are to be prepared by:

• entities that market and export packages,

• entities that market packaged products, export and provide the intra-Community supply of packaged products,

- entities that market vehicles,
- entities that market electrical and electronic equipment,
- entities that market batteries and accumulators.

In the event that the obligations of the marketing entity are performed by a recovery organisation, an electrical and electronic equipment recovery organisation or a packaging recovery organisation, the report on the fulfilment of the obligations is prepared by such an organisation.

Annual reports on the generated waste and waste management are to be prepared by:

• waste producers obliged to maintain a register of waste;

• entities conducting activity which involves waste management, except entities conducting activity of municipal waste collection, in the scope of:

- collection of waste,
- treatment of waste entities obliged to maintain a register of waste;

• entities conducting activity which involves extraction of waste from a landfill site or a valley fill, on the basis of a permit for extraction of waste or a decision approving the instructions of running a landfill site in the pre-operational phase.

Environmental reporting carried out by economic entities is basically of informative and control nature, thus it serves the public administration rather than the entities themselves. It is partially connected with the reporting obligations of a state on the international and EU level. Apart from environmental reporting in its strict sense, national general reporting connected with environmental protection is maintained by statistical offices.

The process of identifying legal requirements and taking into account the requirements related to a given organisation, and the subsequent fulfilment of such requirements is an extremely difficult process for many organisations, in particular taking into account the fact that many companies do not have an Environmental Protection Department or even an Environmental Protection Specialist. In many enterprises, tasks of this type are assigned to employees of the Accounting Department.

In order to meet legal requirements, many organisations make a decision to implement an environmental management system according to the requirements of ISO 14001 or the EU's Eco-Management and Audit Scheme (EMAS), which assures systemic planning, supervision and management of the actions aimed to minimise the adverse impact on the environment and to accomplish environmental performance.

That is why ISO 14001 or Regulation (EC) No. 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No. 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC (hereinafter: EMAS regulations) is a perfect tool allowing one to ensure compliance with legal requirements in the scope of environmental protection and, at the same time, to accomplish environmental performance by an organisation.

Environmental management systems, designed to meet the requirements of the international standard ISO 14001, are becoming more and more popular, both in Poland and globally. The latest edition of the annual review carried out by the International Organisation for Standardisation (ISO) related to the number of ISO 14001 certificates issued globally [ISO Survey 2013] indicated a considerable increase in the number of issued certificates. It was stated that as at the end of 2013 more than 301 thousand certificates were issued in the world, which constitutes an increase by 100% as compared to 2007. As regards the number of certificates confirming the compliance of an organisation's existing environmental management system with the requirements of ISO 14001, an unquestionable leader is China, where more than 104 thousand certificates were issued by the end of December 2013. When it comes to Europe, the leader is Italy, with more than 24 thousand ISO 14001 certificates. Poland takes the 11th position.

The number of EMAS registrations is much lower, though. As at 31 May 2015, there were only 65 Polish organisations that are EMAS registered³ whereas the number of registered European organisations reaches 2,956⁴. What should be emphasised here is that the largest number of organisations registered in the scheme come from Italy and Spain (1,053 and 911, respectively).

³ www.emas.gdos.gov.pl

⁴ www.ec.europa.eu

3.3. A Systemic Approach to Environmental Management in an Organisation according to ISO 14001

The international standard ISO 14001 contains requirements as regards a systemic approach to environmental management. ISO 14001 is a document that is applied by organisations on a voluntary basis; it is publicly available and accepted by the accredited standardisation body. It contains specifications related to the systemic approach to environmental management. The standard was prepared in such a way that it can be applied to different geographical, cultural and social conditions. What should be also highlighted is that ISO 14001 does not establish absolute requirements related to environmental performance [Raines 2002], but it only contains requirements related to an undertaking expressed by organisation's management in the environmental policy, stating that the organisation will comply with relevant legal requirements related to its environmental aspects and considerable environmental impact. Moreover, in its environmental policy, an organisation should place an undertaking to minimise contamination, to improve the condition of the environment and environmental performance on a permanent basis. In connection with the above, the requirements of ISO 14001 may be met by organisations conducting similar or different activities, being of similar or different size, located in similar or different surroundings and having different environmental performance [Ammenberg, Hjelm 2002]. ISO 14001 may be used for internal purposes connected in particular with the assurance of an effective systemic approach to management, and for external purposes connected with environmental performance related to organisation's activity, aimed to meet the expectations of stakeholders. That is the reason why the application of the environmental management system according to the requirements of ISO 14001 may be used by an organisation as reliable and documented actions it undertakes to carry out in its environmental policy and performs through relevant environmental objectives [Matuszak-Flejszman 2007]. For example, it may refer to the supplier's compliance evaluation, carried out e.g. by the enterprise's client and stakeholders and to the certification performed by an independent certifying body.

ISO 14001 specifies basic elements an organisation should pay attention to at the time of the implementation, maintenance and improvement of its environmental management system. The most important elements include:

▶ an undertaking to improve on a permanent basis, understood as a repeated process of improvement of the environmental management system, aimed

to enhance the general environmental performance, in compliance with the organisation's environmental policy [ISO 14001],

• an undertaking to assure compliance with applicable legal requirements in the scope of environmental protection, connected with the environmental aspects occurring in the organisation.

After carrying out an evaluation of its current environmental condition, an organisation that is willing to implement, maintain and improve an environmental management system should plan, implement, assess and review on a periodic basis its environmental management system in compliance with Deming's "Plan-Do-Check-Act (PDCA)" Cycle.

The first stage is connected with planning an environmental management system and includes the establishment of a permanent planning process that enables an organisation [ISO 14004]:

• to identify environmental aspects and related environmental impacts,

• to identify and monitor applicable legal and other requirements an organisation has undertaken to meet and, where applicable, to establish internal criteria of performance,

▶ to establish environmental objectives and tasks and to develop a programme (programmes) aimed to accomplish them,

• to develop and apply performance indicators.

The second stage relates to the implementation and functioning of the environmental management system. As part of this stage, an organisation should [Matuszak-Flejszman 2010b]:

▶ establish management structures, assign roles and responsibilities together with relevant powers,

• ensure relevant resources necessary for implementation, maintenance and improvement of the environmental management system,

▶ train people working for or on behalf of the organisation and ensure a relevant level of their awareness and competence,

• establish internal and external communications processes,

• develop and maintain the environmental management system documentation and ensure control of the documentation,

- establish and maintain relevant operational control,
- ensure emergency preparedness and response.

The third stage is connected with the evaluation of the environmental management system and may be performed by means of [Matuszak-Flejszman 2010b]:

• monitoring and measurements,

• evaluation of compliance with legal and other requirements,

▶ identification of non-conformities and taking corrective and preventive actions,

control of records,

internal audits.

The last, fourth stage (Act) includes elements related to the management review and taking actions aimed to improve the environmental management system. As part of this stage, the top management should carry out, at relevant intervals, reviews of the environmental management system and identify areas that require improvement.

3.4. Eco-Management and Audit Scheme (EMAS) in an Organisation

Another important tool of certain significance in green controlling as regards the systemic approach to environmental management in an organisation is the Regulation of the European Parliament and of the Council on eco-management and audit scheme (EMAS). The primary objective of EMAS is the use by organisations of a possibility of continuous reduction in the adverse environmental impact, reduction in waste, increase in effectiveness, improvement of its corporate image, easier fulfilment of legal requirements and an increase in the ecological awareness of consumers, banks and insurance companies, as well as taking into consideration clean technologies in their activities [Matuszak-Flejszman 2014].

EMAS is based on the environmental management system according to the requirements of the International Standard ISO 14001 and was supplemented with the following elements:

strengthened compliance mechanism,

• strengthened reporting on environmental performance with the use of the main environmental performance indicators;

• guidelines on the best environmental management practices [Matuszak-Flejszman 2013].

The major objective of EMAS as an important instrument of the sustainable consumption and production and sustainable industrial policy action plan is to support the continuous improvement of environmental performance of an organisation by means of establishment and implementation of environmental management systems, systematic, objective and periodic evaluation of effectiveness of such systems, provision of information on environmental performance, conducting an open dialogue with the public and other interested parties and active involvement of organisation's employees and relevant training [EMAS 1221/2009].

The established eco-management and audit scheme is defined as a set of measures taken by an enterprise for the purpose of environmental protection, taking into account the technical processes, equipment, remedial measures and principles of supervision and control. The scheme should constitute a part of the overall management system that includes the organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy and managing the environmental aspects [EMAS 1221/2009].

The eco-audit is also an element of the new concept of actions, which consists of partial abandonment of the regime and supplementation of it with the obligation to control the compliance by an enterprise with relevant requirements. However, the scheme remains a public-law system, since the acts pursuant to which it is introduced reserve a right of supervision over the enterprise's compliance with the system assumptions. Then, supervision is exercised by a wide range of institutions, such as independent environmental verifiers, authorities dealing with granting accreditation, Member States, the committee responsible for the coordination of and supervision over the scheme and, finally, the public opinion that verifies the scheme's effectiveness.

What distinguishes EMAS from the environmental management system compliant with the requirements of ISO 14001 are, in particular, the obligation of an organisation to make public its environmental statement containing information on its environmental impact and environmental performance on an annual basis. External communication and informing stakeholders of direct and indirect environmental aspects are absolute requirements. Pursuant to the provisions of Annex II to the EMAS Regulation, organisations shall be able to demonstrate an open dialogue with the public and other interested parties, including local communities and customers [EMAS 1221/2009]. The afore-mentioned dialogue is to concern the impact of the company's actions, products and services on the environment, for the purpose of identifying issues of interest to the public and other interested parties. The other factors distinguishing EMAS from other environmental management systems include openness, transparency and presentation of information on a periodic basis in order to build confidence of stakeholders [Matuszak-Flejszman 2014].

The EMAS Regulation enables enterprises to voluntarily participate in the European environmental management system. Economic operators are given an EU registration number as evidence of participation in the scheme and may use the EMAS logo.

3.5. Environmental Audits as an Element of Controlling in an Organisation

The evaluation of compliance of the functioning of the environmental management system with the requirements of ISO 14001 or the EMAS Regulation and the effectiveness of the environmental activity of an organisation is carried out by means of internal and external audits.

Internal audits, also referred to as first-party audits, are conducted by organisation's employees or on behalf of an organisation for the purpose of management review and for other internal purposes. They may constitute the basis for declaration of the organisation's compliance with requirements, effectiveness of actions and for indication of possibilities of improvement in this area. In many cases, they are treated as a tool allowing one to verify if the environmental management system complies with the adopted assumptions and whether it is subject to improvements. Moreover, as part of the EMAS scheme there is a requirement to evaluate the effects of the organisation's environmental activity at the time of conducting audits [Annex III to EMAS 1221/2009].

External audits include second- and third-party audits. Second-party audits are conducted by parties interested in the environmental activity of an organisation, including, for example, clients or any other persons acting on behalf of clients. Third-party audits are carried out by independent external organisations, such as certifying authorities or authorities that verify the compliance of the existing environmental management system with the requirements of ISO 14001 or the EMAS Regulation. What should be emphasised here is that during the certification audit auditors focus on the evaluation of the compliance of the existing environmental management system with the requirements of ISO 14001 or the EMAS Regulation, whereas follow-up audits focus on the evaluation of the effectiveness of the environmental management system and the organisation's environmental performance resulting from it. To define the principles of auditing, the International Organisation for Standardisation developed a separate standard, i.e. ISO 19011, containing the guidelines in the scope of conducting internal and external audits of management systems. In accordance with the guidelines contained in ISO 19011, an environmental audit is aimed at:

▶ stating compliance of the audited environmental management system with the audit criteria, including, for example, the environmental policy, environmental aspects, legal and other requirements related to environmental protection, environmental documentation,

• stating if the environmental management system has been properly implemented and is properly maintained,

• defining weaknesses of the environmental management system that may be improved,

• evaluate the ability of the internal management review process for the purpose of assurance of continuous suitability and effectiveness of the environmental management,

• presenting the client with audit results in a clear and firm manner within the time limits agreed in the audit schedule,

• presenting recommendations related to the improvement of the environmental management system if it was included in the agreed scope of the audit.

As a result of conducting an objective evaluation of the environmental management system, auditors should put forward recommendations related to the improvement of the EMS. Obviously, such recommendations depend on whether or not arrangements have been made in this scope, and no recommendations should be presented to the audited organisation by the auditor conducting a third-party audit. To ensure the effectiveness of the audit process, auditors should comply with basic principles on which an audit of an environmental management system relies [Matuszak-Flejszman 2010a].

What should be also stressed is that audit is a tool used not only for the evaluation of compliance with the requirements or for indication of possibilities of improvement of the environmental management system, but also for evaluation of the effectiveness of this management system in an organisation. Thus, it refers to all components resulting from the essence of the environmental management system, occurring in every organisation, regardless of its size or complexity, nature of activity and form of ownership [Kraśniewski 2010]. An environmental audit should cover all significant environmental aspects connected with organisation's activity, its products or services, which directly or indirectly impact the environment. In view of the above, an audit should focus on the evaluation of the degree of accomplishment of environmental objectives and tasks and of the adopted environmental policy as compared with the establishments contained in the documentation of the environmental management system, in organisational and normative documents (regulations, resolutions and directions) and in operational documents developed for particular undertakings (plans, schedules), and end on the actions actually performed on work stations in organisational units [Dunaj-Gryzio 2002].

One of the elements that should be subject to evaluation at the time of an audit is environmental performance accomplished by an organisation as a result of maintenance and improvement of an environmental management system.

Each audit results in a report. The report is discussed as part of the management review devoted to the environmental management system. During the management review, the organisation's top management evaluate adequacy and effectiveness of the existing environmental management system. Other matters discussed at the time of management reviews encompass feedback from interested parties, including all complaints, results of the evaluation of compliance with legal and other requirements in the scope of environmental protection, degree of accomplishment of environmental objectives and targets and environmental performance, the status of corrective and preventive actions, follow-up actions from previous management reviews, and recommendations put forward as a result of the previous audits. The purpose of the management review is to indicate the areas that require improvement and to demonstrate the effectiveness of the functioning of the environmental management system. As a result of the management review a report is prepared, and the recommendations contained in the report are discussed during the next management review.

3.6. Evaluation of Environmental Effectiveness and Performance of an Organisation

The assurance of efficient and effective accomplishment of the organisation's objectives through the prism of which it is evaluated is a significant determinant of management and successful operation of an organisation. In most cases, the evaluation of an organisation and the fulfilment of its tasks relate to its effectiveness, which, in turn, is determined by the effectiveness of its manage-

rial staff [Łańcucki 2004]. The concept of operation efficiency is understood as a positive result of the evaluation of the compliance of the result of the activity with its objective, the ability to choose relevant objectives, relevant things to do, i.e. what the organisation needs and desires for its proper functioning and development [Penc 1997]. The efficiency of operation is a function of both the properties of the system that performs a task and the specificity of the task itself. Thus, the efficiency of an environmental management system may be perceived in the light of compliance of the result of activity with the environmental objectives pursued and skilfully selected by an organisation, as well as in the light of compliance with the requirements imposed on it.

The same is the case as regards the definition of the concept of "effectiveness." In economic terms, "effectiveness" is associated with the economic efficiency of business entities, which relies on their ability to produce, at a given time and with the use of given resources, a certain quantity of goods and services to meet the recipients' needs. The inseparable characteristics of efficiency include promptness and purposefulness of activity. A relative measure in which the degree of effectiveness depends on whether revenue divided by cost is smaller or greater may be a measure of effectiveness. A measure may also constitute the difference at which effectiveness is smaller or greater, depending on whether revenue after deducting the cost is lower or higher. Some authors [Kaczmarek 2001] attribute the definition of efficiency to the concept of effectiveness. According to Kaczmarek, the effectiveness of an organisation relates to the degree of fulfilment of the formulated objectives [Kaczmarek 2001]. Quoting after Kaczmarek, K. Piotrkowski claims that there are three factors on which the effectiveness of an organisation depends, i.e. the human factor, managerial staff and employees [Piotrkowski 2004]. According to Piotrkowski, the most important role as regards the assurance of effectiveness of an organisation is played by its managers who accomplish the organisation's objectives through people and with people. However, taking into account the apparent structural simplicity of the concept of "effectiveness", as it stems from the above remarks, one may not discuss effectiveness as a general issue, since there is not (and there may not be) a universal criterion of effective operation of a human being, including business activity [Matuszak-Flejszman 2001]. That is why budgeting is a factor that significantly contributes to environmental performance. Thus, the top management of an organisation has to become involved in the performance of the environmental policy and in planning actions aimed to minimise the adverse environmental impact.

All these factors should be included in the organisation's budget for a given year, taking into account the business and environmental risks the organisation may incur in the event of failure to accomplish the adopted environmental objectives and failure to demonstrate environmental performance. What is also worth emphasising here is that the effectiveness evaluation depends on the entity carrying out the evaluation, on what the evaluation relates to, what moment it relates to and on the point of reference [Milczewska 1991]. Thus, to unequivocally define the concept of effectiveness one has to take into consideration not only the technical and economic approach but also the organisational and bureaucratic one, or even the praxeological and humanistic approach. The effectiveness of management of an organisation constitutes the incurred expenditure to accomplished effects ratio, taking into account the degree of fulfilment of the strategic objectives set by the organisation's management, with preservation of functionality of activities and efficiency of the information flow and other actions within the organisation. In the opinion of E. Skrzypek, effectiveness is an interactive process that includes the phenomena occurring within an organisation as well as the phenomena occurring between an organisation and its corporate environment [Skrzypek 1998]. Examples of such a process in the contemporary economic life certainly include internal and external communication and market conditions that may affect the activity carried out by an organisation. Therefore, when discussing the issue of effectiveness of organisation's operation one may not neglect external factors an organisation depends on to a varied extent.

What should be analysed at the time of evaluation of an environmental management system is the effectiveness of the functioning of an enterprise as a result measured by means of comparison of the results and expenditure or the generated revenue and incurred costs, taking into consideration the planned activities in comparison with the accomplished results and the impact of the results on the market position of the organisation. Thus, budget planning should take into account the adopted environmental objectives and all expenses related to maintenance and improvement of the environmental management system, as well as matters related to improvement of the awareness of employees, people working based on commission contracts and other stakeholders.

Organisations that have implemented an environmental management system should focus on the evaluation of the results of the system functioning and of environmental performance resulting from the systemic approach to environmental management. Thus, as regards the definition of effectiveness in terms of ecology, one may state that ecological effectiveness is closely connected with economic effectiveness. Higher economic effectiveness means gaining the highest possible economic performance with environmental burdens maintained on the lowest possible level. Ecological effectiveness is understood as the effective use of natural resources, minimisation of waste production and contamination at each stage of production, with simultaneous assurance of relevant quality of the supplied goods and services. These are the elements that should be taken into account in controlling and funding of environmental activities. EU documents define ecological performance as the relation of economic results and environmental pressure connected with the production of the results [Matuszak-Flejszman 2011]. Thus, ecological performance is the relation between the environmental objective set by an organisation and the expenditure incurred for reaching environmental performance. It relates to organisation's environmental activity and allows one to evaluate the results of such activity. Here it has to be stressed that what is important as regards ecological performance is the degree of accomplishment of the adopted environmental objectives (priorities) of the activity. The expenditure incurred for the fulfilment of the aforementioned objectives is of secondary significance, which does not mean that the spent funds should be wasted, though. However, at the time of making environmental investments entrepreneurs may not always expect economic effects within a short time. Then a new category of ecological and economic effectiveness appears that facilitates long-term purposefulness of taking actions. It may be connected with the effectiveness of management since in this case shortterm objectives may diverge from the long-term objective, which stems from the fact that the possibility of gaining profits in the future reduces the possibility of gaining profits within a short time [Matuszak-Flejszman 2011]. In a short-term perspective, increased expenditure incurred on environmental investments contributes to organisation's growing operating costs, which in turn hampers the organisation's activity and possibility of increasing profits within a short period of time. However, in the long run an organisation that wishes to remain on the market should carry out such activities to assure the minimisation of the adverse environmental impact and maintenance of its ecological image. Because of the differences in effectiveness and efficiency of management, organisations may gain completely different economic and ecological results when using the same resources and operating under the same economic conditions. That is the reason why managers have to act both effectively and efficiently. As regards the evaluation of an environmental management system, it is difficult to unambiguously separate the efficiency of the functioning of the management system from its effectiveness [Matuszak-Flejszman 2011]. In many cases, the degree of fulfilment of environmental objectives is connected with expenditure whereas economic results are difficult to quantify. Moreover, an organisation does not necessarily have to be able to gain financial results, but it may generate ecological results. From this perspective, managerial staff of an organisation may perceive such a management system not only as resulting in environmental performance but also in effectiveness [Matuszak-Flejszman 2011].

3.7. Evaluation of Environmental Performance

Environmental performance is a result of both maintenance and improvement of an environmental management system while the provisions of ISO 14031 constitute the basis for carrying out an effectiveness analysis of the environmental management system. What should be pointed out is that the guidelines contained in ISO 14031 are not binding even to organisations that have implemented and certified an environmental management system according to the requirements of ISO 14001. However, the application of the indicators recommended in the afore-mentioned standard to the evaluation of environmental performance may have a positive impact on the quality of the environmental management system, including in particular the evaluation of the degree of its improvement. In compliance with the definition contained in ISO 14001, environmental performance is a result of management of organisation's environmental aspects [ISO 14031]. Within the context of the environmental management system, results may be measured with regard to the environmental policy and environmental objectives and tasks set by an organisation. To evaluate environmental performance, one has to define its criteria [ISO 14031], which may include the environmental objective, task or another intended level of environmental performance established by managerial staff. As it was mentioned above, the purpose of an environmental management system is to reach environmental performance as a result of the improvement of the environmental management system.

The evaluation of environmental performance is a process that facilitates making decisions in the field of management of environmental performance of an organisation by means of selection of indicators, gathering and analysing data, assessment of information with regard to the criteria of environmental performance, reporting and communication as well as review and improvement of the process on a periodic basis. ISO 14031 contains a description of many indicators whose application may contribute to the improvement of the environmental management system. The evaluation of environmental performance and environmental audits constitute a tool that helps the organisation's managerial staff to assess the condition of its environmental performance and to identify the areas of improvement according to needs. The evaluation of environmental performance is an internal process that involves continuous collection and assessment of data and information for the purpose of providing the management, on an ongoing basis, with reliable and verifiable information to allow them to define whether the organisation's environmental performance meets the criteria established by its management [Wathey, O'Reilly 2002]. Environmental audits, in turn, are conducted on a periodic basis to verify compliance with the defined criteria.

ISO 14031 related to the evaluation of environmental performance divides performance indicators into the following categories:

1. environmental condition indicators (ECI), which provide information about the local, regional, national or global condition of the environment;

2. environmental performance indicators (EPI), which provide information about an organisation's environmental performance, including:

- management performance indicator (MPI), which provides information about the management activities to influence an organisation's environmental performance;

– operational performance indicator (OPI), which provides information about the environmental performance of an organisation's operational process.

The application of the indicators presented in Fig. 3.1. when evaluating environmental performance allows to disseminate data without a risk of disclosure of trade secrets. Thus, the application of the evaluation of environmental performance constitutes a tool for informing the interested parties, both within an organisation and beyond it. The use of the afore-mentioned indicators increases with the number of the published environmental reports through which organisations want to demonstrate their achievements outside.

Environmental performance indicators are connected with the direct impact of organisation's activity on the environment through environmental management and operational control. The application of operational performance indicators may help organisations to establish environmental objectives and tasks. Apart from that, the indicators also allow for proper control of processes, in particular the ones connected with significant environmental aspects. If one gains information on an ongoing basis, one may follow trends and correct the process when required. This contributes to the improvement of actions in these areas. The calculation of the values of the defined indicators ocurring with the proper frequency enables the identification of undesirable situations. The selected indicators may constitute operational criteria required by ISO 14001. Management performance indicators provide information on the efforts made in the scope of management for the purpose of influencing the organisation's environmental performance. They are not as obvious as operational performance indicators, but it is worth measuring efforts and decisions made by the management that contribute to the effectiveness and efficiency of organisation's activity, in particular taking into account the fact that the activities contribute to the total environmental performance.



Fig. 3.1. Types of indicators applied in the evaluation of environmental performance Source: author's study based on ISO 14031.

When considering whether or not to apply management performance indicators in an organisation one should look for indicators that present the functioning of an environmental management system in comparison with the planned functioning of its different elements. Examples of such areas include the implementation of policies and programmes, assurance of compliance with requirements or expectations, financial aspects and relations with the public.

When analysing these indicators one may define environmental performance potential in the area of management activity. For the purpose of guaranteeing that management performance indicators are of certain significance to managerial staff, they may be expressed, for example, as percentage values, values referred to a given period of time (e.g. a year, etc.), depending on the purpose of gathering information. The interest of managerial staff in the number of accomplished environmental objectives and tasks does not usually relate to the general number but rather to the number of fulfilled objectives and tasks as compared to all planned objectives and tasks. Managerial staff may compare this percentage share in time and find out whether progress has been made quickly enough.

EPI – environmental performance indicators						
MPI – management performance indicator	OPI – operational performance indicator	ECI – environmental condition indicators				
1	2	3				
 number of implemented initiatives aimed at preventing contamination number of persons who have undergone training as compared to the number of persons who should undergo training number of hours of the environmental training per 1 employee number of products intended for disassembly, recycling or reuse degree of compliance with legal provisions costs connected with penalties or fines savings generated thanks to a reduction in the consumption of resources share of environmentally- friendly investments (e.g. related to cleaner technologies or process improvements) in the total number of sub-contractors who have undergone training 	 quantity of consumed chemicals per one kilogram of cleaned textiles quantity of materials consumed per one unit of product consumption of electric energy per one unit of the manufactured product consumption of water per one employee/one unit of product quantity of water reused in the production process consumption of fuel by a vehicle per one kilometre quantity of hazardous waste per one unit of product quantity of water transferred to recycling quantity of heating oil used per one manhour weight of packaging per one unit of product weight of packages intended for multiple use or recycling (e.g. pallets) as compared to the total packaging weight quantity of effluents 	 change of the ground water level rate of the recovery of resources quantity of E. coli per one litre of water degree of soil erosion impurities in plant tissues lead level in the blood of the local community concentration of contamination in the air resulting from emission of motor vehicles quality of the air in the region temperature of oceans ozone depletion air transparency from the windward and leeward side of an organisation average noise level odours concentration of impurities in the topsoil paved area and wasteland in a given paved area crops from the fields located in the surroundings within a defined period of time 				
 number of investments number of sub-contractors who have undergone training 	 (e.g. pallets) as compared to the total packaging weight quantity of effluents 	 crops from the fields loca in the surroundings within a defined period of time 				

Table 3.1. Examples of environmental performance indicators

3.	Ecological	Conditions	of the Fu	inctioning	and Devel	lopment of	an Ent	erprise
	0					1		1

1	2	3
 number of environmental improvements proposed by employees the number of suppliers and sub-contractors who have implemented an environmental management system response time to environmental incidents number of drills practised number of conducted audits as compared to the number of planned audits 	 concentration of contamination in effluents quantity of raw materials reused in the production process number of emergency situations per year quantity of defined emissions per one unit of product emitted noise, heat 	 cases of diseases in the population on the basis of epidemiological studies carried out on the local or regional level degree of preservation of historical buildings in the local area

Source: Szyszka and Matuszak-Flejszman 2013.

The application of relevant indicators should help organisations to define and measure progress in the accomplishment of their objectives, inter alia in the scope of reduction of the quantity of waste and consumption of resources, reduction in emissions, design and manufacture of products of minimised environmental impact (both at the time of production and operation as well as at the time of consequent liquidation), minimisation of all adverse environmental impacts and promotion of environmental awareness amongst employees and the society.

Environmental performance indicators may be considered key performance indicators for processes connected with operational control. Thus, properly defined performance indicators should meet the general principles adopted for KPIs, which means that they should refer to organisational objectives, be measurable and be a key to success. Apart from that, they should also comply with the SMART principle, i.e. they should be specific, measurable, achievable, results-focused and time-bound. To be able to properly monitor KPIs (and consequently also environmental performance indicators), several conditions have to be met, including:

- definition of the calculation formula of KPIs,
- definition of the measurement unit,
- definition of the reporting period and form of result presentation,
- definition of the objective for a given reporting period, and
- definition of data sources.

Furthermore, a person responsible for gathering data has to be selected. The very analysis of data does not suffice. The indicators obtained as a result of the analysis have to be subject to interpretation.

However, it has to be pointed out that the provisions of ISO 14031 related to environmental performance are not binding even to organisations that have implemented and certified an environmental management system according to ISO 14001 or have been subject to the verification process by EMAS accredited verifiers.

Annex IV to the EMAS Regulation defines the indicators an organisation holding an eco-management and audit scheme based on the EMAS Regulation is obliged to calculate. The following requirements have been set with regard to indicators [EMAS 1221/2009]:

▶ they have to enable the evaluation of the conducted environmentallyfriendly activities,

- they may not be misleading and have to be clear,
- they have to reflect the progress dynamics,

▶ they have to offer a possibility of comparison of the performance with national, regional and sector-based levels of reference,

• they have to offer an opportunity to refer to legal requirements.

The main indicators required under the EMAS Regulation (i.e. the indicators that have to be calculated and reported by organisations that have implemented EMAS) include [EMAS 1221/2009]:

- energy efficiency,
- material efficiency,
- ▶ water,
- ▶ waste,
- biodiversity,
- emissions.

Each of these indicators is composed of number A, B and R, being the result of the division of A by B. A indicates the total annual input/impact in the given field (e.g. consumption of energy expressed in MWh or GJ, annual mass-flow of different materials used, consumption of water, the total annual generation of waste, use of land in m2 of built-up area, emission of greenhouses gases). B refers to the size of an organisation (the number of employees in the nonproduction sector, the gross value added in the production sector (million euros or the total annual result in tonnes or the total annual turnover or the number of employees in the case of small enterprises) [EMAS 1221/2009].

The indicators calculated by an organisation have to be revealed in the environmental declaration that contains thorough information provided to the public and other interested parties on the organisation's environmental performance and compliance with applicable legal and other requirements related to environmental protection. Environmental reporting contributes, among other things, to an increase in employees' motivation and encouraging the society to understand the efforts made by organisations for the purpose of accomplishing environmental performance.

What has to be pointed out is that environmental performance and environmental performance indicators may not be associated with environmental effectiveness. The calculation of environmental performance indicators refers, to a greater extent, to effectiveness (the degree of accomplishment of the environmental objective). The majority of adopted and recommended indicators do not take into account expenditure or resources incurred to reach the result. As it stems from the research, only some organisations maintain an account of environmental costs and benefits [Szyszka and Matuszak-Flejszman 2013].

Organisations willing to monitor environmental costs and, consequently, to take actions aimed to evaluate the effectiveness of their activities may refer to ISO 14051 related to accountancy of environmental costs.

3.8. Final Remarks

The chapter has presented the basic tools of environmental management offered by the International Standard ISO 14001 and the Regulation of the European Parliament and of the Council on EMAS that contribute to the improvement of actions aimed at minimisation of the adverse environmental impact, prevention of contamination, taking into consideration economic, social and legal aspects. The paper has presented the role they may fulfil in green controlling and the manner of using the systemic elements in environmental budgeting and reporting.

4 Value Creation Concept in Sustainable Business

4.1. Introductory Remarks

The purpose of the chapter is to present and locate the concept of green controlling within the context of the theory of the firm and value creation from the perspective of company's shareholders and stakeholders interests. The objective also encompasses the presentation of the concept of company's value creation in the model approach, including the indication of key value drivers and the impact of environmental, social and governance issues on the value creation in a company. The development of a model approach in this scope is of key significance to the correct understanding of green controlling tasks in an enterprise whose primary objective is value creation.

The layout of the chapter is subordinated to the accomplishment of this objective. Firstly, the chapter presents the concept of company's value creation and the objectives of green controlling within a broader theoretical context of the structure of possible organisation's objectives, or the theory of the firm in general¹. Secondly, the value creation from the perspective of company's shareholders is compared with the stakeholders theory that juxtaposes it. The arguments in favour of each of these theories are presented and an attempt is made to find convergent elements.

¹ The familiarity with theoretical backgrounds of the concepts is of key importance to the proper understanding of the discussed topic. In most cases, non-familiarity with different philosophies underlying certain concepts and techniques applied in business results in the impossibility to understand them [Molthan-Hill 2014, p. 18].
Apart from that, the chapter also presents the location of social and environmental aspects in the structure of key value drivers of an enterprise in the model approach. Finally, the results of empirical studies are presented related to the impact of environmental, social and governance issues on creating the company's value.

4.2. The Value Creation Concept within the Context of the Theory of the Firm

The value creation concept² is based on the assumption that the purpose of the activity conducted by an enterprise in the market economy is value growth. The matter of the enterprise's objective is a central point of the theory of the firm³ and, at the same time, one of the main distinguishing features of particular theories.

According to the neoclassical theory of the firm, the objective of an enterprise was profit maximisation. In fact, the neoclassical theory of the firm is not a separately developed theory but rather a result of the application of the equimarginal principle to enterprise [Blaug 2000, pp. 306–309; Landreth and Colander 2005, p. 237] and the adopted assumption of profit maximisation⁴. The difficulty with the comparison of the neoclassical principle of profit maximisation with the objectives resulting from alternative theories of the firm stems from the fact that the profit maximisation rule (executed by an enterprise equated with an entrepreneur) is only one of the theory assumptions⁵. Alternative theories of the firm that challenged the further assumptions of the neoclassical theory raised the issue of the company's goal in a different manner, as a result of which the enterprise objectives covered in alternative theories may be divided

² Shareholder value creation constitutes an axis of value-based management (VBM) [Michalski 2001, Szczepankowski 2007].

³ Some of the authors that pay attention to it include Noga [2009, p. 64, 212] and Gruszecki [2002, p. 156]. Noga [2009, p. 65, 224] states that the so-called autonomous objectives of an enterprise are substance building the theory of the firm.

⁴ The discussion on the profit maximisation as an objective of the enterprise may be found in: [Nowicki 2012].

⁵ It is one of many assumptions of neoclassical modelling. For example, as regards the model of perfect competition, the number of assumptions ranges from four [Rekowski 1997, p. 206], six [Stoelhorst and van Raaij 2002, p. 2], twelve [Gorynia 1998, pp. 14–15], to even sixteen [Gruszecki 2002, pp. 60–61]. They may be divided into the main assumptions and the additional assumptions, or assumptions implied by the others.

into the two groups: the empirical (positive) objectives and normative objectives⁶.

The first group includes the theories of the firm that make an attempt to answer a question about the purpose of an enterprise on the basis of the observations in the economic reality. As those theories indicated based on the comparison with the neoclassical theory, the observation of the economic reality allows one to draw a conclusion that companies do not maximise their profits but rather they attain some other objectives. Examples of the theories from this group include managerial theories, which indicate on the basis of empirical observations that corporations with dispersed ownership structure accomplish the objective imposed by managers. The objective may involve sales maximisation, for example in Baumol's model [Baumol 1959; Frackowiak 1996, p. 48], growth maximisation, for example in Marris's model [Marris 1963, pp. 186–188; Marris 1964] or maximisation of utility for managers, attained thanks to an increase in discretional expenses, like in the case of Williamson's model [Williamson 1964; Kozłowska 2006, p. 36]⁷. There are also some alternative theories of the firm that consider the enterprise objective in the empirical approach. According to Simon's bounded rationality concept, due to limitations of rationality of decision-makers, no "maximisation" is possible, but the only possibility is to gain results (e.g. profit) on a satisfactory level [Simon 1976, p. 181; March and Simon 1964, p. 228; Augier and Feigenbaum 2003, p. 196]. Cyert and March's behavioural theory [1963, pp. 26-40] emphasised the divergence between various interests of individuals acting in a company, who establish certain coalitions. Cyert and March introduced the concept of a bundle of objectives (quantitative and qualitative) attained by an enterprise. A similar concept of a set of objectives may be deduced from the contractual theory of the firm which perceives an enterprise as a nexus of contracts [Sobiech and Woźniak 2005, p. 148; Foss and Klein 2005, p. 2; Foss 1996, p. 4], and from new institutional economics, according to which there is a necessity to look for a compromise among divergent interests of particular individuals in an enterprise that represent opportunistic behaviours [Williamson 1998, pp. 16–25]. The agency theory, in turn, emphasises a conflict of interest between

⁶ The division of the enterprise objectives into empirical and normative ones was introduced in: [Nowicki 2012].

⁷ Apart from the ones listed above, managerial theories are sometimes said to include the growth theory developed by E. Penrose, the precursor of the resource-based view of the firm, competence-based school [Penrose 1959; Stoelhorst and van Raaij 2002, p. 4; Foss 1998, p. 3; Prahalad and Hamel 1990, pp. 79–91].

different groups within an enterprise, in particular conflicting objectives of company owners and managers [Jensen and Meckling 1976, p. 7; Shleifer and Vishny 1996, p. 7]. A different definition of the objective, which may be included in empirical objectives, is presented in biological theories of the firm, according to which the enterprise objective is the survival in the short term and development in the long term [Gruszecki 2002, p. 227].

The group of normative enterprise objectives covers Drucker's concept [1998, p. 52] according to which the objective of a company should be to create and keep a customer, but in the application layer he proposed management by objectives in eight fields, being aware of the necessity to balance potentially conflicting areas [Drucker 1998, pp. 79, 104]. What seems interesting from the perspective of the deliberations presented here is the evolution of Drucker's views. At the end of the 20th century, Drucker was in favour of perceiving business from the long-term shareholder perspective and criticised the concept of balancing interests of different stakeholders [Drucker 2000, p. 60; Ehrbar 2000, p. 2]⁸. At present, the two juxtaposed groups of opinions constituting a reply to the question on the enterprise objective have taken the form of the shareholder theory and the stakeholder theory. The views presented by supporters of both these approaches originate from different theories of the firm applied in different models of the market economy. In the first of them, which originates from and prevails in finance [Michalski 2000, p. 69; Waśniewski and Skoczylas 2002, p. 373; Helfert 2004, p. 21; Brigham and Gapenski 2000, vol. 2, p. 44], an enterprise is perceived from the shareholder perspective and its objective is value creation. According to the other approach, in correspondence with the concept of a bundle of objectives referred to above, an enterprise should balance interests of all groups connected with it, i.e. its stakeholders [Freeman, Martin and Parmar 2007, pp. 303-314; Maas and Boons 2010, p. 159; Skoczylas 1998, pp. 30–33; Handy 2007, p. 89]. Both these approaches are compared in the following section.

As regards the normative objective of a company and in view of the topic presented in the book, one may not neglect the issue of incorporation of corporate social responsibility to the value-based management concept. At present, value-based management differs from the narrow investor's perspective, through which an enterprise was perceived earlier. Initially, the narrow investor's perspective was associated with reaching short-term increments of value and gen-

⁸ The evolution of Drucker's views may be perceived as a result of the convergence of the customer value concept with the shareholder value concept [Black et al., 2000, p. 29].

erating high rates of return thanks to it [Drucker 2000, p. 60]. Nowadays it is emphasised that the focus on creating value in the long term does not conflict with benefits for other stakeholders [Cwynar A. and Cwynar W. 2002, pp. 60-74; Dudycz 2005, p. 17; Pluta 2009, p. 9] and that environmental and social aspects do not contradict the long-term shareholder value growth [Szot-Gabryś 2013, p. 32]. As a result of taking into account the issue of corporate social responsibility, it is currently possible to discuss the issue of enlightened value maximisation (Jensen 2001, p. 16)⁹. This approach may be perceived in two ways. On the one hand, it may be treated as an indication of convergence of the shareholder theory and the stakeholder theory¹⁰. On the other hand, though, consideration of corporate social responsibility in value-based management may be seen as an expression of greater significance of the strategic perspective. With the development of strategic management as a scientific discipline and management practice [Stabryła 2000, pp. 21–32; Strategor 1999, pp. 416–425], the role of the long-term perception increased in economic sciences. Behaviours characterised by corporate social responsibility may turn out profitable to shareholders in the strategic perspective. An enterprise that cares about its employees, suppliers and other stakeholders provides for value creation in the long term. It makes us perceive the activities performed as part of corporate social responsibility as investment projects with a long payback period, but aimed to generate value by means of improvement of the corporate image or good relations with employees, which results in greater loyalty, attachment, performance and higher personnel retention.

4.3. Shareholder Value vs. Stakeholder Value

A stakeholder is a concept that was introduced by Stanford Research Institute in 1963 to denote a person or group that is interested in the activity of a company and bears risk connected with its functioning, without whose support the organi-

⁹ More information on this issue is presented in the following section.

¹⁰ Convergence of the shareholder theory and the stakeholder theory is embodied, for example, in that contemporary managers are aware that the creation of value for employees, clients, suppliers, the local community and other stakeholders supports the creation of value for company owners [Epstein 2008, p. 140], and that the involvement of stakeholders is of key importance for conducting socially responsible business in the contemporary world [Ralph and Kennedy 2014, p. 322]. The causes of convergence of these approaches are discussed in the next section.

sation would cease to exist. In contrast to a shareholder, who is primarily interested in gaining income from the activity conducted by a company, stakeholders compose a wider group that includes, among others, employees, customers, lenders, suppliers and, within a broader context, also the local community. According to R.E. Freeman [2004, p. 229], a stakeholder is "any group or individual that can affect or is affected by the achievement of a corporation's purpose". Stakeholders may be divided into the primary group that includes entities directly connected with the future of a company (for example shareholders and investors, employees, customers, suppliers, local communities) and the secondary group that has an indirect influence on an enterprise (for example mass media, lobby groups and other social or trade organisations, etc.) [Svendsen et al., 2001, p. 3]. Additional divisions cover internal and external interest groups (these two categories do not have to be completely separable) or social and non-social groups [Marcinkowska 2004, p. 19]. What is also stressed when defining stakeholders is the aspect of their relationships with an enterprise (on a voluntary or non-voluntary basis) as well as the financial issues of the relations (their effectiveness, ability to create, increase value) [Post, Pretson, Sachs 2002, p. 7].

One may distinguish two principal concepts of value creation in enterprises¹¹ from the perspective of the parties the value should be allocated to [Marcinkowska 2004, pp. 30, 31], i.e.:

▶ shareholder value creation, being a concept of disharmony of objectives, according to which an enterprise should only meet the interests of its owners, while meeting the needs of any other groups leads to value destruction because of divergence of the objectives of shareholders and other stakeholders (this concept is closer to the concept of an enterprise as an investment project that stresses the financial aspect of its activity),

▶ stakeholder value creation, being a concept of harmony of objectives, according to which shareholders' interests may, or even have to, be reconciled with the interests of any other groups, and the reconciliation has a positive impact on the company's value, it is possible to meet the needs of all groups at the same time, but not necessarily to the same extent (according to this concept, an enterprise is treated as an element of the environment).

¹¹ However, even more detailed divisions are also possible, including, for example, the concept of labour capitalism (Marx and Engels), government capitalism (Keynes), investor capitalism (Friedman), managerial capitalism (Berle, Means, Marris), entrepreneurial capitalism (Schumpeter, Kirzner, Baumol) and stakeholder capitalism (Freeman). More information on the afore-mentioned concepts is available in: [Freeman, Marin and Parmar 2007].

What supports the first approach is that in the event that a company pursues a few objectives and is responsible towards many stakeholders, responsibility blurs and there occur difficulties in measurement and settlement of the effects of actions as well as operationalisation of aims [Black, Wright and Bachman 2000, pp. 17-34; Copeland, Koller and Murrin 1997, pp. 3–20, 25–28; Damodaran 2007, pp. 49–92; Jensen 2001; Rappaport 1999, pp. 1–13]. Attention is also paid to the limitations in the competitiveness of the companies fulfilling many objectives and to the fact that in many cases the objectives contradict each other, as a result of which a necessity arises to make a choice, anyway¹². What should be highlighted here is that decisions made by the management board are in fact issued officially on behalf of the company's owners. Apart from that, in the case of developed capital market pressure exerted on the management board by company owners grows as shareholders are ready to sell their shares in the event of gaining insufficient benefits (a threat of take-over). Another argument is that owners are the ones that invest their capital and incur the greatest risk (in the event of bankruptcy they are the last group entitled to participation in the bankruptcy estate), so they have to be remunerated for it. As the research [Cwynar A. and Cwynar W. 2007, p. 16] demonstrates, the adoption of the concept of shareholder value creation as the objective of an enterprise does not have to be in conflict with the interests of the other stakeholders; what is more, it may contribute to better fulfilment of the needs of stakeholders¹³.

The arguments presented in favour of the stakeholder value creation concept include, in particular, the fact that a company operates in the environment in which there exist mutual relations and links. Thus, an enterprise should not be considered as an instrument of its owners, but rather as an organised whole composed of many parts, groups. In view of the above, a company may not ignore its stakeholders, but it should function in symbiosis with them. The performance of an enterprise should be also evaluated as regards the three areas, including economic performance, environmental quality and social justice [Svendsen et al., 2001, p. 3]. This approach is also more acceptable by the public¹⁴.

 $^{^{\}rm 12}\,$ M.C. Jensen [2001, pp. 10, 11] points out that simultaneous maximisation of many objectives is not logically possible.

¹³ As the experience of socialist economies and state-owned enterprises shows, despite the fact that the stakeholder concept promises generating benefits, this effect is not reached in many cases.

¹⁴ M.C. Jensen [2001, pp. 14, 15, 21] even pointed out that many people support the stakeholder concept because of their attachment to family or tribal values, etc. and as a result of their unwillingness to create privileged groups. On the other hand, though, in many cases the social aspects are the ones that result in the establishment of such groups (e.g. trade union organisations, employee groups, professions, etc.).

Different attitudes to value creation in an enterprise often stem from the existing economic and cultural conditions in particular countries as well as from the applied principles of corporate governance. For example, the principles of corporate governance based on the German model stress a necessity to treat an enterprise as the party responsible towards a wide group of stakeholders. It is the so-called participation group model, pluralistic approach (e.g. Germany, the Netherlands, Sweden, Denmark, Norway). The Anglo-Saxon model, in turn, is closer to the understanding in the categories of shareholder value creation, the so-called shareholder model, monistic approach (e.g. the USA¹⁵, Great Britain). The models typical of France, Italy and Spain offer an intermediate solution, although they may seem to lean toward the German model [Jerzemowska 2002, pp. 25, 26; Marcinkowska 2004, p. 14]¹⁶. In recent years, convergence of the models might be observed, which stems from, for example, the increasing liquidity of markets, changes in the shareholding structures, effects of globalisation, foreign investments or the development of the International Accounting Standards [Black, Wright and Bachman 2000, pp. 205-210].

The concepts of harmony and disharmony of objectives do not have to compete with each other, despite being juxtaposed to each other (presented as a conflict between the shareholder theory and the stakeholder theory, the concept of corporate social responsibility)¹⁷. If one assumes that the aim of an enterprise is the long-term maximisation of shareholder value, managers are required to establish good relations with the corporate environment, which includes meeting its needs¹⁸. The introduction of the concept based on long-term development and value creation assures mitigation of the conflict of interests

¹⁵ In the 1990s, approx. 65% of large companies in the USA stated that they had adopted the shareholder value creation approach as the primary objective of their activities [Black, Wright and Bachman 2000, p. 32].

¹⁶ The countries that are more inclined to adopt the stakeholder value creation approach include, in particular, the economies of the following characteristics: indirect financing plays a considerable role (bank loans, subsidies, etc.), well-developed public sector, dominant model of social capitalism or socialist economy, main blocks of shares are held by institutional investors, low culture of investment in shares, occurrence of strategic shares and links (in many cases, the rate of return fades into the background and safety and control are more important), strong trade unions and low share of foreign investors.

¹⁷ This issue is also discussed by R.E. Freeman [2004, p. 231]. Shareholders should not be confronted with stakeholders, since the former also belong to the other group. Thus, their objectives should be partially convergent with the objectives of broadly-understood stakeholders. The selection of the shareholder perspective does not exclude maintaining good relations with other stakeholders. One may also refer to a wide range of research that confirms a positive dependency between the shareholders wealth and the benefits of other stakeholders [Cwynar A. and Cwynar W. 2007, p. 16].

¹⁸ M.C. Jensen is one of the authors pointing to this fact [2001, p. 16].

among stakeholders. No maximisation of value may be achieved in the long run if the interests of the other parties are ignored¹⁹.

The possibility of fulfilment of shareholders' objectives with consideration of stakeholders' needs is well presented in the value added statement (German: *Wertschöpfungsrechnung*), prepared by some entities (e.g. some British and German companies). It constitutes specific transformation of the profit and loss account for the purpose of presentation of the participation of particular stakeholder groups, i.e. owners (through dividend and retained earnings), employees (remuneration and benefits), creditors (financial costs) and state (taxes) in the value added generated by an entity.

Thus, the creation of the value of an enterprise may be perceived from the perspective of enlightened shareholder value²⁰, i.e. as a concept in which shareholder value creation constitutes the primary objective, with simultaneous emphasis of the role played by other stakeholders and the natural environment in value creation. The latter grows in the event that a group has in its possession assets of key importance to a given enterprise. After all, the strategy adopted by an enterprise is the resultant of the objectives, responsibilities and limitations being a compromise reached among particular interest groups. Those objectives depend on the expectations of particular interest groups as well as their influence strength [Marcinkowska 2004, s. 30].

There is a lot of research²¹ that confirms a positive impact of incorporating environmental, social and governance issues (ESG issues) in the activity conducted by an enterprise on its operational and financial performance (including the cost of capital) and value.

The benefits stemming from the consideration of ESG issues in the activity of an enterprise include in particular:

• increased market value of shares and investment attractiveness of a company, approximation of the market price to the intrinsic value (closing the value gap),

¹⁹ An exception is the event of a monopoly that applies unjustified price increases, reduces the supply and does not have to be interested in maintaining good contacts with its environment, or the event that an enterprise bears no responsibility for its actions and decisions, for example connected with ecology (environmental pollution and bearing no costs connected with it).

²⁰ This approach is very close to the concept of enlightened value maximisation presented by M.C. Jensen [2001]. However, the concept of enlightened shareholder value stresses to a greater extent the meaning of the shareholder perspective. The concept of enlightened shareholder value, enlightened shareholder capitalism may be also found in: [Cwynar A. and Cwynar W. 2007, p. 15].

²¹ The research is presented in section 4.5. and 16.6.

▶ reduction in the cost of capital (both equity and debt) thanks to a lower risk premium, upgraded rating, farther easier access to capital, increased liquidity and lower volatility of shares, reduction of information asymmetry,

• increase in operational and financial performance, identification of new value drivers, unification of internal and external communication, understanding the corporation's objectives and leadership,

▶ better work environment, greater involvement, satisfaction, loyalty and efficiency of employees, more cost-effective use of resources and reduction in the costs of organisation connected with monitoring, supervision and coordination of processes,

• easier recruitment of employees and gaining natural resources, reduction in transaction costs as a result of contractors' confidence, lower risk and lower verification costs,

• building reputation, reinforcement of brand and company's image, increase in interest, acceptance, satisfaction and loyalty of customers, increase in the market potential, bargaining power, easier access to new sales markets,

▶ more loyal shareholders, possibility of shaping certain opinions and attitudes of stakeholders, increase in the share of long-term investors, increase in the significance of the long-term perspective of the company's growth (greater possibilities of introducing strategic moves, decreased significance of shortterm results)²², increased reliability of the company and its management board,

▶ reducing the risk of negative public reception, avoidance of penalties and costly trials, interference of inspection authorities.

Arguments put forward against the social responsibilities of an enterprise [Filek 2006, pp. 9–12; Friedman 1970], in turn, include statements that it disturbs the free-market mechanism, limits freedom and slows down the development of enterprises and poorly-developed countries because of the impossibility to meet the employment, environmental protection, product quality and similar requirements. Another point is that such activities are expensive (both in the phase of their intro-

²² According to the research carried out by PWC [2002, p. 10], managers often complain that investors are excessively focused on the short-term perspective of a company (more than 50% of managers covered by PWC's research think so), which discourages enterprises from investing in long-term value creation. However, they immediately note that this problem is not tackled by the companies they manage. The thesis about too short-term attitude of the market is also confirmed by market participants themselves, i.e. by investors, analysts, providers of capital and others [Eccles et al., 2001, p. 95]. However, investors do not merely look for short-term benefits in the form of dividends and capital gains, but they also expect long-term prospects of development, despite the fact that in many cases the management board think otherwise [Black, Wright and Bachman 2000, p. 23; Damodaran 2007, p. 73; Rappaport 1999, p. 82].

duction and implementation), that they result in costs being passed to customers, and that they are in opposition to the principle of profit, value maximisation. Opponents of CSR claim that despite the fact that some economic activities may contribute to individual harm, they are more beneficial, anyway, than if no economic principles were to be applied at the time they were taken, since economically rational activities minimise the size of social injustice in the long term. They also point to problems with operationalisation of CSR activities and measurement of their results as well as to the lack of managers' competencies in this field and difficulties with competing on the basis of CSR. Apart from that, they perceive the activities in the area of CSR as an element of public relations that may be characterised as superficial and conformist, and, in extreme cases, even fraudulent.

The further sections present the research on the impact of the ESG issues on the business activity of enterprises.

4.4. The Impact of Environmental and Social Aspects on Value Drivers – Model Approach

The value of a company is shaped by value drivers, i.e. factors that affect it. The schemes showing linkages between enterprise value and value drivers may turn out helpful to understand the influence of different factors, including environmental and social aspects on enterprise value. A necessity to look for key value drivers stems from the fact that an enterprise does not directly affect its value but it may only have an indirect impact on it, with the use of value drivers. Apart from that, what is also important as regards value-based management is that all entities and sub-systems of a company take part in the value creation process, starting with the top management to regular employees. The top management of an enterprise has an overall view, possibility of influencing and controlling the value created in different areas, whereas regular employees may only affect partial value drivers [Copeland, Koller and Murrin 1997, p. 96]. Thus, there is a necessity to disaggregate enterprise value into such factors on which particular employees have an influence.

A great number of factors that may impact the enterprise value, their different origin and diversity are characteristics of analytical models, presenting value drivers on an orderly basis²³.

²³ In most cases, the afore-mentioned models relate to the intrinsic value of an enterprise.

While disaggregating the valuation model with the use of discounted cash flows, Rappaport [1999, pp. 40, 65] distinguished the following main value drivers²⁴:

- 1) sale growth rate,
- 2) operating profit margin,
- 3) income tax rate,
- 4) investments in net working capital,
- 5) investments in fixed assets,
- 6) competitive advantage period,
- 7) cost of capital.

It should be pointed out that the Rappaport model is connected with the business valuation methodology with the use of free cash flow to firm method. The first five factors derive from discounted cash flows, the sixth one regards the period of gaining rates of return exceeding the cost of capital, while the seventh factor constitutes the discount rate (weighted average cost of capital).

Key value drivers may be also seen as generating value in the three areas: growth, profitability and risk [Black et al., 2000, p. 56]. In this approach, they affect the afore-mentioned areas as follows:

▶ the sales growth rate, investments in net working capital and investments in fixed assets have an influence on growth;

• the profitability area is created through operating profit margin and the income tax rate;

▶ risk is recognised thanks to the cost of capital and the competitive advantage period.

The analytical model introduced by Rappaport constitutes probably the most popular approach to value drivers [Skoczylas 2007, p. 119]. It focuses on financial value drivers, but does so on a universal basis, since it also allows for including factors that shape value from beyond the financial area, including environmental and social aspects in the form of consideration of the position of other stakeholders, which may result in the optimisation of products and processes, taking into account the pollution prevention and the entire product lifecycle assessment [Maas and Boons 2010, pp. 159–160].

²⁴ They are referred to by Michalski as value macro-drivers [2001, p. 117]. However, it does not relate to factors that affect the value of an enterprise that are within its macro-environment, but to the main general value drivers.

What should be emphasised in this approach is the impact on the enterprise value that is exerted by environmental and social aspects via value drivers, by means of modification of the decisions made in an enterprise as part of enlightened value maximisation. The incorporation of environmental and social aspects into the Rappaport model of key value drivers is presented in the diagram in Fig. 4.1^{25} .



Fig. 4.1. Value network – interrelations among decisions, value drivers and the corporate value, taking into account environmental and social aspects

Source: author's study based on [Rappaport1999, p. 65].

The influence of each of the presented key value drivers on the enterprise value is complex, and changes contributing to the improvement of any of value drivers should be evaluated as a whole from the perspective of their total impact on the enterprise value. Considering the fact that environmental and social aspects may affect decisions that often exert a simultaneous impact on many value drivers, the impact of these aspects on the enterprise value is even more complex²⁶. The types of possible impacts of these aspects on revenues and costs, shaping two out of seven key value drivers, presented in Table 4.1, illustrate

²⁵ A slightly different approach to the impact of corporate social responsibility on key value drivers is presented in: [Chousa and Castro 2006, p. 135; Schaltegger 2006, p. 49].

²⁶ A discussion focusing on the impact of some environmental decisions made by enterprises may be found, for example, in: [Schaltegger 2006, p. 50].

the complexity of the issue related to the impact of environmental and social aspects on enterprise value.

Specification	Impact on costs	Impact on revenues				
1	2	3				
Possible negative impact	Environmental performance improvements require managerial time, capital investment and operating expenditure, and thus increase production costs. Environmental performance improvements harm productivity, thus requiring more inputs to produce the desired amount of outputs.	Environmental performance improvements may adversely affect product quality, thus reducing sales revenue.				
Possible positive impact	Environmental performance improvements result in increased effeciency, thus reducing production costs. Environmental performance improvements enhance relations with environmental authorities, thus reducing regulatory costs. Environmental performance improvements reduce risk and thus the costs of capital and insurance. Environmental performance improvements enhance the relations with employees and the local community, thus reducing related costs.	Environmental performance improvements enhance the general company image, thus increasing revenue. Environmental performance improvements allow the company to charge a price premium or to increase market share in environmentally conscious market. Environmental performance improvements result in higher product value for customers, thus increasing revenue. Environmental performance improvements open opportunities in the market for environmental goods and services.				

 Table 4.1. Types of possible impacts of environmental and social aspects on revenues and costs

Source: [Lankoski 2006, p. 36].

An analytical diagram that is aimed, according to its assumptions, to analyse the impact of different options of environmental decisions on the value of an enterprise is the Environmental Shareholder Value Approach [Schaltegger 2006, p. 52]. As it stems from the approach, environmentally-friendly and pro-social activities that increase the enterprise value:

• use "smarter", smaller and cheaper equipment and use as little capital as possible;

▶ focus on dematerialisation of production processes that results in a reduction in the consumption of materials, reducing purchase, storage and depreciation costs; • widen the margin thanks to reduction in production costs and increase in benefits to customers;

• increase the sales volume thanks to the growth of customer benefits by means of offering more desirable products and services;

• increase the confidence of capital providers by reducing risk, as a result of which they provide for inflow of capital;

• extend the competitive advantage period through differentiation and longer maintenance of the price premium resulting from ecological and social innovations [Schaltegger 2006, pp. 52–58].

Another approach that leads to separation of value drivers is the disaggregation of the value creation process, based on the economic value added. This approach is presented in Fig. 4.2.



Fig. 4.2. Shareholder value creation - disaggregation of the economic value added

Source: own study based on [Fiksel 2003, as cited in: Epstein 2008, p. 141].

As it stems from the diagram presented in Fig. 4.2, the enterprise value is created if sustainable projects generate profits exceeding a charge for the capital which finances the used assets. Profit is generated from growth undertakings that increase revenue, for example product innovations and market growth or efficiency projects that reduce costs. A charge for capital is the function of the amount of resources used and risk connected with their use [Epstein 2008, p. 140].

The key value drivers presented in different approaches may be too general to constitute sufficient requisite and assistance in decision-making process on lower organisational levels of a company. Apart from that, each enterprise is unique as regards using resources and creating value. Therefore, for each enterprise one should look for specific value micro-drivers, being detailed factors affecting the value, which may be controlled by junior managers and regular employees. A starting point as regards looking for value micro-drivers may be disaggregation or specification of general drivers. As far as necessary, further levels of specification have to be created in order to receive useful drivers on the lowest level [Copeland, Koller and Murrin 1997, p. 99]. Such drivers play a key role since they may be measured on a periodic basis and junior managers may control them.

The most important value drivers are not fixed and they should be reviewed from time to time. In most cases in order to find value drivers one has to look at the processes occurring in a company from a new perspective. It is a creative process to a large extent. What should be remembered when analysing them is a necessity to comprehensively analyse value, i.e. to consider the impact of a given value driver on the other drivers Copeland, Koller and Murrin 1997, pp. 100–101]. Diagrams of value micro-drivers, which are often referred to [Rappaport 1999, p. 188], constitute an example of the direction of the search for value micro-drivers also amongst environmental and social aspects which impact the enterprise value through general drivers. A map of value drivers, created in this way, will indicate the paths of impact of particular drivers on the enterprise value. Placing value micro-drivers on the matrix presented in Fig. 4.3 may turn out to be helpful from the perspective of company's management.



Fig. 4.3. Matrix of guidelines with regard to value drivers

Source: author's study based on [Rappaport 1999, p. 191].

In particular as regards value micro-drivers from the environmental and social area²⁷, it is not only important to define whether a given value driver has a considerable influence on value, but also whether managerial staff may affect this value.

From the management perspective, the purpose of the analysis is to separate the drivers which have a great impact on value and, at the same time, are controlled by managers. If a manager is not able to impact the driver of considerable influence on value, he/she should secure the risk connected with changes of this driver [Rappaport 1999, p. 190]. This group may include many micro-drivers from the environmental area, but also such factors as prices of raw materials, interest rates or exchange rates. A natural direction as regards the use of matrices of guidelines with regard to value drivers is looking for the ways to increase the enterprise value²⁸.

The identification of links among key value drivers constitutes important steps aimed to describe the value creation process and to find the manners of increasing the value. What should be stressed here is that the significance of particular value determinants is not only different in various types of activity, but it may be changed in further phases of the life cycle of an enterprise, which is presented in Table 4.2.

Value drivers	Start-up	Growth	Maturity	Decline	
Sales growth	high	high	none	negative	
Operating profit margin	low/high	high	average	low	
Tax rate	low	low	normal	it depends	
Investments in net working capital	high	high	low	declining	

Table 4.2 .	Key value	drivers in	the life	cycle of a	an enterprise
					•

²⁷ Examples of micro-drivers from the environmental and social area include rates of annual charges for the economic use of the environment, expenditure on environmental improvements that reduce harmful substance emission, rates of economic insurance connected with environmental improvements or revenues and costs of many particular activities in the scope of CSR (e.g. support for social institutions, which, on the one hand, consumes funds and, on the other hand, creates a positive corporate image and generates cash receipts).

²⁸ Many authors describe different methods of managing shareholder value using value drivers, including, for example, Black et al. [2000], Michalski [2001], Mills [2005], Rappaport [1999].

4. Value Creation Concept in Sustainable Business

Value drivers	Start-up	Growth	Maturity	Decline
Investments in fixed assets	high >> depreciation	high > depreciation	low/medium = or < depreciation	low/declining << depreciation
Cost of capital connected with the business risk level	he very high med el		medium	low
Planning period	short	medium/long	long	short/medium
Residual value	high	high	medium	medium

Source: [Mills 2005, p. 44].

For example, in the initial phases of the firm's life cycle the dominant role is usually played by sales growth. However, as the company and the market develop and in view of the competition, the focus on the operating profit margin may turn out to bring more benefits [Mills 2005, p. 44]. The significance of different value drivers in particular phases of the life cycle may differ in various types of activity [Mills 2005, p. 45]). That is why it is so important to treat every enterprise on an individual basis and to look for combinations of value drivers that are specific to it.

As it was mentioned above, environmental and social aspects impact all key value drivers. However, within this context special attention should be paid to the particular significance of these aspects for the competitive advantage period²⁹. It is the time slot within which an enterprise maintains competitive advantage to the extent allowing it to reach the return on capital exceeding the cost of capital [Black et al., 2000, p. 58]. In the practice of the income-based valuation method the period should set the horizon of detailed financial projection. After this period, it is usually assumed that the competition, the appearance of imitators and the technical progress result in a reduction in generated margin, which contributes in the long run to reaching the rate of return on the level of the cost of capital [Michalski 2001, p. 16].

In order to define the competitive advantage period and the impact of this driver on corporate value, it is necessary to understand both the external context of the activity of a company and internal factors of competitive advantage. That is why a considerable impact of environmental and social aspects may be

²⁹ The influence of environmental and social aspects on the cost of capital should be also considered to be of particular significance; this aspect is discussed in detail in Chapter 16.

revealed within this driver; these aspects come both from the corporate environment and from the inside of an enterprise. In order to understand the external context of the operations one may use (for example) Porter five forces analysis, since environmental and social aspects may in fact affect each of the five forces, and they are the factors that determine the competitive advantage period [Rappaport 1999, p. 48]. As regards the internal aspect, it is necessary to analyse core competences of an enterprise [Prahalad and Hamel 1990, pp. 79–91; Obłój 1998, pp. 83–93], including in the environmental and social aspect, to identify the characteristics that distinguish the company or to carry out value chain analysis [Porter 2006, p. 64]. The use of the analysis of life cycles of products, technologies, enterprises and sectors and the analysis of value migration may serve the purpose of a synthesis of the external and internal perspectives [Mills 2005, pp. 64–66].

To sum up, a conclusion may be drawn that environmental and social aspects may impact particular value drivers from many perspectives and in a very diversified manner. A review of the results of empirical research on the connection of environmental and social aspects with the enterprise value is presented in the next section.

4.5. The Impact of Environmental, Social and Governance issues (ESG) on the Value Creation in a Company – Empirical Studies

Incorporating environmental, social and governance issues in the company's activities may have a positive influence on its operational and financial performance³⁰ as well as on an increase in its value, which is confirmed by a great number of studies (compare table 4.3.).

The research is mainly based on an analysis of relationships between the indices of corporate governance (CG), corporate social responsibility (CSR), corporate social performance (CSP)³¹ (or their components) and such performance

³⁰ The research concerning the impact of ESG issues on the cost of capital of an enterprise is presented in section 16.6.

³¹ Despite the fact that the term Corporate Social Performance suggests main focus on the social aspect, this concept and the ratios based on it analyse this issue within a broader context and also include environmental or even governance issues.

and value creation ratios as, for example, return on equity (ROE), return on assets (ROA), return on invested capital (ROIC), return on sales (ROS), economic value added (EVA), market value added (MVA), Tobin's Q³², price earnings ratio (P/E) or total and excess, abnormal rate of return. A considerable part of the research uses the database of KLD Research and Analytics Inc. (currently MSCI ESG), which describes enterprises on the basis of surveys, financial reports, information presented by key mass media, governmental documents and widely-reviewed publications, according to the following dimensions of CSR: community, diversity, employee relations, environment, product characteristics, corporate governance and human rights. These dimensions are evaluated as regards the strengths and concerns of an enterprise, and main groups are subject to even more thorough elaboration. Apart from that, the database also includes the involvement of company's activities in six controversial (sin) industries, treated as a negative factor, including gambling, firearms, military, tobacco, alcohol and nuclear energy industries. Thus, the indices built on this basis take into account a wide range of factors in the field of CSR³³.

For example, the research conducted by P.M. Healy, A.P. Hutton and K.G. Palepu [1999] confirms benefits from a wide scope of voluntary disclosures. The authors claim that expanded disclosure leads to higher market prices of shares, greater institutional and analyst interest, and higher liquidity of shares on the market.

The issue of the impact of corporate governance on the market value of shares (with particular attention paid to the rights of shareholders) is discussed by P. Gompers, J. Ishii and A. Metrick [2003]. Their research demonstrated that a democracy portfolio (strongest shareholder rights) gained average annual return by approx. 8.5 p.p. higher than the dictatorship portfolio (highest management power). They also stated that companies from the democracy portfolio had higher firm value (measured by Tobin's Q), higher operational margin, higher return on equity (ROE) and higher average annual sales growth. What is more, these enterprises were found to incur lower capital expenditures and made fewer acquisitions as compared with the dictatorship portfolio.

³² It is worth noting that in most studies the book value of total assets is adopted in the denominator of Tobin's Q instead of their replacement value, as Tobin assumed. It happens so because of difficulty with determining the actual replacement value of analysed companies, which, assuming that the market value of debt equals its book value, finally brings Tobin's Q to P/BVPS ratio (Price to Book Value per Share).

³³ The key issues discussed within the context of the impact of ESG issues on the business activity of an enterprise are also presented in section 16.2.

The existence of a positive correlation between the social and environmental performance of an enterprise and its profitability (ROA, ROE, ROS)³⁴ was confirmed, among others, by the research carried out by S.A. Waddock and S.B. Graves [1997]³⁵. Similar conclusions concerning the link between the level of ROA and the company's relationships with its employees and customers were drawn by S.L. Berman et al. [1999]³⁶, and as regards ROE by researchers: S. Ayuso et al. [2007], in particular as regards engagement with employees and a wide range of external stakeholders)³⁷.

As it stems from the research conducted by C. Flammer [2013], in turn, the environmental footprint exerts an influence on cumulative abnormal return (CAR), i.e. news about eco-harmful events occurring in an enterprise contribute to negative abnormal rates of return (and vice versa). It also turns out that as over time (i.e. the closer it is to the contemporary times), the value of negative CAR increases (what is interesting, this relationship weakens with time in the event of positive news). What should be also highlighted is that the conclusions drawn on the basis of the research suggest that shareholders of companies with higher levels of environmental CSR react less strongly to both good and bad news.

A positive relation between CSR and the enterprise's results may also be observed in the case of controversial sectors, which include, apart from the industries mentioned at the beginning of this section, also the mining, oil, biotech and cement industries. As the research conducted by Y. Cai, H. Jo and C. Pan [2012] demonstrates, also in the case of the afore-mentioned industries a positive cor-

³⁴ It is worth noting that the measurement of the impact of corporate social and environmental responsibility on company's performance and value has certain limitations and methodological imperfections, because of (inter alia) colliding qualitative and quantitative data. The afore-mentioned imperfections may relate to the research horizon (short- and long-term perspective), selection of variables, the extent of their aggregation, their correlation, proper definition, and, last but not least, lack of significant variables in the model. Such significant variable, which is often omitted in models in the field of CSR, is the intensity of R&D investment, what is pointed out by McWilliams and Siegel [2000]. These authors prove in their research, on the basis of the model of Waddock and Graves [1997], that if this variable is taken into account, the impact of the social involvement of an enterprise on its financial performance changes from positive into neutral.

³⁵ As regards ROE, this relationship turned out to be positive, but statistically insignificant. However, what is interesting, the positive impact of ROE on CSP has been proven statistically significant [Waddock and Graves 1997, pp. 310, 311].

³⁶ However, the research did not confirm statistically significant relationship between environmental, social issues, diversity and ROA [Berman et al., 1999, p. 501].

³⁷ They did not confirm positive relationship between ROE and customer engagement, though [Ayuso et al., 2007, pp. 14 and 16].

relation between CSR and the value of an enterprise (measured by Tobin's Q) can be observed.

The research also confirms the benefits from maintenance of ethical standards. S. Webley and E. More [2004] demonstrated that companies with a code of ethics significantly outperformed (in terms of EVA, MVA and P/E) those wihout codes. Apart from that, as regards the P/E ratio, the companies from the first group experienced much lower volatility of this ratio, which suggests, according to authors, that they were perceived as more secure investments, attracting cheaper capital and managed in a consistent way. As regards return on capital employed (ROCE), the research did not confirm considerable differences between the groups in the years 1997 and 1998. However, in the period of 1999–2001, an increase in average return by ca. 50% was observed in case of those with codes, while at the same time those without experienced decrease of the ratio. In the years 1997–2001, the companies demonstrating ethical conduct also had a higher return on sales (by ca. 18%). The research carried out by C.C. Verschoor and E.A. Murphy [2002] also confirmed the above conclusions. Enterprises perceived as Best Corporate Citizens demonstrated higher long-term performance (measured by such ratios as sales growth, profit growth, profit margin, return on equity or total rate of return) as compared with other companies from S&P 500 index.

However, literature contains examples of research questioning a beneficial impact of the afore-mentioned aspects on the performance and value of an enterprise.

The results of the research carried out by A.J. Hillman and G.D. Keim [2001] indicate, however, that CSR actions focused on primary stakeholders³⁸ may bring about benefits in the form of company's value increase (measured by MVA), but social issues participation³⁹, activities not directly connected with these stakeholders, have an adverse impact on value creation in the enterprise. The implementation of these activities comes at the cost of lost development and investment opportunities of a company. Apart from that, the authors did not manage to confirm a significant relationship between both groups of activities

³⁸ According to Hillman and Keim [2001, p. 126], they include capital suppliers, employees, other resources suppliers, customers, the local community and the natural environment.

³⁹ According to Hillman and Keim [2001, p. 128], these issues include in particular not engaging in controversial industries (tobacco, alcohol and gambling), refraining from doing business with countries that violate the human rights, avoidance of nuclear energy or refusing to sale to the army.

mentioned above and performance of an enterprise in the case of an analysis conducted on the basis of traditional accounting ratios (ROE, ROA, Tobin's Q).

A summary of the studies described above and a wide range of research conducted by other authors is presented in table 4.3^{40} .

Authors of the study	Period	ESG issue	ESG factor	Impact
1	2	3	4	5
Aktas, de Bodt and Cousin (2011)	1997–2007	Intangible Value Assesment Ratings	ESG	Positive
Albuquerque, Durnev and Koskinen (2013)	2003–2012	Composite CSR index	ESG	Positive
Ammann, Oesch and Schmidt (2011)	2003–2007	Compiled G indices	G	Positive
Ayuso, Rodríguez, García- Castro and Ariño (2007)	2004	CSR index (excluding E)	SG	Mixed
Baron, Harjoto and Jo (2011)	1996–2004	Aggregate CSR strengths index and CSR concerns index	ESG	Mixed
Bebchuk and Cohen (2005)	1995–2002	Classified boards (Board structure)	G	Positive
Bebchuk, Cohen and Ferrell (2009)	1990–2003	Entrenchment index	G	Positive
Bebchuk, Cohen and Wang (2011)	2010	Classified boards	G	Positive
Bebchuk, Cohen and Wang (2013)	2000–2008	G quality / shareholder rights	G	None
Beiner, Drobetz, Schmid and Zimmermann (2006)	2003	Composite and individual G indicators	G	Positive
Benson and Davidson (2010)	1991–2002	Stakeholder management and social issue participation	S	Positive

Table 4.3. The impact of ESG issues on the performance and value of an enterprise

⁴⁰ In the case of certain studies, the conclusions were not clear; whether research was allocated to the positive, mixed, neutral or negative group depended on the weight of particular indications, the number thereof and the authors' opinions. Some of the studies quoted after [Clark, Feiner and Viehs 2014] are provided with additional comments with details or clarifying the classification. The comments and a full bibliography could not have been presented due to the size of the paper; however, they are available in the above publication.

4. Value Creation Concept in Sustainable Business

4	•	2		-
I	2	3	4	5
Berman, Wicks, Kotha and Jones (1999)	1991–1996	CSR index (excluding G)	ES	Mixed
Borgers, Derwall, Koedijk and ter Horst (2013)	1992–2009	Stakeholder relations index	S	Mixed
Brammer and Millington (2006)	1990–1999	Charitable giving	S	Mixed
Brammer, Brooks and Pavelin (2006)	2002–2005	Composite CSR index	ES	Mixed
Brown and Caylor (2006)	2003	Composite G score	G	Positive
Busch and Hoffmann (2011)	2007	Carbon intensity	E	Mixed
Cai, Jo and Pan (2012)	1995–2009	Aggregate CSR index (excluding G)	ES	Positive
Capelle-Blancard and Laguna (2010)	1990–2005	Environmental disasters (explosions) at chemical plants	E	Positive
Cheung (2011)	2002–2008	Sustainability index (inclusion / exclusion)	ESG	Positive
Clarkson, Li and Richardson (2004)	1989–2000	Environmental capital expenditures	E	Positive
Cochran and Wood (1984)	1970–1979	CSR reputation index	ESG	Positive
Core, Guay and Rusticus (2006)	1990–1999	G index / shareholder rights	G	Positive
Core, Holthausen and Larcker (1999)	1982–1984	Excess compensation	G	Positive
Cormier and Magnan (1997)	1986–1993	Amount of pollution	E	Positive
Cornett, Erhemjamts and Tehranian (2013)	2003–2011	Overall ESG index	ESG	None
Cremers and Ferrell (2013)	1978–2006	G index / shareholder rights	G	Positive
Cremers and Nair (2005)	1990–2001	Reversed G index and block holder ownership	G	Positive
Darnall, Henriques and Sadorsky (2008)	2003	Adoption of environmental management practices	E	Positive
Deng, Kang and Low (2013)	1992–2007	Composite CSR index	ESG	Positive

4.5. The Impact of Environmental, Social and Governance issues (ESG) on the Value Creation...

1	2	3	4	5
Derwall, Guenster, Bauer and Koedijk (2005)	1995–2003	Corporate eco-efficiency	E	Positive
Doh, Howton, Howton and Siegel (2010)	2000–2005	Sustainability index (inclusion / exclusion)	ESG	Mixed
Dowell, Hart and Yeung (2000)	1994–1997	Adoption of global environmental standards	E	Positive
Eccles, Ioannou and Serafeim (2013)	1991–2010	Corporate sustainability index	ESG	Positive
Edmans (2011)	1984–2009	Employee satisfaction	S	Positive
Edmans (2012)	1984–2011	Employee satisfaction	S	Positive
Edmans, Li and Zhang (2014)	1984–2013	Employee satisfaction	S	Positive
Faleye and Trahan (2011)	1998–2005	Employee satisfaction	S	Positive
Filbeck and Preece (2003)	1998	Employee satisfaction	S	Positive
Fisher-Vanden and Thorburn (2011)	1993–2008	Environmental performance initiative participation	E	Positive
Flammer (2013)	1980–2009	Corporate environmental footprint	E	Positive
Flammer (2013)	1997–2011	Shareholder-sponsored CSR proposals	ESG	Positive
García-Castro, Ariño and Canela (2010)	1991–2005	Aggregate stakeholder relations measure	ESG	None
Giroud and Mueller (2010)	1976–1995	Industry concentration	G	Positive
Giroud and Mueller (2011)	1990–2006	G index in highly concentrated industries	G	Positive
Godfrey, Merrill and Hansen (2009)	1991–2003	Social initiative participation	ESG	Positive
Gompers, Ishii and Metrick (2003)	1990–1999	Shareholder rights	G	Positive
Guenster, Derwall, Bauer and Koedijk (2011)	1997–2004	Eco-efficiency levels	E	Positive
Hamilton (1995)	1989	Volume of toxic releases	Е	Positive
Hart and Ahuja (1996)	1989–1992	Reduction in pollution	Е	Positive
Hawn and Ioannou (2013)	2002–2008	Symbolic CSR actions	ESG	Positive

4. Value Creation Concept in Sustainable Business

1	2	3	4	5
Healy, Hutton and Palepu (1999)	1978–1991	Voluntary disclosure	G	Positive
Hillman and Keim (2001)	1994–1996	Stakeholder management and social issues participation	ES	Mixed
Huselid (1995)	-	Good workforce practices	S	Positive
Jacobs, Singhal and Subramanian (2010)	2004–2006	Environmental performance	E	Mixed
Jayachandran, Kalaignanam and Eilert (2013)	-	Corporate environmental performance, product social performance	ES	Mixed
Jiao (2010)	1992–2003	Stakeholder welfare score	S	Positive
Jo and Harjoto (2011)	1993–2004	Aggregate CSR and G index	ESG	Positive
Johnson, Moorman and Sorescu (2009)	1990–1999	G quality / shareholder rights	G	None
Karpoff, Lee and Martin (2008)	1978–2002	Financial misrepresentation	G	Positive
Karpoff, Lott and Wehrly (2005)	1980–2000	Environmental regulation violations	ESG	Positive
Kaspereit and Lopatta (2013)	2001–2011	Corporate sustainability and GRI	ESG	Positive
King and Lennox (2001)	1987–1996	Total emissions	E	Positive
King and Lennox (2002)	1991–1996	Installation of waste prevention measures	E	Positive
Klassen and McLaughlin (1996)	1985–1991	Environmental management awards	E	Positive
Koh, Qian and Wang (2013)	1991–2007	Aggregate CSR score	ESG	Positive
Konar and Cohen (2001)	1989	Release of toxic chemicals	E	Positive
Lee and Faff (2009)	1998–2002	Corporate sustainability quality	ESG	Negative
Matsumura, Prakash and Vera-Muñoz (2011)	2006–2008	Total level of carbon emissions	E	Positive
McWilliams and Siegel (2000)	1991–1996	CSR index (including R&D)	ES	None
Mehran (1995)	1979–1980	Total executive compensation and share of equity salary	G	Positive
Pava and Krausz (1996)	1985–1991	Aggregate CSR score	ESG	Positive

4.5. The Impact of Environmental, Social and Governance issues (ESG) on the Value Creation...

1	2	3	4	5
Preston and O'Bannon (1997)	1982–1992	Employee, customer, and community relations	S	Positive
Richard, Murthi and Ismail (2007)	1997–2002	Diversity	S	Positive
Russo and Fouts (1997)	1991–1992	Corporate environmental performance	E	Positive
Servaes and Tamayo (2013)	1991–2005	Aggregate CSR index	ESG	Positive
Simpson and Kohers (2002)	1993–1994	Community relations	S	Positive
Smithey Fulmer, Gerhart and Scott (2003)	1998	Employee wellbeing	S	Positive
Spicer (1978)	1970–1972	Pollution control mechanisms	E	Positive
Statman and Glushkov (2009)	1992–2007	Composite CSR index	ES	Positive
Verschoor and Murphy (2002)	1999–2001	Business ethics	ES	Positive
Waddock and Graves (1997)	1989–1991	Weighted average CSR index	ES	Positive
Webley and More (2004)	1997–2001	Codes of ethics	ES	Positive
Wu and Shen (2013)	2003–2009	Aggregate CSR index	ESG	Positive
Yermack (1996)	1984–1991	Reductions in board size	G	Positive

Source: author's study based on [Ayuso et al., 2007; Berman et al, 1999; Cai, Jo and Pan 2012; Clark, Feiner and Viehs 2014; Flammer 2013; Gompers, Ishii and Metrick 2003; Healy, Hutton and Palepu 1999; Hillman and Keim 2001; Lee and Faff 2009; McWilliams and Siegel 2000; Verschoor and Murphy 2002; Waddock and Graves 1997; Webley and More 2004].

As results from the data contained in table 4.3, 80% of 85 presented studies indicate the existence of a positive relation between incorporating ESG issues in the company's business and its performance and value creation. A lack of the afore-mentioned relationship is demonstrated in only 6% of the research, while mixed indications reach ca. 13%. Only one study (1%) pointed to a negative relation⁴¹.

⁴¹ This research demonstrated lower performance of the leading CSP portfolio as compared to the lagging CSP portfolio. As the authors of the research prove, the reason for this situation is that higher rates of return reached for the lagging CSP portfolio are the result of compensation for increased specific risk (idiosyncratic risk) [Lee and Faff 2009, p. 235].

4.6. Final Remarks

The purpose of the chapter was to present and locate the concept of green controlling within the context of the theory of the firm and value creation from the perspective of company's shareholders' and stakeholders' interests. The objective also encompassed the presentation of the concept of company's value creation in the model approach, including the indication of key value drivers and the impact of environmental, social and governance issues on the value creation in a company.

The objective was accomplished in the chapter. Particular sections presented at first the concept of company's value creation and the objectives of green controlling within a broader theoretical context of the structure of possible organisation's objectives, the theory of the firm in general. Next, the shareholder theory was compared with the stakeholder theory that juxtaposes it. The arguments in favour of each of these theories as well as possibilities of their co-existence were presented. Apart from that, the chapter also presented the location of social and environmental issues in the structure of key value drivers of an enterprise in the model approach. Finally, the results of empirical research, focusing on the impact of ESG issues on the operational and financial performance as well as on the enterprise value were described.

5 Design and Implementation of the Green Strategy in an Enterprise

5.1. Introductory Remarks

An enterprise is only able to survive for a long period of time and accomplish its objectives if it develops, which means that it has to bring about changes that correspond to the changing environment. An issue that may not be neglected by an organisation at the time of adapting to its corporate environment is its competitiveness. In order to remain on the market, a company has to reach and maintain a competitive advantage, a key to which is effectiveness.

Development of an organisation means implementation of changes, including for example the ones which involve introduction of new elements and improvement of the quality of the ones that already occur in the company. It is beyond any doubt that the adoption by an enterprise of the concept of sustainable development implies such changes. These changes often include, for example, introduction of innovations in products, processes or management.

The eco-strategy (green strategy) determines the types of changes a company plans to implement at the time of creating its corporate value in the ecological and social areas. In compliance with the sustainable development concept, companies should not only adopt such a policy but they should be also able to implement it effectively.

The purpose of this chapter is to present a model approach to the formulation and implementation of the green strategy in an enterprise.

5.2. Corporate Environment and its Impact on a Company's Action Strategy

A basic issue as regards the proper functioning of an enterprise should be, first of all, a proper internal and external analysis and, next, selection of an action strategy. Certainly, in the competitive environment organisations use different procedures and strategic methods. However, this paper is not aimed to carry out a fundamental analysis of the selection of the proper strategy from a group of many known strategies.

Innovative enterprises, in many cases highly specialised, may adopt four types of sustainability strategy [Rue, Holland 1989, p. 41]:

- a defensive (protective) strategy,
- a strategy of stability and establishment,
- a growth (development) strategy,
- a combination of different strategies.

However, before selecting the proper strategy an enterprise should define the factors of competitive advantage in the following scope [Pierścionek 2003, p. 263]:

- a) the human capital productivity,
- b) the social capital reputation in the local community,

c) the material capital – machines, equipment, transport, technology, buildings and structures,

d) the natural capital – land, natural habitat.

These capitals and, consequently, the competitive advantage of an enterprise, are co-created, apart from the enterprise itself, by the local community, local authorities and the sustainability policy adopted by the national authorities. What should be taken into account when analysing the competitive advantage is the fact that not all entities may be characterised as perfectly competitive. Perfectly competitive markets are the ones with a great number of both producers and competitors, with no barriers to entry or exit, with a homogeneous product [Czarny, Rapacki 2002, p. 190]. On the market we also deal with enterprises characterised by imperfect competitiveness or even the ones with features of pure monopoly. That is why a significant factor determining wellunderstood competitiveness of a company is the level and possibilities of using its equity. Whether potential new clients are willing to purchase the manufactured products or provided services or, instead, they become interested in another enterprise that does not only offer better products or services but also more effective solutions in the scope of social, economic and logical aspects, depends on the level and possibilities of use of company's equity. Therefore, as part of the operational activity companies should optimally build a structure of the material and human capitals held by them. This approach, based in many cases on systematic investments in the technology and productivity growth, may contribute to an increase in the market share (Fig. 5.1).

1						
	PP/PU0 IN	PP/PU1 IN	PP/PU2 IN	PP/PU3 IN	PP/PUN IN	
evel	PP/PU0 I3	PP/PU1 I3	PP/PU2 I3	PP/PU3 I3	PP/PUN I3	
lient	PP/PU0 I2	PP/PU1 I2	PP/PU2 I2	PP/PU3 I2	PP/PUN I2	
estm	PP/PU0 I1	PP/PU1 I1	PP/PU2 11	PP/PU3 I1	PP/PUN I1	
Inv	hitherto position PP/PU0 10	new position PP/PU1 I0	new position PP/PU2 I0	new position PP/PU3 I0	new position PP/PUN I0	no investments

Market share of new recipients

PP/PUk - new recipients of a manufacturing/service company; lk - further investments with innovations

Fig. 5.1. Investment level vs. increase in the market share of manufacturing or service companies Source: [Bartkowiak 2008, p. 93].

A simple structure of a matrix, with lines defining the level and size of an investment and columns defining new recipients, allows one to define the critical path of development of an enterprise. The specificity of the functioning of each production company or service provider is presented in the proposed layout of the matrix. Potential new clients require producers to offer new or more effective technical and technological solutions, which is connected with investments. At the time of commencement of the sale of products or provision of services, we deal with a slightly different enterprise, PP/PU1 I1. If the proposed solutions exceed the actual demand of the goods and services market, the enterprise in the matrix is in the PP/PU1 position. For the strategy adopted by an organisation as mentioned above, a straight line is established for further lines and columns that is an optimal line of the investment size in the function of the market position.

If this matrix is written into the coordinate system in which the ordinate defines the goodwill (e.g. defined social capital) and the abscissa represents the

market value of the enterprise (Fig. 5.2), it may be easily observed that greater investment expenditure (e.g. in the scope of ecology) and market share result in a bigger increase in both the market value and the goodwill.

rprise	•				
entei	PP/PU0 IN	PP/PU1 IN	PP/PU2 IN	PP/PU3 IN	PP/PUN IN
or an	PP/PU0 I3	PP/PU1 I3	PP/PU2 I3	PP/PU313	PP/PUN I3
aine	PP/PU0 I2	PP/PU1 I2	PP/PU212	PP/PU3 I2	PP/PUN I2
	PP/PU0 I1	PP/PU111	PP/PU2 I1	PP/PU3 I1	PP/PUN I1
MICI	PP/PU010	PP/PU1 I0	PP/PU2 I0	PP/PU3 I0	PP/PUN IO

goodwill

PP/PUk - new recipients of a municipal heating company; Ik - further investments with innovations

Fig. 5.2. The relation of the market value of an enterprise in the reputation function

Source: author's study based on Fig. 5.1.

The proposed solution is very simple and presents in a schematic manner the relations that may be established in a manufacturing or service company with regard to the analysis of its own capitals, including the human, social, material and natural capitals. The linear relation is seldom reached in the event of analyses in the scope of multi-parameter strategies adopted by enterprises, which are brought by certain approximation and rounding to smaller systems. In many cases, mathematical transformations lead to a wide range of points using statistical methods in the mathematical model (e.g. the method of least squares), introduced by C.F. Gauss, and allow us to reach a line that minimises the sum of squared deviations.

On the basis of occurring inter-capital links and the obtained information on possible effects, each enterprise is obliged to choose its proper action plan. The choice depends on what the management board plans to accomplish in the long term and on the possibilities of increasing the market share. As regards the afore-mentioned choice, which in many cases results in a change of the corporate image of a company, the first thing to do is to carry out an in-depth analysis of the present condition, including the material, financial and human potential. These three capitals and exceptionally good familiarity with them are what can significantly affect the further development or temporary stability, which is aimed to strengthen the occurring changes, both in the decision-making and operational processes. Therefore, the two following strategies are the ones that should play a key role, both in manufacturing companies and in service companies:

▶ the strategy of systematic development, which leads to an equally systematic growth of the market position, market value and goodwill;

▶ stabilisation, when an enterprise that receives certain stimuli from the environment and makes certain changes within the organisation is in an unstable position that may result in temporary or permanent loss of its stability.

Systematic development may also contribute to unstable conditions. Thus, managerial staff have to be prepared to introduce the stabilisation strategy by means of adopting a programme. The unstable condition is a factor that is included in economic activity as a certain element of the market game. Enterprise's decision-makers who are aware of the possibilities and, most of all, consequences of a loss of balance, both within the company and outside it, are obliged to introduce equivalents in the form of a stabilisation strategy corresponding to the situation.

However, the financial and material expenditure connected with the implementation of the strategy may turn out insufficient. In such an event, a different strategy may be adopted for some time, i.e. a defensive strategy. Taking into consideration the fact that the objective of each enterprise is understood as the future desirable condition that all activities are oriented on and that sets the proper structure [Bieniok 2001, p. 106], the defensive strategy may not be pursued for a longer period of time. In connection with the above, a company has to undertake comprehensive works in the scope of the change.

In the case of free enterprises (non-monopolies), the afore-mentioned work is associated with a much higher risk, while in the case of monopolies the risk is minimised almost to zero; such entities should adopt either the stabilisation strategy or the growth strategy, being the best choice on the competitive market. The model of an enterprise and its corporate environment is the factor determining the adoption of the growth (development) strategy (Fig. 5.3).

The purpose of this paper is not to carry out a primary analysis of particular areas, taking into consideration both macro- and micro-environment, but to indicate potential groups of the factors that are responsible for growth or certain stability of a company in the turbulent environment. Knowledge of such factors, their specificity, character, diversity of needs and, in particular, predictability of their changes serve as the basis for designing strategies and, consequently, for

building growth. The environmental factors penetrate enterprises. They also penetrate one another, which results in the establishment of network links and new possibilities of establishing further ones. It gives rise to a change of the system of valuation of these relations.



Fig. 5.3. Model of an enterprise in its corporate environment

Source: [Sudoł 2006, p. 46].

This model suits entities that are free to compete, the ones that may play a market game, so those which are of non-monopolistic nature.

The links between the particular factors make an impression that an enterprise functions under quite specific conditions. The afore-mentioned featur does not only cover the cause and effect relations of each factor with the ones establishing the relations, but it may be a reflection for managerial staff of the shaping of a proper policy of the enterprise.

5.3. Sequential Game as an Element of Implementation of the Environmental Sustainability Strategy Adopted by an Enterprise

Strategic decisions made by management boards of companies do not only depend on the ability to predict reactions of the competition playing on the market. For example, an enterprise that is the first to establish the size of the production of ecological products is a production or qualitative leader, while a company taking the second position in this scope is merely a production or quantitative imitator. Therefore, the indicated relations and interactions in strategic decisions are defined in the source literature as a sequential game [Varian 1997, p. 427].

For an innovative enterprise in which managerial staff introduce environmental sustainability to the company's policy, the sequential game may directly or indirectly affect the decisions made by managers of any other company operating in the same sector. When analysing the two factors, i.e. the price and the profit, a matrix may be built for every organisation (Fig. 5.4). As it stems from this structure, the relations in enterprises from the same industry are favourable for them at the same time only if the enterprises have established similar

	product price		product price	product price	energy price
	in P1 – fixed		in P2 – fixed	in P1 – falls	in P2 – fixed
e P2		1.2		2	2.2
rpris	profit		profit	profit	profit
entei	in P1 – fixed		in P2 – fixed	in P1 – rises	in P2 – falls
nd €	product price		product price	product price	product price
eco	in P1 – fixed		in P2 – falls	in P1 – falls	in P2 – falls
ne s		1.1.			2.1
F	profit		profit	profit	profit
	in P1 – falls		in P2 – rises	in P1 – falls	in P2 – falls

The first enterprise P1

Fig. 5.4. Matrix of the product price and the profit in enterprises implementing the environmental sustainability strategy in the case of a duopoly

Source: author's study based on [Oyrzanowski 1996, p. 125].

prices for ecological products and in the event of natural impacts on the market. In this part of the matrix, we deal with fixed profit and fixed price of ecological products.

Clients buying ecological products are interested in the purchase if the unit price of products falls in both enterprise types (matrix field (2.1)). The situation is favourable for neither of these companies, since the predicted profits are lower, which means that the possibilities connected with further innovations of technological processes aimed to improve performance are also smaller.

We deal with the least favourable situation if the enterprises are in the matrix field of (2.1), and (1.1) and (2.2). In the two latter cases, a lack of benefits results in a necessity to reduce the price by one of the enterprises, in which case profits rise, and in the maintenance of the price by the other company on a fixed level, in which case profits are lower, or vice versa. In the case of an increase in the profit, i.e. lower prices, the demand for ecological products will grow with the assumption of a fixed number of clients all the time. In the other organisation, the profit will be relatively reduced when the price of ecological products is fixed and taking into account the optimisation of purchasing by clients. That is why only in the case of the two enterprises that take account of sustainable development in their strategies the decisions related to the unit price of ecological products are so important from the perspective of the public and of optimisation of the enterprise's profits.

5.4. The Significance of Controlling for the Design and Implementation of the Green Strategy

Because contemporary enterprises should develop on the basis of strategies, a necessity arises to design and implement a relevant controlling system that supports not only operational management but also the preparation and implementation of strategies. Controlling responds to this challenge by means of separation of operational and strategic controlling. The most important actions taken in strategic and operational controlling are presented in the previous chapters.

What needs to be stressed when focusing on the actions taken in strategic controlling is that it is a system of navigating an organisation that uses the recognition of the level and scope of the pursued strategic objectives within the context of internal and external conditions as the basis for verification and correction of assumptions, objectives and manners of their attainment [Urbanow-ska-Sojkin 2004, p. 417].

Strategic controlling distinguishes three elements: strategic planning, strategic control and internal reporting system. Strategic planning includes plans related to the development of a company. If an enterprise intends to develop in a sustainable way, its strategic plan should include long-term objectives divided into economic, ecological and social objectives, resources needed to attain the set objectives and manners of gaining and using resources [Nowak 2011, p. 24]. Strategic control means verification of strategic plans on a systematic basis as regards their accomplishment and up-to-date status. What is important, control does not only regard the performance of the strategy covered by the plan, but also the assumptions adopted at the time of its formulation. In view of the above, strategic controlling should be also treated as an early warning system in an organisation [Nowak 2011, p. 25]. The fulfilment of the strategic planning and strategic control functions is assured by the reporting system, constituting a separate system for reporting information that supports decision-making processes at different levels of management and contributes to succeeding in the objectives set by an organisation [Nita 2015, p. 32].

5.5. Green Strategy and its Types

From the strategic angle, the inclusion of social and ecological aspects in the functioning of a company may be interpreted differently. According to the first interpretation, one may expect that the fulfilment of requirements in these areas may contribute to an increase in costs and loss of competitiveness. The other interpretation emphasises that the activity for the benefit of ecology and the public contributes to greater innovativeness of organisations and new market opportunities. The first of these interpretations is based on the assumption that meeting the expectations resulting from the sustainability concept serves the environment rather than enterprises themselves. The other interpretation is based on the conviction that no one loses as regards the sustainable development concept, and the winners include the economy, ecology and the public [Bień, Dobiegała-Korona, Duczkowska-Piasecka, Kasiewicz, Pierścionek 2000, p. 7]).

Too strict enforcement of the assumptions of the sustainability concept may make companies unable to meet these assumptions and, what is more, may result in the loss of their competitiveness. In such an event one should expect enterprises to focus on pursuing strategies aimed to avoid potential restrictions. However, to arouse organisations' interest in the development and implementa-
tion of the environmental sustainable development strategy, the intentions and particular plans of a state should be disseminated in advance and, preferably, accepted by companies.

The following issues are the ones that need attention at the time of developing the eco-strategy:

1) the policy pursued by a state, including long-term priorities and objectives in the scope of ecological and social aspects,

2) interdependencies between the actions taken for the benefit of ecology and the public and an increase in the company's value,

3) effectiveness of activities for the benefit of ecology and the public described in standards.

The following types of the environmental sustainability strategy may be distinguished: growth, stability, defence and a combination of them. In order to assure the development of the sustainability concept one should expect that an organisation will be able, in the long term, to accomplish its growth strategy and possibly only in the short term will it implement stabilisation strategies (when it is in a good position and the sector is stable) and defensive strategies (when it tackles financial difficulties and in the event of increasing changes in the environment and the society). The pursuing of the stabilisation strategy might involve the introduction of changes in products and processes, for example as regards the fulfilment of ecological requirements. The defensive strategy, in turn, may consist in the reduction of costs or resignation from some areas of the enterprise's activity.

5.6. Design and Implementation of the Green Strategy in an Enterprise on the Basis of Controlling

The process of design and implementation of the sustainability strategy supported by controlling is presented in Fig. 5.5.

The expectations of the state towards companies in the scope of environmental and social aspects are what constitutes the starting point in the process of design and implementation of the eco-strategy in an organisation. Such expectations may relate to different issues, for example the expected rate of return or compliance with environmental standards. To find out about the expectations and possibilities of meeting them by a company, it is necessary to apply methods of strategic analysis, both with regard to the inside and outside of an enterprise. Amongst the methods of strategic analysis one may widely apply methods of economic analysis related to an organisation and its corporate environment (Fig. 5.6), which are presented in the next chapter.



Fig. 5.5. Process of design and implementation of the green strategy in an enterprise

Source: author's study.



Fig. 5.6. Methods of strategic analysis in controlling applied when formulating the green strategy Source: author's study.

Strategic analysis of an enterprise covers an analysis of the company and its corporate environment. Environmental analysis focuses on the identification of changes occurring outside an enterprise as a consequence of market mechanisms, direct regulations and disclosure of information. Learning about these changes is what should facilitate formulating the future scenarios of situation development in the scope of ecological and social requirements. The possible scenarios of changes in the environment should constitute a basis for the determination of key success indicators for a company (depending on opportunities and threats of particular scenarios). The future success indicators should serve as a basis for the development of options of the environmental sustainability strategy, aimed to attain economic, ecological and social objectives. Depending on the selected eco-strategy, an enterprise has to define the size of resources it plans to involve or use and the measures of the strategy implementation.

The development of an organisation as a result of the implementation of the eco-strategy means the introduction of coordinated changes in the company. The purpose of controlling (both strategic and operational) at the time of implementation of the environmental sustainable development strategy is to make changes effective as regards the accomplishment of economic, ecological and social objectives. What is necessary in this situation is to apply relevant tools of controlling, including planning, budgeting, analysis of indicators and measures, reporting, evaluation of investments projects, analysis of risk and capital costs. Fig. 5.7 presents a set of potential tools of controlling, applied when implementing the environmental sustainability strategy, which is an open catalogue, as in the case of methods of strategic analysis, i.e. it is to be considered as an exemplary set of tools.

The basic principles as regards the development of the environmental sustainable development strategy include broad involvement of employees of the Controlling Department, creativity, proper assumptions, good communications and decentralisation of responsibility.



Fig. 5.7. Controlling tools used when implementing the green strategy Source: author's study.

5.7. Final Remarks

When analysing the functioning of an enterprise one may not omit the scope of the company's impact on the natural environment. It is of great significance since, as a complex system, an organisation is connected with the natural environment in many aspects, both in theory and in practice of management. Thus, strategic decisions made as part of the management process may not neglect environmental sustainable development. A sense of responsibility for the natural environment and ecology is what has become a link between the traditional economic policy, based on profit, and the strategy of corporate social responsibility. It enables companies to develop in a sustainable manner. Thus, focusing enterprise's activity on sustainable development should be treated as a challenge aimed to solve complex economic, environmental and social problems being a consequence of the fundamental change of the economic, political, technical and technological orientation. Therefore, the actions taken in this scope by managerial staff should comply with the following principles:

- perpetration repair by the perpetrator,
- prevention,

▶ economic effectiveness – optimal relations between expenditure and ecological effects,

▶ fairness – sharing costs in a proportionate manner,

▶ subsidiarity – assistance with a guarantee of assuring the effectiveness of actions [Machowski 2003, pp. 36 and 38].

6 Strategic Analysis as a Tool of the Green Strategy Design

6.1. Introductory Remarks

Strategic analysis is carried out in enterprises as part of strategic controlling. The subject of the analysis is both the corporate environment and the enterprise itself. The literature on strategic controlling and management distinguishes a wide variety of methods of strategic analysis of an enterprise and its corporate environment. Taking into consideration the limitations as regards the volume of the paper and the specificity of controlling, including in particular green controlling, the chapter focuses only on selected methods of strategic analysis of the corporate environment and internal analysis.

The purpose of the chapter is to present methods of strategic analysis, which, in the authors' opinion, best correspond to the requirements of the sustainability and controlling concepts.

6.2. Purposes and Scope of Strategic Analysis

In order to develop an eco-strategy (green strategy) for an enterprise, a wide range of factors has to be analysed, as a result of which the strategy may be realistic and effective. An analysis of factors determining a strategy may be referred to as strategic analysis [Pierścionek 2001, p. 102].

As regards the activities that have to be carried out as part of the analysis, strategic analysis is a collection of actions aimed to diagnose an enterprise and its corporate environment, which allow for building a strategic plan and putting

it into practice. As regards tools, strategic analysis is a set of analytical methods that enable the examination, evaluation and prediction of the future conditions of selected elements of a business and its corporate environment from the perspective of the possibilities of development, for example sustainability [Gierszewska and Romanowska 2007, p. 17].

The scope of strategic analysis covers the following areas:

- 1) analysis of the environment,
- 2) internal analysis.

A good direction as regards conducting a strategic analysis is the method of formulating the SWOT strategy, connected with identification of strengths and weaknesses (S – strengths, W – weaknesses) as well as opportunities and threats in the environment (O – opportunities, T – threats). SWOT analysis applied for the formulation of the environmental sustainability strategy is presented in Fig. 6.1.



Fig. 6.1. SWOT method applied for the formulation of the green strategy Source: author's study.

Figure 6.2. presents a diagram of the application of strategic analysis methods for the formulation and implementation of the green strategy.

In Fig. 6.2. it is emphasised that an analysis of changes occurring in the corporate environment should allow us to predict the most important determinants of the enterprise's eco-development. However, possible development scenarios have to be taken into consideration because of the uncertainty of predictions related to the future conditions of the corporate environment. Depending on the predicted sustainability scenarios, it is necessary to indicate critical success factors for the company's green development, used as the basis for defining strategic options.



Fig. 6.2. Application of strategic analysis methods for the formulation and implementation of the green strategy

Source: author's study.

6.3. Analysis of the Environment

In strategic controlling, a strategic analysis of the environment should allow for evaluating the situation in the most important segments of controlling, including the legal, economic, ecological, social and technological segments. What is important, an analysis of situations in separated segments of the corporate environment may be limited to an analysis of single segments, but in strategic controlling it is advisable to enrich the analysis with mutual relations among them [Goliszewski 2015, p. 245].

What should attract particular attention in the analysis of environmental segments is the separation of the ecological and social segments, strictly corresponding to the two aspects of the sustainable development concept; as regards the economic aspect, it is always of great significance to companies. The ecolog-

ical segment covers regulations and tendencies related to environmental protection while the social segment relates to such matters as the development of social standards, consumers' needs and behaviours [Goliszewski 2015, p. 245].

It has to be emphasised that all segments of the macro-environment are generally worth analysing from the perspective of green controlling, not only the economic, ecological and social segments, but also the legal and technological ones. An analysis of the legal aspect relates to legal and tax conditions of operations of an enterprise, whereas an analysis of the technological aspect regards both the modification of the hitherto technologies and the introduction of new ones.

The basic methods of the analysis of environmental segments include forecasting methods (e.g. gap analysis, scenario methods, creativity techniques), statistical methods (e.g. time-phased trend analysis) and early warning methods (e.g. comparison of the planned values with the expected values).

The most useful methods applied in controlling, including green controlling, cover gap analysis and scenario analysis. Strategic gap analysis allows for identifying problems in the scope of sustainable development that occur in the environment, while scenario analysis facilitates finding a solution to a problem.

Strategic gap analysis involves determining deviations between desirable and predicted development in the long term, for example with regard to a country or a region. We deal with a strategy gap if the deviations between the desirable condition and the predicted condition occur in the long term [Marciniak 2008, p. 244].

If a strategy gap does occur, the following elements have to be defined: strengths and weaknesses of the country (region), possible reactions of the corporate environment and strategic potential of the country (region) in the biological, technical and financial dimensions, in order to close the strategy gap. If the strategy gap is closed quickly, an opportunity to gain better environmental performance as well as social and economic effects increases.

An environmental scanning method that is useful for closing the strategy gap is the scenario method, which consists of the determination of consistent scenarios of development of particular segments of the environment with the definition of development stages for each scenario. Scenarios may be divided into four groups, including scenarios of possible events, simulation scenarios, scenarios of environmental conditions and scenarios of environmental processes [Kozioł 2008 a, pp. 158–160, as cited in: Goliszewski 2015, p. 246]. Generally speaking, in each case the purpose is to define the strength and scope of the impact of changes occurring in the corporate environment on the organisation and to define the organisation's ability to adapt to such changes.



The essence of scenario analysis is presented in a graphic form by the scenario funnel (Fig. 6.3).

Fig. 6.3. Scenario funnel in green controlling Source: Marciniak 2008, p. 246.

In strategic controlling, the scenario funnel is aimed to facilitate predicting and selecting the best scenario of events. The following scenarios can be distinguished, depending on the situation in the corporate environment: extremely optimistic, optimistically realistic without disruptions, optimistically realistic with disruptions, compliant with the present tendency and extremely pessimistic.

6.4. Internal Analysis

6.4.1. Areas Covered by the Analysis and Analytical Methods

Internal analysis of an organisation is a very significant element of strategic analysis. The difficulty of carrying out an internal analysis as part of a strategic analysis stems from the fact that it is a complex issue, since internal analysis has to relate to all areas of an enterprise, i.e. apart from the economic aspect it also has to regard the technological, social and cultural aspects. It requires analys-

ing the whole range of phenomena and applying different methods [Gierszewska and Romanowska 1999, p. 34]. Moreover, the internal factors in a company are not always controllable and may not be planned. A necessity arises to pay attention to resources controlled by an organisation, in particular if it wishes to take into consideration environmental and social aspects in its development. Strategic internal analysis of an enterprise only makes sense if it is assumed that the enterprise's resources are the ones that contribute to gaining a competitive advantage, rather than that the competitive advantage is merely a result of the enterprise's ability to adapt to the changing external conditions [Gierszewska and Romanowska 1999, p. 139]. The resource-based view of a firm is an approach in which an organisation is perceived as an organised set of assets allowing it to gain extraordinary rates of return thanks to access to unique combinations of resources, which would be costly to copy¹. The resource-based approach gave rise to the establishment of the competence-based school, focusing the strategy on core competences of a company [Prahalad and Hamel 1990, pp. 79–91]². According to the assumptions adopted by the competence-based school, an enterprise builds competitive advantage by means of configuring its resources and abilities into core competences. Resources are of strategic significance if they are precious, rare and difficult to imitate and when they are effectively used, and dynamic stretch should occur between the resources [Obłój 1998, pp. 83-93].

As regards strategic internal analysis of a company, various methods may be used, ranging from comprehensive to fragmentary analyses, including strategic balance sheet method, aimed to carry out a comprehensive evaluation of the inside of a company on the basis of many criteria. Another approach does not analyse all aspects of the organisation's activity, but only focuses on critical success factors. Comprehensive methods of analysis also include value chain analysis, which focuses on looking for the competitive advantage in particular basic and auxiliary functions of an enterprise [Strategor 1999, p. 61]. What should be pointed out here is the fact that a comprehensive internal analysis requires analysing particular sections of the company's activity. Fragmentary methods include a life-cycle analysis and portfolio methods. Since a comprehensive stra-

¹ E. Penrose is considered to be the precursor of this approach [Foss 1998]. A synthetic review of the main assumptions of the resource-based approach may be found, for example, in: [Stoelhorst and van Raaij 2002, p. 4].

² There are a number of names of this approach used nowadays, including competence-based, resourcebased or capabilities approach [Foss 1996, p. 9].

tegic internal analysis is an inter-disciplinary analysis, it may also apply methods originating from other disciplines.

Taking the above into consideration, a strategic internal analysis may derive from a wide range of methods of economic analysis. Apart from the areas constituting the focus of attention of vastly popular financial analysis of an enterprise, as part of the resource-based approach an analysis should be also carried out with regard to some other areas, including for example:

- production in a manufacturing company,
- human resources,
- fixed assets,
- materials,
- intangible assets (intellectual capital).

Apart from that, there are also other methods that may be used in green controlling, designed in particular to best take into account environmental and social aspects in a strategic internal analysis of an organisation. Such methods include an analysis of stakeholder expectations and a cross-impact analysis.

What should be highlighted here is that analytical methods referred to in this chapter may not completely neglect the external environment of an enterprise, despite the fact that they focus on the inside of the firm. Taking into account the fact that organisations function in a corporate environment, it is understandable that sometimes methods operate on the verge of the internal and external environments, and in many cases the corporate environment constitutes a point of reference enabling one to draw proper conclusions as part of these methods.

The limited size of this chapter does not allow for discussing all aspects and methods of strategic internal analysis of an organisation in detail, so the author has to focus on the most important ones only. In view of the above, the further part of the chapter presents briefly the selected comprehensive methods of analysis of the strategic potential, such as strategic balance sheet method and critical success factors analysis, with emphasis put on the significance of environmental and social aspects within the framework of these methods. Next, possibilities of applying economic analysis of an enterprise in some areas are indicated. Apart from that, the chapter also refers to portfolio methods, such as BCG-matrix, McKinsey matrix, ADL matrix or Hofer matrix, and indicates a possibility of modifying these tools, so as to extend the scope of their application to environmental and social aspects. Finally, a diagram of stakeholder expectations analysis and cross-impact analysis is presented.

6.4.2. Selected General Methods of the Strategic Potential Analysis

Two of the methods of the strategic potential analysis of an enterprise³ will be briefly presented here, including strategic balance sheet method and critical success factors analysis. Both of them may be considered to be comprehensive methods, since their purpose is to carry out a comprehensive evaluation of the strategic potential of an organisation. SWOT analysis is a guide for conducting the whole strategic analysis, including internal analysis and strategic potential analysis in particular [Strategor 1999, p. 26; Gierszewska and Romanowska 1999, p. 207]. According to SWOT analysis, strengths should be focused on and weaknesses should be improved.

Strategic balance sheet is a method of systematic and multi-criteria analysis of an organisation that covers all areas of its functioning [Gierszewska and Romanowska 1999, p. 142]. As a rule, a large number of factors subject to the analysis are grouped according to functional areas or according to some other criteria. The purpose of the analysis is to define strong and weak points of the analysed company. The analysis takes on different forms in the operationalised layer, from descriptive assessment, to allocation of different levels of importance to particular factors, to an attempt of quantitative evaluation [Stabryła 2000, p. 195; Gierszewska and Romanowska 1999, pp. 143–146].

Since strategic balance sheet method assumes carrying out a review of all resources and factors of an enterprise that impact its strategic position, this method is very time-consuming. Another approach in strategic potential analysis assumes that a review of all resources of an enterprise is not necessary to find key factors. This approach gave rise to critical success factors analysis. It involves limiting the analysis to the factors considered by the analyst as the ones that determine the competitive position and development prospects of an organisation [Stabryła 2000, p. 163; Gierszewska and Romanowska 1999, p. 146]. The difficulty of this method lies in the establishment of a list of critical success factors⁴, which is different for different sectors; in many cases, it is an individual aspect of a particular enterprise and, what is more, it changes over time depending on

³ It is also referred to as competitive position analysis [Strategor 1999, p. 68].

⁴ A list of critical success factors may be determined either by means of prior review of all possible factors, which basically requires preparation of strategic balance sheet of a company, or on the basis of competences and experience of an analyst, i.e. more or less subjectively.

the phase of the life cycle [Strategor 1999, p. 69]. There are different detailed techniques of the evaluation of critical success factors, including assignment of score and weight, profile charts or paths of competitive positions [Strategor 1999, pp. 70–73; Gierszewska and Romanowska 1999, p. 151; Stabryła 2000, pp. 163–165].

As the above specification of methods indicates, it is impossible to neglect the corporate environment even in the case of an analysis of internal resources. It stems from the fact that both presented methods require adopting a point of reference for the purpose of evaluation. Within this context, the benchmarking technique may be useful. Its application includes the five phases [Strategor 1999, pp. 73–76]:

• identification of comparable variables,

identification of model companies,

collection of information,

• definition of the effectiveness gap and the desirable level of achievements,

• definition of objectives, plans of action and techniques of progress measurement.

Since strategic balance sheet method and the analysis of critical success factors are open methods, there are no obstacles to taking into consideration environmental and social aspects in the analysis of the strategic potential carried out with the use of the afore-mentioned methods. As regards strategic balance sheet method, it may be done by means of considering also environmental and social indicators as part of analysed strategic factors in particular functional areas. As it was mentioned above, the factors covered by strategic balance sheet method may be grouped according to different criteria, not only functional areas. Such criteria may include the type of used resources or strategic area. In such an event, environmental and social aspects may also be taken account of by adding separate areas (e.g. environmental and social areas) to the analysed areas.

Similarly, in the case of an analysis of critical success factors, an enterprise aiming to guarantee sustainable development perceives the consideration of environmental and social aspects as one of the key factors of its success. That is why the distinguishing of environmental and social factors as the areas of critical success factors analysis is not only recommended but is directly associated with strategic recommendations.

6.4.3. Corporate Financial Analysis as an Element of Strategic Analysis

Financial analysis constitutes a part of economic analysis of an organisation. It focuses on the identification and evaluation of changes and indication of causes of changes in the scope of revenues, costs, profit and profitability, assets, liabilities and financial coverage of assets, net working capital, assets and capital turnover ratio, financial liquidity, operational, financial and total risk or the position on the capital market⁵. Corporate financial analysis deals with resources and streams of a company that may be expressed in monetary terms. Since financial analysis is aimed at evaluating a broadly-understood financial position of a company, it may constitute an interesting tool of strategic analysis of the inside of an organisation from the financial angle⁶. The tools of financial analysis include both the ones that fragmentarily refer to certain areas and problems and the ones that attempt to provide synthetic information on the entity's financial situation. The latter group includes tools of bankruptcy prediction, such as models of multi-criteria discriminant analysis and measures of value creation, for example economic profit and its derivatives. Due to their synthetic nature, they may serve as assistance in the evaluation of the results of the strategy pursued by an organisation. However, full presentation of the areas and methods of financial analysis would go beyond the framework of this publication⁷.

6.4.4. Other Areas of the Corporate Resources Analysis

The other methods (apart from financial analysis) that may be applied to evaluate resources as part of strategic analysis are the ones that derive from technical and economic analysis. One of the areas covered by such evaluation is produc-

 $^{^{\}rm 5}\,$ Corporate financial analysis may also cover other areas, but their presentation would go beyond the framework of this book.

⁶ The use of economic analysis of companies in strategic analysis describes Duraj [Duraj, 1993, s. 18–19].

⁷ Anyone interested may become familiar with extensive source literature. Financial analysis is the focus of many publications, e.g. [Hamrol 2010; Sierpińska and Jachna 2007; Wędzki 2006; Ćwiąkała-Małys and Nowak 2005; Urbańczyk 2001; Dudycz 2000; Waśniewski 1997; Sierpińska and Jachna 1993, Dudycz, Wrzosek, 2003].

tion in an industrial enterprise⁸. Since industrial enterprises deal with production and sale of industrial products and provision of industrial services, production is a reflection of the results of its operations [Kurtys 1995a, p. 193]. The importance of production analysis stems from the fact that it determines the effectiveness of dealing with different production factors. Production may be measured with the use of natural measures, conventional measures, measures of value and labour intensiveness [Kurtys 1995a, pp. 193–200].

An analysis of the assortment structure of production examines its adaptation to the needs of customers, including the degree of accomplishment of the plan in the aspect of the assortment and deviation as well as their causes. Thus, it constitutes the heart of the controlling-oriented approach and should take account of environmental and social aspects. In the times of increasing social awareness and ecological pressure, these requirements are becoming an inherent part of the market demand and the analysis may be aimed to state if the production was in compliance with the plan, if it was even and if there is any assortment that was not planned to produce [Kurtys 1995a, pp. 202–207]. What is of certain significance from the perspective of social and environmental requirements is production rhythm analysis, since irregular production may result in excessive involvement and consumption of production factors, increased costs, deterioration of working conditions, problems with occupational health and safety, adverse ecological effects, tension amongst employees, which may be experienced not only by the analysed enterprise but also by its contracting parties. Production rhythm analysis is aimed to determine the degree of production rhythm, to recognise the factors that disturb it and to define adverse effects of a lack of production rhythm [Kurtys 1995a, pp. 207–214].

Another area of the analysis that is of certain significance as regards the conditions of sustainable development is human resource management. Technical and economic analysis in this scope traditionally covered the dynamics and structure of employment from various angles, analysis of professional qualifications of employees, analysis of employee retention, analysis of work efficiency and analysis of remuneration, which is connected with financial analysis [Kurtys 1995b, pp. 227–262]. Taking into account the contemporary conditions of management, it is of key importance for the analysis in this scope to cover not

⁸ Along with financial analysis, technical and economic analysis is part of economic analysis of an enterprise and refers to an industrial company in the full scope. That is why fragments related to the technical and economic analysis cannot be referred to other types of enterprises in the full scope.

only persons employed on the basis of employment contracts, but also the ones employed on the basis of other contracts, including management contracts, the self-employed and the persons employed on the basis of other contracts (e.g. mandate contracts, although in this case there is a factual employment relationship between the parties to such contracts rather than the relation between the ordering party and contractor). Socially responsible companies should avoid such contracts (commonly called "junk" contracts) as they pose a threat to a decent life of an employee, a risk of poverty, considerably limit access to social rights and generate high social costs. At this stage, a diagnosis should be carried out with regard to all persons that actually provide work for the benefit of a given enterprise and should present a picture of changes in the employment structure, taking into account the greatest possible number of perspectives, depending on the purpose of the analysis.

What is important is an analysis of employees' professional qualifications that includes at least the level of education and years of service of employees. An analysis of personnel retention monitors such indicators as employment, redundancies, exchange and undesirable redundancies. The weight of the analysis carried out in this area, in particular within the context of sustainable development, results from the possible adverse effects for the performance of an organisation, such as recruitment costs, disorganisation of the processes of the basic and auxiliary activity, an increase in the shortage and return indicator, an increase in the number of accidents at work, greater consumption of property or overall reduction in the social capital of a company [Kurtys 1995b, pp. 236–247].

An analysis of labor productivity should not only indicate its changes in time and in different groups of employees, but also causes of such changes. As regards an analysis of remuneration, an attempt should be made for the dynamics of the average labor productivity to exceed the dynamics of average remuneration [Kurtys 1995b, p. 260].

An analysis of fixed assets management includes an analysis of productivity of fixed assets, changes in fixed assets, use of machines and equipment and the influence of fixed asset management on the economic results of an entity [Borowiecki 1995, pp. 263–293]. In the case of a production entity, fixed assets are the factor that determines the company's production capacity. Productivity analysis should distinguish non-productive fixed assets from directly and indirectly productive fixed assets, as well as average productivity from incremental productivity [Borowiecki 1995, pp. 267–268]. An analysis of changes of fixed assets covers their dynamics, structure and changes in the structure, both in the quantitative and qualitative aspect, for the purpose of measurement of the renewal, liquidation, restoring and depreciation of fixed assets. The use of machines and equipment, in turn, is analysed both from the perspective of intensiveness and extensiveness [Borowiecki 1995, pp. 272–289]. The analysis also covers the impact of fixed asset management on the economic results of a company, which is aimed to examine the possibilities of increasing productivity of fixed assets with the use of model systems of inequalities, propagating (inter alia) that the dynamics of financial results should exceed the production growth, which in turn should be greater than the increments of fixed assets growing faster than employment [Niedzielski 2010, p. 209; Borowiecki 1995, p. 291].

Another area of analysis related to sustainability conditions is materials management, aimed at recognising data allowing one to assess the condition and results of materials management, to detect causes and to determine effects of the occurring disturbances and to define the manners of their improvement. The subject scope of an analysis corresponds to the phases of the flow of material streams in a company and encompasses purchasing, consumption of materials and material intensity of production, stock of materials, warehouse management, movements of materials in the warehouse and production processes, and the application of recycled raw materials. As a rule, a criterion adopted for the evaluation is the possibility of reduction in stock management costs with simultaneous assurance of continuity of operations of an enterprise [Wersty 1995, pp. 295–296].

As regards an analysis of material intensity of production, the causes that affect material intensity of the whole production and unit material intensity [Wersty 1995, p. 297] do not only include such factors as changes of the production structure or changes of the prices of products and materials, but also the factors that may positively affect both the material intensity of production and the environment. As regards unit material intensity, the above relates to, for example, changes of the design and technology of products and services or changes of the consumption of materials as a result of better use of the existing technology and improvement of the technological discipline. In the scope of the total production of an enterprise, it relates to such changes in cooperation that result in a change of the production value and the value of the consumed materials. Another issue that may be of considerable significance for the improvement of the ecological parameters of the conducted activity is an analysis of the consumption of materials [Wersty 1995, p. 298], which allows for distinguishing indicators of technological losses and waste. Among other areas of materials management the focus of the analysis should be brought into the material balance, based in its fundamental form on the principle stating that the initial volume of the stock increased with the size of supplies has to equal the total of the consumption and the final stock volume. The material balance in the scope of the comparison of plans with results allows for setting directions of detailed tests related to the causes of occurring deviations. Another specific issue is an analysis of rhythm and completeness of supplies, whose disruptions may affect the volume and quality of production [Wersty 1995, pp. 300–306], and this may have an adverse influence on the natural habitat and the social environment.

As regards an analysis of the areas largely affected by environmental and social aspects, one may not neglect intangible assets, which may be a determining factor of the competitive advantage in the contemporary economy [Low and Cohen Kalafut 2004, pp. 11–34; Kasiewicz, Rogowski and Kicińska 2006, pp. 41–72]. An analysis of intangible assets is of great significance within the context of sustainable development, since the effects of conscious consideration of environmental and social aspects in the activity conducted by an enterprise contribute to cost savings only to a certain extent, while they become, to a greater extent, a part of intangible assets held by a company, including in particular the social capital, both in the internal (company's employees) and external aspects (perception of the company by people from its corporate environment).

6.4.5. Taking into Account Environmental and Social Aspects in Portfolio Analysis Methods

Portfolio analysis methods include, for example, BCG, McKinsey, ADL and Hofer matrices. The basic form and directions of use of each of the afore-mentioned matrices are discussed in detail in the literature [e.g. Strategor 1999, pp. 125–142; Stabryła 2000, pp. 177–188; Obłój 1998, pp. 272–281; Gierszewska and Romanowska 1999, pp. 176–194]. This section indicates the possibilities of considering environmental and social aspects in the discussed matrices, so that they also inform (apart from the hitherto set of data) about the matters connected with sustainable development of an organisation.

As regards the afore-mentioned matrices, the procedure includes the following stages [Strategor 1999, p. 133]:

• definition and decomposition of fields (centres, segments) of strategic activities of an organisation, • evaluation of particular strategic segments according to the two basic criteria constituting matrix axes,

putting these segments on matrices,

• carrying out an analysis of the structure of the whole portfolio for the purpose of defining the overall strategy.

The discussed matrices may be treated as tools used for the visualisation of the strategic position of a company, taking into account the portfolio of its products or strategic business units. From this perspective, the matrices use several ways of coding information, which constitute significant criteria of evaluation that may be adopted by an analyst or a decision-maker. The information contained in these matrices with regard to an analysis unit (a product, a group of products or a strategic business unit) is not limited to the two basic dimensions defined by the matrix axes. The dimensions of the information that constitute significant criteria are included in particular matrices and presented in Table 6.1.

Specification	BCG matrix	McKinsey matrix	ADL matrix	Hofer matrix
Analysis unit	Product	Strategic business unit	Product or group of products	Strategic business unit
Y-axis	Market growth rate	Attractiveness of industry	Competitive advantage of an enterprise	Industry development phase
X-axis	Relative market share	Competitive position of an enterprise	Maturity of the sector according to life cycle phases	Competitive position
Circle size (diameter)	Share of a given product (segment) in sale of the analysed enterprise	Size of the market (sector) in which a given segment operates (strategic business unit)	Share of a given product (segment) in sale of the analysed enterprise	Share of a given segment in sale of the analysed enterprise
Section of the circle	-	Share in the market (sector)	-	Market share of a given group of products

Table 6.1. Criteria considered in particular portfolio methods (matrices)

Source: author's study based on [Strategor 1999, pp. 125–142; Stabryla 2000, pp. 177–188; Gierszewska and Romanowska 1999, pp. 176–194].

As it stems from Table 6.1, the scope of information considered in matrices is not limited to the two basic criteria designated by the two dimensions of the matrices. The two basic criteria are used for defining the coordinates of the point in the twodimensional coordinate system, which becomes the radial point in all methods. The diameter of the circle allows one to take into account the third dimension of information on the analysis unit (a product or a strategic business unit), whereas McKinsey and Hofer matrices also contain the fourth dimension of information in the form of a section of the circle. On the basis of such a complex information structure of the presented matrices, one might draw a conclusion that matrices have no room for placing any additional (fifth) dimension of information, which would code data related to the fulfilment by products of the requirements of sustainable development (i.e. the fulfilment of environmental and social requirements).

However, the author's proposal assumes that the fifth dimension may be a colour of the circle or of a section of the circle placed in the matrix. It is recommended that sustainability conditions should be taken into consideration by means of analysing the degree of fulfilment of environmental and social requirements by relevant analysis units (products, groups of products or strategic business units)⁹. This solution will allow for putting units of analysis in the order from the "greenest" ones (i.e. meeting environmental and social requirements to the greatest extent) to the ones that are far from the fulfilment of such requirements, which may be marked red. To mark analysis units whose score was in the middle between maximum and minimum values one may use transitional colours between green and red (according to the selected colour palette)¹⁰. Next, the analysis units marked with a relevant colour (products, strategic business units) are to be put into the matrix. Additionally, arrows used in some matrices (for example in BCG matrix) for indicating strategic recommendations may be also marked with colours, but the colour of the beginning of the arrow should correspond to the colour of a given product or strategic business unit it relates to, and the colour of the arrowhead should indicate the strategic objec-

⁹ The information contained in other chapters of this publication may be of certain assistance here, in particular the information presented in chapter 3. For the purpose of defining the degree of fulfilment of the environmental and social requirements, one may use analogous methods as the ones applied as part of strategic balance sheet method or critical success factors analysis.

¹⁰ Here it is assumed that the environmental and social requirements resulting from applicable legal provisions in force are met in the analysed entity. That is the reason why the above considerations about the fulfilment of these requirements relate to the activities which do not result from legal provisions defining boundary conditions of the activity in this scope but rather from a conscious effort made by an entity to put into effect the concept of sustainable development.

tive of a given product or strategic business unit in the aspect of the fulfilment of the requirements of sustainable development¹¹. It has to be emphasised that adding this additional dimension of information is of great significance in the case of enterprises for which the principles of sustainability are a part of the development strategy.

Figure 6.4 presents an example of using the above proposal in the BCG matrix.



Fig. 6.4. Example of including information on the fulfilment of sustainability requirements in the BCG matrix

Source: author's study.

The portfolio of products presented in the BCG matrix in Fig. 6.4 includes the following categories of products and strategic recommendations regarding them:

➤ the product from the "cash cow" category does not only have a high relative share in a mature market, but to a considerable extent, it also meets the environmental and social requirements; strategic recommendations related to this product assume an increase in the relative market share and making efforts to make it meet environmental and social requirements to a greater extent;

▶ the product from the "stars" category has quite a large share in the market which is in the growth phase; at the same time, it fulfils the environmental and social requirements to a small extent only; strategic recommendations related to this product assume gradual transition of the market of this product from the growth phase to the maturity phase and an increase in the relative market share and improvement of the degree of fulfilment of sustainability requirements;

¹¹ In the case of the black and white presentation, green may be replaced with white and red may be replaced with black, while transitional conditions may be presented in shades of grey, as in figure 6.4.

➤ the product from the "dogs" category has a small relative share in a market which is in the maturity phase or in the declining phase; at the same time, it only meets the environmental and social requirements that result from applicable legal provisions in force; strategic recommendations assume abandonment of the "dog", thus it would be purposeless to spend funds on the activities aimed to improve the degree of fulfilment of sustainability requirements.

McKinsey, ADL and Hofer matrices may be modified in a similar way. Adding a new dimension of information disclosed by a matrix in an analogous manner as in the case of BCG matrix by means of a colour of the circle (ADL matrix) or of a section of the circle (McKinsey and Hofer matrices) would enrich the conclusions on the strategy adopted by an enterprise that prefers sustainable development, for which consideration of environmental and social aspects is of such great significance. However, in this case attention should be paid to certain methodological issues. The competitive position is a criterion marked on one of the axes in the three analysed matrices.¹²

In enterprises taking into consideration environmental and social aspects these are the variables that contribute to the competitive position. For the purpose of transparency of the methodology, the proposed modification of these matrices should assume that the information on the fulfilment of the sustainability requirements is presented only once, i.e. in the form of a colour of the circle or of a section of the circle and is not taken account of as part of the aggregate criterion, i.e. the competitive position.

The analysis of environmental and social aspects in strategic matrices in the proposed manner would allow one to look for a sustainable portfolio, i.e. not only balanced¹³ but consistent with the requirements of sustainable development.

¹² As compared with the BCG matrix, it is an advantage of these matrices, since it does not focus on the two dimensions only. In the case of the BCG matrix, it results in a necessity to adopt certain assumptions related to the shaping of other variables, such as profitability of the analysed products. In McKinsey, ADL and Hofer matrices, the adoption of the competitive position as one of the criteria allows to include a great number of variables as part of this aggregate criterion. In this way, these matrices analyse a greater number of variables, but it results in subjectivity of the selection of the variables and including them in the overall variable, being the competitive position.

¹³ For example, in the BCG matrix a balanced portfolio means that cash flows generated by "cash cows" and profitable "stars" allow one to invest in young products without a considerable market share ("question marks", "young stars") and the enterprise is profitable and generates cash despite these investments. Apart from that, a portfolio of products should be also growing, which means that an organisation assures its future cash flows thanks to skilful investment in "question marks", so that they become "stars" and "cash cows" in the future and so that they replace the present "cash cows" [Strategor 1999, pp. 133–138; Gierszewska and Romanowska 1999, p. 180].

6.4.6. Analysis of Stakeholders' Expectations and Cross-impact Analysis as Methods that take into Account Environmental and Social Aspects in Strategic Internal Analysis

A starting point for an analysis of stakeholders' expectations is the identification of particular interest groups. A detailed list of stakeholders is established on an individual basis in particular industries and by particular companies. This analysis refers to the stakeholder theory¹⁴, assuming that the long-term success of an enterprise depends on whether or not its managers find balance between interests of particular stakeholders [Steinke et al., 2014, pp. 54–55]. In practice, expectations of stakeholders may be identified by means of workshops, annual standardised surveys and regular contacts with representatives of groups of stakeholders [Steinke et al., 2014, pp. 55–56]. What is important in the process of determining such interests is to define their significance for particular groups and significance of these issues for the conducted business. The results of the research may be gathered in a two-dimensional matrix with expectations of stakeholders presented on Y-axis, grouped according to their significance (e.g. in a distribution into low, medium and high) and the significance for business (low, medium, high) on X-axis [Steinke et al., 2014, pp. 56–57]. The topics that should be included in the further strategic planning are the ones of great importance from the perspective of both an enterprise and its stakeholders. Areas that are important to stakeholders, but of lower importance from the perspective of an organisation should be included to a greater extent in the area of communication [Steinke et al. 2014, p. 56].

Cross-impact analysis is another method that may be applied to identify important topics of environmental sustainability¹⁵. It helps to determine mutual links among the variables in the analysed system and to put them in a correct order, but it provides no answer to the question on the actions that have to be undertaken to change the considered system in a desirable manner. It is a tool aimed at the evaluation of the influence of changes in the corporate environment on the shaping of corporate governance. The analysis allows one to present, in the form of a matrix, the impact of events on which an enterprise has a small influence on different areas of its activity or functions. It may contribute

¹⁴ This theory is discussed in chapter 4.

¹⁵ The type of cross-impact analysis described here is only one of the methods of its application. More information on cross-impact analysis is available in, for example [Gordon 1994].

to detection and assessment of opportunities and threats which were not known before [Steinke et al., 2014, p. 56]. Cross-impact analysis should start with defining the areas of activity or functions that are important to a company. Next, they are set against the background of important events or tendencies in the environment. The third step involves the evaluation of the impact of particular events or tendencies on the selected areas of the enterprise's activity. The assessment may be limited to defining the direction of the impact (positive, neutral, negative), it may also define the power of the impact with the use of a grading scale (e.g. from "–3" (a very negative impact) to "+3" (a very positive impact)), and it may also include defining the probability of occurrence. An example of a matrix with evaluation carried out according to the second formula discussed above is presented in Table 6.2.

Table 6.2. Example of cross-impact analysis							
Specification biogas plants		Areas of the activity conducted by an enterprise					
		gas treatment	process biology	technical service		Total	
cies in the onment	Legislation	2	1	1	3	7	
	Technology	2	2	1	0	5	
	Competition	-2	-2	1	1	-2	
ndenc envir	Clients	-3	-2	0	2	-3	
Tei	Investors	-3	-2	-1	-1	-7	
Total		-4	-3	2	5		

Source: author's study based on [Steinke et al. 2014, p. 58].

In the presented example, the total score in the last column presents information on how a given tendency observed in the environment impacts all distinguished areas of activity, whereas the total score in the last line presents the predicted impact of all observed tendencies in the environment on a given area of the activity conducted by a company [Steinke et al., 2014, p. 59].

6.5. Final Remarks

The presented methods of strategic analysis are not a comprehensive collection of techniques that may be used in green controlling. However, they are the ones that best correspond to the requirements of the sustainability concept. Because of the plenty of analytical areas in green controlling, requiring separate analyses for particular areas of functioning of an enterprise and its corporate environment, and within the context of the relations among them, the simultaneous application of several methods of strategic analysis should be considered a proper solution. In the authors' opinion, it will increase the accuracy of the decisions made in an organisation in the economic, social and ecological aspects.

7.1. Introductory Remarks

Corporate social responsibility is a strategy of corporate responsibility, implemented with the participation of stakeholders through ethical and transparent behaviour contributing to the sustainable development. It relates to the impact of decisions and activities on society and the environment [Samelak 2013, p. 17].

Accounting is an art of measurement. It cannot measure everything and many elements of business activity remain outside the area of interest of accounting; however, it happens from time to time that an item not covered by accounting measurements and reporting, begins to be noticed.

It does not happen overnight; usually various attempts are made over many years to include a given issue in the scope of accounting, especially financial accounting, and only then are these rules codified.

Today, mandatory financial statements are the final product of accounting. They are based on established internationalised principles and contain highquality information on the financial standing of entities [Samelak 2013, p. 5].

However, due to a limited scope of information (mainly financial information), they meet stakeholders' expectations to a lesser and lesser extent. Therefore, more and more entities publish additional reports [Jędrzejka 2012, p. 315 as cited in: Michalczuk and Mikulska 2014, p. 199]:

1) which allow them to create a context for the financial statements by generating supplementary information in their descriptive part and, above all, in reports on activities and economic risks,

2) which go beyond economic aspects of the entity's business, such as reports on corporate social responsibility (CSR) and sustainable development, in-

tellectual capital reports (ICR), as well as environmental reports (ER) concerning the environmental impact of the business.

Ecological accounting is part of the accounting system, dealing with identification, measurement, collection, processing and transfer of information on the course and results of business activity as regards the entity's impact on the environment, as well as on the course and results of the environmental protection process in a given reporting period [Stępień 2003, p. 298].

Ecological accounting, green accounting, environmental accounting (there are several names, but they do not always have the same meaning) is not a topic that has come up in recent years. In fact, the term "green accounting" was used for the first time in the 1980s. Since then, it has been growing in importance and has been perceived as part of accounting. However, it should be added that "traditional" accounting also measures some natural resources and requires the determining of the value of their consumption. In fact, one of the International Financial Reporting Standards (IFRS 6 *Exploration for and Evaluation of Mineral Resources*) is dedicated precisely to this issue.

In recent years, a more critical look at the functioning of accounting in society can be observed. The aim of this chapter is to present the concept, development and examples of ecological accounting on the country and enterprise level. Traditionally, social expectations towards business have been rather uncomplicated and have related to gaining profits. However, society's perception of business as such has changed in recent decades. Studies devoted to accounting have also partially influenced discussions on the sustainable development and reporting of issues concerning corporate social responsibility (CSR) [Gray, Owen and Maunders 1998, Gray 2001, 2002]. It is continuously debated on whether such discourses may bring significant changes in economic practice. The emergence of social or environmental accounting as a subject of university courses and the growing importance of CSR create challenges as regards both the professional liability of accountants and accounting practices [Gray 2001, p. 11]. Therefore, the question arises about the function of business and accounting in society.

7.2. Accounting in the Social Context

Ecological accounting has been related to the concept of sustainable development as this concept has been originally applied in terms of the environment and has related to the use of natural resources in a way that does not deprive future generations of these resources [Gabrusewicz 2014]. In case of companies, the concept has been transformed into the concept of "sustainable development of companies" or "corporate social responsibility," which has been associated with the sustainable economic or financial development [Gabrusewicz 2010, pp. 56–63; Dellaportas et al. 2005, p. 214].

The accounting system both affects and is affected by many external factors. These are ecological, environmental and institutional factors concerning the country to which the given system applies, where political, economic, legal, tax, financial and educational systems existing in this particular country are significant, as well. Other issues are also of importance, such as old trade routes, the existence of colonies and the current flow of foreign investments. Cultural conditions should also be mentioned. They can be perceived as either strengthening or weakening the other factors. All this causes that accounting systems are usually complex and vary from one country to another. Factors that affect the accounting system¹ are shown in Figure 7.1.

The perception of accounting as a social science becomes increasingly popular; such an approach has already been apparent for several years. "A tendency manifesting itself in our times to orient the development of accounting towards the need to account for the liability of business entities is caused by the growing awareness of connections among business and other spheres of human life and activity, as well as environmental elements (social and natural environment). Thus, the social and ecological aspect of corporate business activity is more and more fully perceived, which affects in a relevant way the development of various trends of the so-called social responsibility accounting, derived either from the criticism of national income as a measure of management results (providing data for the calculation of prosperity measures) or from the idea of the so-called social balances, where companies present information to the wide public on all positive and negative results of their activity perceptible to the business entity's environment in a broad sense" [Burzym 2008a, p. 27].

¹ The concept of accounting sub-culture included in the diagram requires a brief explanation. Where the term "culture" is broadly understood as factors that potentially affect legal and tax systems, as well as methods of establishing companies, etc., it is worth noting that these factors, referred to as "culture", have been used in attempts to explain international differences between accounting systems. See, for example, Violet [1983], Hofstede [1980] and Gray [1988]. "Culture" is a term that refers to society and nation as a whole, whereas "sub-culture" refers to the level of organisation, profession or family. Accounting sub-culture values are believed to influence the development of accounting systems at the national level. Therefore, the question may be asked whether the accounting system can have the same shape in every country.



Fig. 7.1. Factors that affect the accounting system

Source: Roberts, Weetman and Gordon 1998, p. 35.

Traditionally, social expectations towards business have essentially related to gaining profits; therefore, they have been rather uncomplicated. Along with a change of expectations regarding business, a different, more critical look at the functioning of accounting in society has emerged. Research on accounting has also partially influenced discussions on sustainable development and reporting of corporate social responsibility (CSR) issues [Gray, Owen and Maunders 1998, Gray 2001, 2002]. It remains unresolved whether such discourses have a chance to result in considerable changes in economic practice. However, the simultaneous emergence of social or ecological accounting, an increase in the awareness of its necessity, its introduction to university curricula and, above all, the growing importance of CSR, create challenges as regards both the professional liability of accountants and accounting practices [Gray 2001, p. 11]. Therefore, the question arises concerning the function of business and accounting in society. It can be said that accounting, including financial reporting, is expected, for example, to provide information [Cieślak 2011]:

1) on environmental and social activities of corporations and companies,

2) about what managers do with the assets they are to manage, particularly in terms of compensation they receive in exchange,

3) that would allow users to assess the extent to which workers are or are not used,

4) on the impact of business activities and the economy on the environment.

Therefore, what values should be included in codes of ethics if their aim is to determine or make a list of ethical responsibilities of members of a profession (in case of professional codes) or a modern international corporation (in case of corporate codes)? Ensuring adequate environmental protection in achieving economic goals should definitely belong to these values [Cieślak 2011].

As rightly pointed out by Gabrusewicz [2014], "conventional understanding of sustainable development based on the model of three pillars has a certain imperfection, which assumes that it is always possible to 'interchange' ecological, social and economic dimensions of the sustainable development. In response to this problem, a distinction between 'strong' sustainable development (where such an interchange is inadmissible or restricted) and 'weak' sustainable development (where this interchange is acceptable) is often used. The concept of 'critical natural capital' is also applied to describe those elements of the biosphere which cannot be exchanged (e.g. ecosystems or species of critical importance) [Adams 2006]. In practice, however, development decisions made by governments, enterprises and other organisations allow for an exchange and place greater emphasis on the economy, preferring it to other aspects of sustainable development. This is the main cause of progressing environmental degradation and failure to achieve desired capital objectives of the development".

Globalisation has given individuals and organisations the motivation and tools to monitor the behaviour of corporations, which sometimes raise ethical doubts. A possibility has also emerged to inform the public around the world about manifestations of irregularities. The economic development has created conditions for international cooperation and sharing of information by those interested in negative social, economic and environmental effects of the pursuit of maximum profit in a relatively poorly regulated economic environment; the same economic development which is the cause or result (whichever) of globalisation.

The process mentioned above has also resulted in the accelerated formation of the third sector known as a civil society.

Civil society organisations want to influence the morality or ethics of business, and it results from the principles they try to defend. Political influence of these organisations, directly related to their ability to convince potential supporters about benefits from the issues they fight for perceived in terms of principles or morality, also becomes more and more apparent. Their involvement in the debate concerning regulations of corporate behaviour focuses not only on issues from the field of economic interests of individuals, corporations and governments, but also on matters concerning environmental protection, among other things.

7.3. Environment and its Resources in the Traditional Accounting System

In a traditional view, accounting has not measured the consumption of natural resources. However, Anglo-Saxon accounting has known the term "depletion" for many years, as it had been introduced to and used in the International Financial Reporting Standards. Depletion refers to natural resources and means "exhaustion" or "using up" (it is a derivative from the phrase "environmental depletion", which is best explained as "exhaustion of natural resources"). This is a measure of consumption of natural resources such as gas, coal or oil. Moreover, the consumption of biological assets is also measured, but in accordance with IFRS, not on the basis of depletion, but at fair value. Thus, the reduction in the forest area at the disposal of an entity will result in a decrease in the fair value of natural asset resources and will affect the financial result of the entity.

In Polish conditions, the value of depletion is not determined, and natural resources, for example forests in accounting of the National Forests, have a zero value.

The only element related to natural resources are concessions, such as authorisations for prospection or extraction of oil, depreciated and recognised in the group of intangible assets.

In accounting terms, natural resources can be divided into two categories: the first one – biological assets such as forests, crops and animals, and the second one – mineral resources such as oil, gas or coal. As already mentioned, accounting around the world uses fair value to evaluate biological assets. In contrast, in case of the second group, the consumption value (depletion) is determined due to the fact that these assets are consumed entirely, and they cannot be renewed

as a result of human activity. In other words, a forest can be planted in place of the felled trees, but the renewal of oil resources lies in the hands of nature.

Unlike fixed assets, mineral resources are consumed during their use and they do not retain their physical form. Despite this fact, problems occurring in the accounting of mineral resources are similar to those related to the accounting of fixed assets First of all, it is necessary to answer two basic questions [Kieso, Weygandt and Warfield 2014, pp. 11–8]:

1) How do entities determine the base for writing off the value?

2) What method for writing off should be adopted?

The determination of the base for write-offs of mineral resource consumption involves an appropriate recognition of three types of expenditure, namely expenses incurred before exploration for deposits, expenses on exploration for deposits and their evaluation, as well as development expenses.

Expenditures incurred before prospecting have occurred by the time the entity has obtained the right to explore for deposits in a particular place. Those can be expenses related, for example, to testing potential oil deposits. Such disbursements are included in costs of the period in which they are incurred.

Expenses related to exploration for and evaluation of deposits may include, among other things [IAS Plus 2005]:

1) acquisition of prospecting rights,

2) topographical, geological, geochemical and geophysical studies,

- 3) test drilling,
- 4) trenching,
- 5) sampling,

6) activities related to the assessment of technical possibilities of acquiring resources and commercial viability of their extraction.

Upon initial recognition, in accordance with IFRS 6 *Exploration for and Evaluation of Natural Resources,* exploration and evaluation costs must be valued at historical cost. Expenses included in costs of this type of assets are determined by an entity in its accounting policy, which should be applied on a permanent basis. When making such a decision, the entity should consider the extent to which the expenses may be attributed to the discovery of particular resources.

Therefore, entities have a choice as regards the extent of recognition of specific expenditure. They can either write it off in the period in which it is incurred or activate it by the time the works are completed. IFRS allow for such freedom due to ambiguous opinions as to the correct approach.

A hypothetical example can be provided of an entity prospecting for oil, which believes that oil resources are sufficient in a particular place. The entity performs drilling tests to assess the volume of reserves. Unfortunately, drilling produces no results, which means that it has turned out that there are no oil resources in a given place. The entity keeps on drilling, and although it finds oil in some places, others turn out to be empty. The question is whether expenditure incurred for drilling which gave a negative result should be capitalised. Or maybe only costs of the drilling with a positive result should be treated in this way? An argument for the full capitalisation is the fact that mistakes and negative results are inevitable during drilling, and these expenses have to be incurred in order to find the places where resources are present, as well. On the other hand, it can be said that only costs of successful drilling should be capitalised as the only appropriate method for measuring project costs is the method of direct costs incurred for a specific action. Anything beyond this should be written off in the period in which the costs are incurred.Moreover, as a result of the full capitalisation, an unsuccessful entity recognises high amounts in assets, due to which its image is positive for some time – its financial result is similar to the result which it would have demonstrated had its explorations been successful [Kieso, Weygandt and Warfield 2014, pp. 11-8].

When the technical suitability and commercial viability of the production are confirmed, expenses incurred in the second phase are reclassified and treated as expenditure associated with the development. Generally, the phase of development occurs when an entity has determined that mineral resources in deposits are large enough for the production to be profitable. At this moment, the expenses recognised as assets (costs incurred to date) are tested for impairment in order to establish whether the value shown in the accounts and financial statements is not higher than the recoverable amount.

Entities divide development expenditure into two groups, namely material costs related to the purchase of equipment (appliances) and intangible costs associated with the development.

Material costs are expenses related to the purchase of means of transport and other heavy equipment needed to extract and transport resources in order to prepare them for sale. Obviously, entities can move this type of equipment between extraction sites. Therefore, they do not include their values in the base for determining amounts of mineral resource consumption (depletion). This equipment is recognised in the group of fixed assets and is depreciated. However, it sometimes happens that some tangible assets, such as foundations of a drilling platform, cannot be moved to another location after the completion of exploitation. In such a situation, depreciation is based on either the useful economic life of the assets or the deposit extraction period, depending on which is shorter.

Intangible development costs are such costs as the costs of drilling and digging tunnels, elevators or wells. Of course, these costs are not of tangible nature, but they are necessary for extraction and subsequent use or sale of mineral resources. Thus, they are taken into account in determining the base for calculating the value of the consumption of resources.

There are also situations where entities incur significant costs to restore the environment to its original condition after the end of extraction, for example in the case of opencast coal mining. Such costs are also included in the depletion base, estimated at fair value of costs necessary to incur.

After determining the base for calculating the value of natural resource consumption, it is necessary to make a decision on the method for allocating the costs to individual periods. Typically, entities apply the natural method here, based on the volume of production. In such a case, the total value of mineral resources reduced by the residual value is divided by the number of product units expected to be extracted, which allows the entity to determine the unit cost. Then, this cost is multiplied by the output volume in a given period and thus the value of periodic consumption of natural resources is determined.

7.4. The Essence and Objectives of Ecological Accounting

Accounting provides data for decisions made by information users. Such information can and should include information concerning, for example, ecology (ecological information).

Szadziewska [2008] presents an interesting list of ecological information sources, some of which are related to accounting, as shown in Table 7.1.

Green accounting (also known as environmental accounting) searches for better measurement of the sustainable development by increasing the number of measures of national wealth (production, investments, etc.), so that non-market values would also be taken into account, especially those related to environmental goods and services (it is about the natural environment). Furthermore, green accounting attempts to measure both costs of and benefits from the environmental protection and the use of natural resources – these two measures are usually not included in national measurement systems, such as GDP. There are different opinions as regards the principles of green accounting; nevertheless, ecological accounting is used in many countries around the world, including in the United States.

Ecological accounting, also referred to as "green accounting", is part of accounting that attempts to take into consideration environmental costs when determining the entity's result. Its development coincides with the criticism of gross domestic product as the main measure of development, due to the fact that it does not consider the environment; hence, decision-makers need a revised model that takes into account ecological accounting.

Source	Description	Objectives
1	2	3
Nationwide statistical reporting	It includes these elements of socio- economic statistics within the framework of which information relating to broadly- perceived environmental problems is gathered (in the form of statistical reports), processed and published. Statistical reporting covers business entities directly benefiting from the environment, governmental and local offices, as well as national, provincial and municipal funds for environmental protection. Statistical information is published in papers of the Central Statistical Office and statistical offices, including in statistical yearbooks and publications of other bodies conducting statistical surveys.	 Results of calculations, studies and analyses carried out on the basis of data collected in public statistics surveys are open and accessible to the public. They provide information to society and state authorities on the condition and protection of the natural environment, including data on: air pollutant emissions and the condition of the purification devices, threats to and protection of the forest environment, water management and discharge of sewage into water or soil, drawing of water for irrigation in agriculture and forestry, as well as for filling fish ponds, the capacity of sewage treatment plants, the amount of treated sewage and sewage sludge, as well as pollution load, industrial waste which is burdensome for the environment,

Table 7.1. Description of sources of ecological information
1	2	3
Reporting of business entities	It includes reports prepared by entities in accordance with applicable provisions of law (Environmental Law, Water Law, the Waste Act, the Act on Product and Deposit Fees, the Act on Packaging and Packaging Waste, the Act on Waste Electrical and Electronic Equipment, the Act on Recycling of End-of-Life Vehicles). Furthermore, depending on their needs resulting from their business nature and implemented environmental policy associated therewith, companies draw up environmental reports. For this purpose, they use ecological information collected, among others, within the framework of the in-house accounting system, performed analyses of the product life cycle, environmental measure system for the assessment of the company's operation, the cleaner production system, as well as the eco- management and audit scheme.	 The objectives of reports drawn up by an entity include providing users with information on major environmental aspects of the conducted business, in particular presenting: fields of activities which have the most significant impact on the environment (including an indication of specific aspects of their influence such as the level of consumption of water and natural resources, pollutant emissions to air, water and soil, produced waste, etc.), goals the entity intends to achieve in the field of environmental protection in the future, key achievements in the area of environmental protection and a description of actions taken to protect the environment in collaboration with other organisations).

Source: [Szadziewska 2008].

As it is noted by Borys [2001], ecological accounting may be incorporated in the accounting system of an entity in three ways:

- 1) As an element of financial accounting,
- 2) As an element of management accounting,

3) As a separate part of the entity's accounting system (next divided into internal, thus, in fact, ecological management accounting and external, thus financial ecological accounting).

The inclusion of social and environmental costs and benefits associated with the environment in traditional accounting systems is to enable green accounting to capture interdependences among and mutual influence of the three pillars of the sustainable development (economy, society and natural environment). More accurate measurement of costs and benefits relating to natural resources can contribute to the development of more appropriate and balanced economic and trade policies, as well as development policies [Parker, 1971].

Corporate decision-makers usually do not have access to data on project costs and benefits in the area of health, environment and security. Such costs may include not only costs traditionally considered as associated with these areas, but also costs of consumption of materials, labour or capital resources. Closer attention paid to these costs through the use of management green accounting often reveals opportunities, effective in terms of costs, to prevent the environment poisoning or to eliminate waste, and thus it encourages such business decisions that are both financially viable and beneficial for the environment.



Fig. 7.2. Ecological information potentially expected by external stakeholders

Source: [Drewer, Stanton and McGowan 2007, p. 196].

The incorporation of green accounting into the national economy measurements could provide measures of the sustainable development. However, substantial progress is needed in the development of measurement and valuation methods. From a purely accounting perspective, particular capital forms could be depleted or, in extreme cases, completely eliminated without reducing the total wealth, as long as other forms could replace them in turn. Of course, there are no substitutes for the environment functions as regards life sustaining; the question of how and when to register it is the source of numerous discussions concerning ecological accounting.

Although much has been written about ecological accounting as such since it is not a new concept, as has already been mentioned, there is no single, formalised methodology of green accounting. Despite the ambiguous interpretation of the category of ecological accounting in literature on the subject, it is generally accepted that the primary objective of this accounting in an entity is to provide data [Szadziewska 2008] to:

1) external users – in the form of reports which reveal environmental performance,

2) internal users – by creating information (financial and non-financial) concerning past and future environmental impacts in order to support management processes in the managing entity.

There is a set of methodological options referred to as SEEA (Satellite Economic and Environmental Accounts) from which users can choose those they think most suitable for their needs.

The American National Academy of Sciences examines the set of environmental accounts created even in 1994 by the Bureau of Economic Analysis (BEA), called the Integrated Economic and Environmental Satellite Accounts. However, there is no increase in the pace of works on the creation of a standardised system of green accounting (and the works are conducted rather slowly) [Nordhaus and Kokkelenberg 1999].

At present, there are used tools and methods that measure natural resources, gas emissions, values of non-market goods and services, as well as green GDP [Hecht 1999].

It seems important to ask what the strengths and weaknesses of ecological accounting are in the context of sustainable development. Theoretically, with the use of green accounting, national data should include a definition of sustainable development and operational procedures allowing one to assess whether this development is achieved. A society is "sustainable" if the value of goods and services consumed by its members does not decrease over time – and an assumption is made here that such a situation will not happen if the society preserves rather than uses its capital.

Key environmental factors included in the American System of National Accounts (SNA) provide a standard set of recommendations on how to combine measures of business (economic) activity. The key environmental factors included in the SNA are environmental expenses, non-commercial goods on markets, as well as consumption (usage) of natural resources. In order to determine values of environmental performance with the use of the SNA, it is necessary to define and assign a monetary value to many environmental goods and services. The question of how it should be done is still under discussion. Currently, in state information systems there is no room for non-commercial goods and services on markets, such as those provided by natural resources and the environment. Therefore, only when this obstacle is removed, a comprehensive system of green accounts will be possible.

7.5. Examples of the Application of Ecological Accounting

As noted by Gabrusewicz [2014], communities involved in ecology, business communities and socially engaged communities become interconnected. The theory of legitimacy suggests that society will punish those companies that do not work in line with expectations and values of the society [Lindblom 1994] as companies are part of the society and operate with its consent. The resulting social costs have not been historically assigned to business entities [Hawken 1994; Drever, Stanton and McGowan 2007, p. 195].

7.5.1. Ecological Accounting and Supply Chain Management

Reasonable practices of ecological management can reduce the financial risk. One of the areas in which the use of techniques and methods of ecological accounting seems particularly promising is the supply chain management, where large companies require from their suppliers and contractors to comply with their ecological and social/ethical policies and procedures.

Many entities have already introduced strategies promoting eco-efficiency, for instance through better utilisation of materials. Further steps may concern purchases, warehouse stock management, rules for using and processing materials, as well as sales and logistics. Such actions can and should improve both the level of costs in the entity and its eco-efficiency.

Examples of supply chain optimisation with the use of information on environmental costs are presented in a report of the Office of Chemical Safety and Pollution Prevention of the Environmental Protection Agency [US EPA 2000].

The report shows how the supply chain management practice can be improved by determining, with the use of monetary measures, the impact of business activities on environmental performance. It also shows how ecological management accounting can be integrated with business activity. The report contains case studies, including concerning two entities, namely the Commonwealth Edison and Andersen Corporation. Each of these entities has a slightly different approach, but the methods they use may be useful for other companies.

Commonwealth Edison

Commonwealth Edison is a very large entity of the electric sector (electric utilities) based in Chicago, with an annual revenue of approx. 7 billion US dollars. It is an example of how companies of this sector can successfully achieve a considerable reduction in both operating costs and a negative environmental impact - through changes in their accounting. As early as 1993, Commonwealth Edison began to notice that the total management cost with respect to materials and equipment was significantly higher than the historical cost of their acquisition. In particular, the entity's managers realised that they did not notice costs of environmental management. This observation led to the implementation of the first phase of activities in the area of life-cycle management, which, in turn, made it possible to minimise stocks. These activities ended with an introduction of the formal Life-Cycle Management two years later. Since that time, people involved in the LCM have worked together with other departments of Commonwealth Edison to systematically assess costs and benefits relating to the product life cycle. Commonwealth Edison has managed to reduce the amount of waste and, simultaneously, to save approx. 50 million dollars per year. These were amounts resulting from the improved supply chain management, production management, as well as from improvements in several other areas of activity.

Andersen Corporation

Andersen Corporation is the largest manufacturer of wooden windows and terrace doors in North America, with annual revenues of approx. 1 billion US dollars. It improved its financial situation and, at the same time, gained environmental benefits when it began to take into consideration issues related to the environment while making decisions on purchases and material management, as well as liquidation decisions.

In the late 1980s, managers of Andersen Corporation issued an order to reduce emissions of toxic chemicals in the company. The Corporate Pollution Prevention Team was established. The team prepared the waste accounting project and defined goals as regards waste reduction. Each of the demands was substantiated with business examples, for instance, the purchase of a better colour mixing system, which could be used directly in places where paint is applied, which was further justified by savings in material usage and less waste.

Since the initial actions were successful, the Board recognised that more systemic methods of environmental accounting needed to be introduced, which would improve the ability of the entity to find room for improvement. Cost estimation procedures for a range of actions in the field of supply chain management were developed.

7.5.2. Water Accounting in Australia

Water is a resource for which high-quality data is often missing. Water level comparisons are a way to collect existing data on the value of water and the amount of used water, so that they can be integrated with other information, particularly statistics provided by governmental agencies. This approach allows one to use the data, even if it is imperfect.

Water management is a global issue. The proper management of water resources and care of its quality require regular, high-quality and reliable information, professionally prepared and presented. Australians have been the first to prepare such a tool, since water accounting has become a sub-discipline of accounting in Australia. It was aimed at supporting national, regional and interregional decision-making [Vardona et al. 2000].

Water accounting (or rather accounting of water consumption measurement and valuation) was introduced in Australia for statistical purposes in the first decade of the twenty-first century. It was prepared and introduced by the Australian Bureau of Statistics, an equivalent of the Polish Central Statistical Office. Thanks to this, it provides information on water consumption and resources.

The main feature of the Australian environment is the fact that water is a rather rare resource there as compared to other inhabited continents. Rainfall is irregular both in terms of its place and time, as well as its amount. Moreover, droughts are frequent, which is a matter of common knowledge and does not require any particular documentation.

Information on water accounting from accounts of the Australian Bureau of Statistics is presented along with examples of its use in economic analyses aimed at informing both the public and decision-making governments. In 2004, the Intergovernmental Agreement on a National Water Initiative (NWI) was signed among the national government and eight state and territorial governments. The NWI is to solve environmental, economic and social problems associated with the current and future condition of water resources in Australia. The National Water Initiative particularly stresses the need to prepare annual studies on the water condition and consumption, which clearly indicates the expected usefulness of national and regional data concerning this issue [Vardona et al. 2000].

Compilations of water data prepared by the Australian ABS provided a review of the water resource and have made it possible to assess the quality of existing data and then to improve it, as well as they indicated information gaps. This information is used by both leaders and decision-makers on an ongoing basis. Water accounting in Australia rapidly increases its range, and the quality of the tools it uses is constantly improved. Water studies are also prepared by the states and territories.

In Australia there is the Water Accounting Standards Board, operating as an independent, advisory body of the national government, which has published the first water accounting standard (AWAS 1, Preparation and Presentation of General Purpose Water Accounting Reports, http://www.bom.gov.au/ access on 30 April 2015). Godfrey, Chalmers and Lynch [2010] predict that one day, as a result of political actions, water accounting will be implemented all over (or almost all over) the world.

7.5.3. Carbon Accounting

Carbon accounting is a general term for actions taken to measure carbon dioxide equivalent emitted by an entity. It is used by countries, as well as business and other entities, for example, for the purpose of trading in carbon dioxide emission allowances.

Therefore, data prepared by carbon accounting can be found in annual reports of business entities; on the other hand, countries attempt to establish social costs of emissions of gas of this type. These countries include, among others, the United States of America (see www.whitehouse.gov/sites/default/files/omb/inforeg/social_cost_of_carbon_for_ria_2013_update.pdf, access on 24 April 2015).

There are physical, political, market, financial and socio-economic reasons for carbon accounting [Ascui and Lovell, 2011]. This accounting is not well-or-

ganised yet – for its greater accuracy, time and quantitative measures, as well as organisational frameworks are needed. There is a need for information on what data is important, how it will be used and how to collect it, as well as whether to consider social expectations with respect to the level of sustainable development in carbon accounting, and to what extent. The determination of the level of gas emissions is fairly easy and it can be alike in case of their evaluation, but it is more difficult to provide useful data on the entire carbon economy with the use of accounting tools.

Especially, if the data was to be used by decision-makers in different countries as they take different issues into consideration; what is more, there have been established various levels of permissible greenhouse gas emissions or replacement of fossil fuels with renewable energy. For example, a programme announced in the United States to reduce production of CO2 caused by power generation leaves many decisions in the hands of individual states. Therefore, this raises the question of interstate trade, interstate travels, and entities operating in different states, as well as the problem of perception of the need for and measurement of the sustainable development in each state [Marland, Kowalczyk and Marland 2015].

7.6. Final Remarks

Despite its history of several decades, ecological accounting encounters problems of practical nature. They are mainly related to the lack of precise measures in respect of the environment measurements and, more precisely, to the condition of this environment and its changes resulting from entities' activities. The problem is also to establish value measures, which considerably hinders the recognition of environmental issues in accounts. Szadziewska [2008] recalls her research conducted with medium and large companies of the Pomeranian (Pomorskie) Voivodeship in 2006. She indicates that to measure and record environmental costs, the majority of respondent entities (76.53%) apply generally accepted solutions within the existing cost accounting systems (without separating detail accounts).

It is indicated in this chapter that not only is the demand for financial information derived from the accounting system not in decline, but there can be observed the process of expanding the scope of information included in annual reports. It is worth observing the development of ecological accounting and seeing to it that information provided in reports of companies or countries is of the highest quality, so that it could be the basis for making good decisions.

It should be emphasised again that the inclusion of social and environmental costs and benefits associated with the environment in traditional accounting systems is to enable green accounting to capture interdependences among and mutual influence of the three pillars of the sustainable development.

8 Place of Green Projects in Financial Planning

8.1. Introductory Remarks

The purpose of this chapter is to determine the importance of financial planning and characterise methods for constructing financial plans in the context of companies oriented at environmental goals. The proper implementation of financial planning principles by companies is one of prerequisites for achieving expected results of their activity.

In the first place, the chapter presents motives for constructing a financial plan and general principles of its construction. It is followed by a presentation of successive stages of the financial plan construction. Sub-chapters 4 to 7 include a detailed description of the most important elements of the plan, also in the context of activities of companies implementing the strategy of eco-efficiency, referring to planning revenues, costs and environmental fees, planning investment and financial flows, as well as the issue of risk analysis in the financial plan.

8.2. Financial Plan as a Management Tool in a Company Oriented at Environmental Goals

Financial planning is an essential management tool designed to help companies achieve their overarching goals. One of the most important objectives of company's operation can be considered an increase in its value to the benefit of its owners¹. This objective is of financial nature; therefore, a degree of its fulfilment can be assessed through financial measures. The implementation of the strategy of corporate social responsibility (CSR), taking into account pro-environmental attitudes, is often positively correlated with the company's value. This is evidenced by numerous studies whose results clearly confirm the impact of CSR on the company's value [Nowak 2014, p. 237]. According to J. Brzeszczyński, although conclusions of the studies on relations between aspects of social responsibility in companies' operations and their financial results are inconclusive, those that show a positive relationship in this area are predominant [Brzeszczyński 2013, pp. 399–400]. A socially responsible business must be planned in such a way that the rate of resource exploitation is lower than the rate of their regeneration, which ensures the maintenance of the environmental balance [Węgrzyńska 2013, p. 45]. Therefore, environmental actions should be taken into consideration at the stage of financial planning.

The formulation of plans expressed in value terms is necessary for the proper functioning of any company. The construction of a financial plan allows the company to assess its actions thoroughly, as well as coordinate and control them in the implementation phase. Financial planning enables an enterprise to integrate the process of making strategic and operational (detailed) decisions. Specific objectives pursued by a company within the framework of its operational plans should arise from the development strategies it has adopted. A financial plan is a set of financial statements covering results of the options considered by the company. However, results of the analysed scenarios may lead to a change of strategy as it may become apparent in view of the financial plan that the adoption of a given strategy will not bring the expected results.

Planning is inherently related to making choices; therefore, it is part of the decision-making process. The process of planning for accomplishing intended tasks and objectives is multi-phase, extremely complex and dependent on other factors and conditions. The plausibility and effectiveness of planned volumes is determined by an available set of information. This information should be complete, reliable and up-to-date [Kowalczyk 2010, p. 9]. Furthermore, another problem may be the difficulty with interpreting the information and a related issue of evaluating the effects of the company's operation. Such a situation undoubtedly occurs in the case of planning effects of projects affecting social costs

¹ An extensive discussion on the issue of business objectives in the context of the theory of enterprise is presented in chapter 4.

and benefits. The estimating of social effects related to actions affecting the environment is particularly difficult since it involves not only the evaluation of the environmental matter, but also its impact on health and well-being of the population.

A prepared financial plan may be used in a multi-faceted manner. On the basis of financial statement forecasts, it is possible to assess the effectiveness of planned investments, and thus determine whether the predicted results meet objectives and expectations of investors. The effects of changes proposed in the company with respect to its operational activity, which determine the impact of the changes on the company's liquidity and profitability in a short-term period, can also be estimated. The financial plan can also be used to assess future financial needs of the company by predicting its capital needs.

Each financial plan consists of pro forma financial statements. First, a profit and loss account is created, showing revenues and costs within a planned period. Then, a cash flow statement is constructed, which determines future revenues and expenses, as well as cash balance during the planning period in the three areas of the company's activity: operational, investment and financial. The balance sheet is drafted in the last stage. It constitutes a planned picture of the company's assets and sources of funding, expected at the end of the planning period provided that all assumed values have been realised [Naruć, Nowak and Wieloch 2008, p. 147].

Strategic planning should also include a strategy for long-term development and positioning of the company on the market, concepts for the development of sales, products, production and distribution, as well as plans for long-term capital and financial operations. The purpose of long-term planning is, among other things, to enable an assessment of the effectiveness of investment projects in order to make decisions about their future implementation.

Operational plans are aimed at accomplishing operational tasks, and they subordinate the company's current actions to its strategic objectives. An important element of short-time planning is an assessment of the company's liquidity.

The need for financial planning can be justified by benefits of this process, which include, among others:

• consideration and comparison of scenarios as regards the course of events and examination of their impact on the company;

determination of risks;

• examination of interrelations between investment decisions and the choice of sources of investment funding;

 integration of operational plans created by different departments of the company;

• motivation for the company's managers to take actions aimed at the fulfilment of objectives determined by the owners or management board.

A financial plan cannot be treated as a simple juxtaposition of production, sales, cost and investment plans. It is created on their basis, but information it provides affects the detailed plans mentioned previously. There are interactions among the detailed plans that may result in the need to verify their assumptions and change them in the course of constructing a financial plan on their basis. Therefore, works and plans of individual departments (e.g. marketing, production, logistics, accounting, and finance) should be closely coordinated to enable the company to integrate the formulated strategies.

The future is always uncertain, and financial planning is a tool aimed, for example, at alleviating this uncertainty. Planning can be defined as designing a desired state of the future and effective ways of achieving it, as well as examining the future and adjusting actions to the expected conditions [Richardson and Richardson 1989, p. 2]. Thus, several important characteristics of planning can be identified. This is a process relating to the determination of the company's performance in the future, focusing on the fulfilment of adopted goals and identifying actions aimed at achieving these goals.

It is worth noting the difference between financial forecasting and planning. A forecast is a categorical judgment as to the occurrence of a specific event in the future [Czerwiński and Guzik 1980, pp. 18–22]. Although forecasting is a process relating to the future, its result is to be a clearly defined judgment. Therefore, a forecast is to cover those events to which a high value of probability can be assigned. On the other hand, in financial planning, there are also checked financial consequences of less likely scenarios of the course of events, due to which the risk of a project may be estimated more accurately.

8.3. Stages of Financial Plan Construction

The process of financial planning involves the construction of a planning model. Such a model comprises several stages. The first stage is to define a decision problem, or an objective. The second stage of model construction is to define initial variables, and the third one is to establish a relationship between those variables and data included in pro forma financial statements [Pluta 2003, p. 28]. The procedure for the adoption of the basic plan assumptions is as follows [Gryko et al. 2011, p. 22]:

- 1. Determination of a detailed plan.
- 2. Determination of the plan type which best serves the objective.
- 3. Determination of parameters of the constructed model.
- 4. Determination of decision variables and their scope.
- 5. Adoption of assumptions which simplify the plan.

The most common goals formulated in the context of financial planning are as follows: an assessment of liquidity, evaluation of goodwill of the company and assessment of profitability of investment projects, also with a possibility of including aspects of the sustainable development in those projects. At this stage, model values are also determined in order to compare the planned and actually achieved values, which facilitates performing the monitoring function in the company.

Once the objective has been decided on, the plan type should be selected which is most suitable for achieving the objective. When selecting the appropriate type of plan, the company should be guided by several principles. The financial plan should be characterised by simplicity and ease of simulation but the main feature should be conciseness which makes it possible to focus on variables relevant from the point of view of decisions made by the company. Another guiding principle that needs to be considered is consistency in the application of the previously adopted assumptions imposed by the choice of a particular solution.

A forecast horizon and a planning time step should be adjusted to the needs resulting from the adopted objective. In case of long-term plans, the forecast horizon may encompass even several decades, and the time step is generally one year. Such a plan adopts many simplifying assumptions, and items appearing in financial statements are often presented in an aggregated form. The most common simplifications include an omission of part of revenues and expenses calculated on an accrual basis, such as evaluation of receivables and related exchange rate differences or deferred costs. Revaluation and deferred income tax are also omitted in the plans [Gryko et al. 2011, p. 25]. A short-term plan is usually an elaboration of the long-term financial plan for the first year of operation or it is created in order to manage the company's liquidity. The purpose of this plan is to calculate accurately the financial result and examine the liquidity. Items in financial statements in a short-term plan are detailed, and the most commonly adopted time step is a month or a quarter.

Financial plans can be prepared using fixed or variable prices. Planning with the use of fixed prices involves omitting the impact of inflation on prices of goods and services. In this way, the risk of prediction error is avoided. On the other hand, it leads to a significant simplification of reality because it assumes a constant relation between prices of the products, goods and services sold and prices of the materials, goods and services purchased. In case of planning with the use of variable prices, assumptions should be determined concerning indicators of price changes (in relation to the average inflation) of individual items in the statements.

In case of planning with fixed prices, inflation should be eliminated from interest rates. In the situation where applicable prices are as of the beginning of the forecast horizon, expenses or financial revenues for the following periods cannot be calculated at the rate including inflation. Therefore, it is necessary to determine the real interest rate. The real interest rate may be calculated based on the following formula:

$$r_{\rm real} = \frac{1 + r_{\rm nom}}{1 + \text{inflation}} -1, \tag{8.1}$$

 $r_{\rm nom}$ – nominal annual interest rate, $r_{\rm real}$ – real annual interest rate.

In case of planning with variable prices, financial costs and revenues should be determined on the basis of nominal rates. They are planned based on the real inflation rate calculated for the current period and inflation rates predicted for subsequent years. As a rule, information on the predicted inflation rate is derived from forecasts developed by government agencies or research institutes. The nominal rate can be estimated according to the following formula:

$$r_{\rm nom} = (1 + r_{\rm real})(1 + \text{inflation}) - 1 \tag{8.2}$$

Regardless of the adopted planning horizon and whether the plan is prepared with the use of fixed or variable prices, several basic elements can be distinguished in its construction that need to be estimated for each of the subperiods (time steps) included in the plan:

1. Adoption of assumptions with respect to macroeconomic factors,

2. Planning of a profit and loss account, including various types of income and expense,

3. Determination of working capital needs,

- 4. Planning of a cash flow statement,
- 5. Drafting of a closing balance sheet.

Once they have been prepared, the following should be carried out for the entire planning horizon:

An assessment of the financial situation for the basic variant,

• An analysis of sensitivity of core outcome variables (used to measure the planning objective) to a change of the original assumptions relating to explanatory variables.

A company has no direct influence on macroeconomic factors. These include interest rate levels, tax rates and foreign exchange rates, but also a level of the current and planned inflation rates.

As part of profit and loss account planning, a sales forecast should be prepared in the first place. Of course, it should be preceded by a thorough analysis of the market. After the revenues have been planned, the company can set about planning variable operating costs. It requires a careful analysis of costs and a clear determination which costs are fixed and which are variable. The next step involves the planning of operating costs of a relatively fixed nature. Salaries and depreciation are usually of great importance.

In order to properly plan financial costs and revenues, it is necessary to prepare a schedule with respect to taking out and repaying a long-term loan (or short-term one after an assessment of cash flows), other sources of foreign funding (e.g. lease, issuance of bonds) and to adopt assumptions as regards the rate of return on financial investments. The schedule for handling funding sources and the estimation of income from capital investments developed at this stage are often corrected after the cash flows have been planned. Only then does the planner receive information whether it will be necessary to obtain additional sources of financing or, on the contrary, it will be possible to plan for investing the surplus cash remaining at the disposal of the company.

In view of the fact that no extraordinary gains and losses are included in the financial plan as part of the profit and loss account, the final element of this stage is to determine the gross financial result, income tax and net financial result. As already mentioned, a simplifying assumption is usually adopted that the tax base is equal to the gross financial result.

The third of the above-mentioned core elements of the plan is to determine working capital needs. This is necessary for the planning of receipts from and expenses on the company's operating activities. Working capital needs grows with the increase in the value of stocks and receivables, and it drops with the increase in the value of operating liabilities of the company. An increase in needs for working capital decreases the value of the company's cash flows from operating activities, and a reduction in this demand increases the value of cash flows. Therefore, at this stage of the financial plan construction, levels of stocks, receivables and operating liabilities should be planned. The parameters used to estimate them are turnover ratios, expressed in days, of receivables, stocks and liabilities [Fight 2006, pp. 114–122].

In order to properly evaluate stocks, their type and diversity should be taken into account. The value of materials and goods depends on their purchase costs and storage length, whereas the value of work in progress depends on incurred production costs and length of the technological production cycle. The value of stocks of finished products, in turn, depends on their production costs and storage duration.

The volume of material stocks can be determined according to the following formula:

$$Z_{\rm mat} = \frac{OUZ_{\rm mat} \cdot K_{\rm mat}}{O}, \tag{8.3}$$

where:

 Z_{mat} – planned value of material stocks, OUZ_{mat} – assumed number of days of keeping the material stocks, K_{mat} – planned costs of purchase of materials in a given period, O – number of days in the period.

Stocks of work in progress can be calculated using the following formula:

$$Z_{\rm pt} = \frac{OUZ_{\rm pt} \cdot K_{\rm wyt}}{O}, \qquad (8.4)$$

where:

 $Z_{\rm pt}$ – planned value of stocks of work in progress,

 $OUZ_{\rm pt}$ – assumed number of days of the production cycle,

 $K_{\rm wyt}$ – planned production costs in a given period,

O – number of days in the period.

Stocks of finished goods can be determined according to the following formula:

$$Z_{\rm wg} = \frac{OUZ_{\rm wg} \cdot K_{\rm wyt}}{O}, \qquad (8.5)$$

where:

 Z_{wg} – planned value of stocks of finished products,

 OUZ_{wg} – assumed number of days of keeping the stocks of finished products,

 K_{wyt} – planned production costs in a given period,

O – number of days in the period

The value of receivables can be planned using the following formula:

$$N = \frac{OSN \cdot S}{O},\tag{8.6}$$

where:

N – planned value of receivables,

OSN - assumed number of days sales outstanding,

S – planned sales revenues in a given period,

O – number of days in the period.

Valuation of liabilities relating to operating activities depends on those costs of the company which are settled as a deferred payment. Therefore, the liability value so presented can be calculated with the use of the following formula:

$$Z_b = \frac{ORZ \cdot K_{\rm op}}{O},\tag{8.7}$$

where:

 Z_b – planned value of operating liabilities,

ORZ - assumed number of days payable outstanding,

 K_{op} – planned costs with a deferred payment in a given period,

O – number of days in the period.

The base for planning stocks, receivables and liabilities is to adopt assumptions as regards their turnover expressed in days. Usually, their value is determined on the basis of data concerning their formation in the company in the past.

The fourth step is to plan a cash flow statement. It consists of three groups of flows related to ongoing activities (cash flow from operating activities), material and capital investments (cash flows from investment activities) and related to financing activities (cash flows from financial activities). Cash flows from operating activities are usually planned with the use of an indirect method. Therefore, an adjustment of the net financial result is made in such a way as to take into account all differences between the accrual and cash methods [Buk, 2011, s. 92]. Ultimately, the net profit or loss after adjustment is brought to the value of operating cash flow. Cash flows from investment activities should include all inflows and outflows with respect to the sale or acquisition of fixed assets and short-term financial assets, as well as related monetary costs and benefits. On the other hand, cash flows from financial activities will require planning inflows and outflows associated with obtaining and maintaining sources of the company's capital, as well as all related costs and benefits².

After the pro forma cash flow statement has been prepared, it should be checked whether the planned cash balance as at the end of the analysed period is positive [Naruć 2013, p. 196]. In the situation where we are dealing with a negative cash balance, changes should be made in respect of the decision variants to increase the cash balance, but only such changes that are feasible for the company.

The last stage of the plan construction process is a pro forma balance sheet, which presents planned amounts of assets and liabilities for a given period. Data used to create a balance sheet is of secondary nature, which means it is based on findings made at the earlier stages of planning. The time continuity should not be disrupted, which means that the opening balance sheet in the financial plan should be the balance sheet based on actual data as at the day which is the initial day for the plan. In the presented algorithm of the financial plan construction, the balance sheet performs a control function. Incompatibility between the balance sheet sides means that an error has been made in any of the statements already prepared. It should be noted again that the process of constructing the pro forma financial statements includes feedback. The cash balance obtained in the cash flow statement may make it necessary to change the assumptions with respect to the schedule for handling the sources of funding or the working capital needs and to recalculate the net profit and cash flows.

After constructing the forecasts about the situation included in the pro forma statements, it is necessary to measure the company's performance with the use of methods which are appropriate in relation to the objective set out in the plan. Therefore, the choice of assessment methods depends on the purpose of the plan. In case of pursuing operational objectives and constructing short-term plans, a ratio analysis and budgeting tools are most frequently used in the plans.

² A detailed description of the construction of a cash flow statement for the purpose of financial planning: [Gryko et al. 2011, pp. 54–58].

In case of strategic objectives and constructing long-term plans, the financial plan requires the application of methods for assessing the profitability of investments and/or methods for measuring the company's value³.

The final stage of integrated financial planning should be an analysis of sensitivity of core outcome variables to a change of the original assumptions in respect of explanatory variables. It allows the company to carry out a risk analysis as regards the implementation of the plan, as well as an assessment of threats and opportunities⁴.

The process of creating a financial plan described above is illustrated in Diagram 8.1.



Fig. 8.1. Stages of the construction of a financial plan

Source: author's study.

³ A description of the tools mentioned above used to assess effects of the company's activities will be presented in subsequent chapters.

⁴ More on this issue later in the point 8.7.

8.4. Planning of Results of Operating Activities of Companies Implementing the Strategy of Eco-Efficiency

8.4.1. Revenue Planning

An assessment of operating revenues is a difficult and important stage of constructing a financial plan. An incorrectly estimated value of sales will cause an increase in forecast errors in case of its other elements such as variable costs, as well as certain assets and sources of funding. The best solution is to estimate revenues on the basis of the planned quantity of products sold and their unit price. However, it sometimes happens that such a manner of revenue planning is ineffective (e.g. in case of a large assortment or an untypical nature of provided services). In such a case, when planning its sales revenues, the company may refer to revenues it generated in the past and calculate the sales revenue as a product of the past revenue and assumed rate of growth (decline). In calculating the rate of revenue growth, an increase in both prices and the volume of goods or services sold should be taken into account.

Investments aimed at implementing sustainable development strategies, including those relating to environmental protection, are rarely directly linked to the amount of sales revenues unless the subject of business is production of (trade in) products designed to protect the environment. In this case, an increase in sales may result from changes of legal provisions demanding the use of products with specific technical parameters that meet ecological standards. However, when planning sales revenues, the company should also try to estimate indirect effects of implementation of the strategy of eco-efficiency, associated with increased public awareness of the need to protect the environment, leading to preference for environmentally-friendly products in the first place and, secondly, to selecting those products whose manufacturers meet the criteria of socially responsible companies. Science strives to develop tools that can support monitoring and measurement of changes in respect of corporate social responsibility. An example of such a measure, which, according to Chow, can also be used for the purpose of international comparisons, may be a shareholder engagement commitment indicator (SEC) [Chow 2011]. However, it is necessary to be aware of the fact that it is difficult to carry out an assessment of positive results of an increase in sales resulting from the use of the strategy of

eco-efficiency and that such an assessment is highly prone to a prediction error. Therefore, caution should be recommended when determining the scale of this increase.

8.4.2. The Planning of Operating Costs

The planning of operating costs should begin with an estimation of variable costs. They can be planned as accurately as possible on the basis of matrices of material and energy consumption. However, this is not always possible (as in the case of planning revenues on the basis of sales volumes). In such a case, these costs can be planned on the basis of historical rates of their share in sales revenues.

Salaries and depreciation are usually of great importance as regards costs of a relatively fixed nature. Salaries are planned based on the number of employees, their average salary and premiums to the social insurance fund. On the other hand, depreciation is estimated according to the plan of withdrawal and acquisition of fixed assets subject to depreciation, based on information about the initial value of fixed and intangible assets and amounts of their accumulated amortisation. It is worth noting that depreciation, as a cost depending on the historical value of assets, is not subject to recalculation with the use of price change indices. Other operating costs are often planned in a simplified manner, on the basis of their amount from the previous period and an expected price change index.

For the purposes of calculation of eco-efficiency, it is necessary to identify all costs relating to environmental protection expenditure. These costs may include, among others:

• costs of employing persons responsible for monitoring and supervising the company's impact on the environment, as well as for the preparation of information in this regard;

• costs of measuring and recording pollution emissions, energy and water;

• costs of obtaining permits to release certain substances or energy to the environment;

• costs of assessing damage to the ecosystem resulting from the company's operation and costs of its removal;

• estimation of costs of waste disposal or storage;

▶ charges for the use of the environment and penalties for exceeding permissible standards⁵;

• assessment of recycling costs of packaging and post-consumer waste, as well as amounts of possible product fees in case of failure to achieve the level of recovery and recycling required by law (in comparison with target standards).

8.4.3. Environmental Fees and Taxes

Tax planning plays a particular role in the case of companies that are obliged to pay environmental taxes and charges, and that implement a strategy for the introduction of environmentally-friendly solutions. In such a case, when calculating the efficiency of environmental investments, a tax reduction may constitute a significant part of benefits from projects. Therefore, the planner should take into consideration all changes in burdens relating to environmental taxes and charges.

Emission taxes, indirect taxes, as well as charges (some of which are of tax nature) are imposed for the purposes of environmental protection [Głuchowski 2002, pp. 11–12]. Emission taxes are directly related to the amount of discharged pollution and sewage. Indirect taxes (mainly VAT and excise duty) are an alternative to taxation on the amount of harmful emissions. The result expected by public authorities may be achieved through taxation with a higher rate on goods and services related to environmental destruction (e.g. excise duty on fuel)⁶. In contrast, environmental fees are the price for environmental destruction. Moreover, economic balance of the company's operations must also take into account penalties for non-compliance with legal norms concerning environmental protection. Fines are imposed, for instance, for failure to provide information for the purpose of the state environmental monitoring, violations of prohibitions (e.g. use of specific technologies) and releasing substances to the environment in excess of permissible emission standards.

Environmental fees constitute the main burden for companies polluting the environment. The types of these fees, calculation methods, rates and dates of payment are regulated in detail by the Environmental Protection Law – Title V

⁵ This problem is further described in the following section *Environmental Fees and Taxes*.

⁶ After the amendment of 23 October 2009 to the Act on Goods and Services Tax, generally there are no VAT exemptions and reductions which would increase the extent of environmental protection.

"Financial and Legal Measures", Articles 272 to 321⁷. Pursuant to Article 273(1), environmental fees are paid for:

- 1) emission of gas or dust to air;
- 2) releasing effluents to waters or soil;
- 3) water collection;
- 4) waste storage.

Moreover, separate cases and rules as regards payment of environmental fees and administrative fines are set forth in the Geological and Mining Law and other statutes. These fees may relate to charges for mining activities and removal of trees and shrubs, fees associated with protection of forest and agricultural lands, as well as product charges (for packaging, batteries, accumulators, oils, electrical and electronic equipment, and recycling of vehicles), fees and charges for the use of facilities and areas related to water management, charges for failure to take out the required amount of renewable energy and fees on account of trading in emission allowances and in respect of other environmental aspects.

According to Article 274 of the Environmental Protection Law, the amount of environmental fees and administrative fines depends on, respectively:

1) the amount and type of gases or dusts released to the air;

2) the quantity and quality of the water collected and whether the water collected was surface or underground water, as well as its purpose.

The amount of fees for discharge of effluents, in turn, depends on the type of substances contained in the effluents and their quantities, type of effluents and, in case of cooling water – on the temperature of water. The amount of fees for waste storage depends on the quantity and type of the waste stored; however, the amount of the increased fee also depends on the duration of waste storage⁸. Therefore, the planner should carefully read the detailed rules for calculating these fees.

As noted by Kryk, Kłos and Łucka [2011, p. 27], there are no taxes in Poland which would be called "environmental". Thus, it is only possible to talk about taxes which are of environmental nature. In contrast to environmental fees, they enable general charging on the products which are used on a large scale and in a dispersed manner. In this way, the final consumer is charged with the

⁷ It is worth noting that some of the provisions relating to the determination of environmental fees have been changed. New rules for their calculation will come into force on 1 January 2017 (Articles 285 and 286 of the Environmental Protection Law).

⁸ The detailed rules for determining the fees are included in Article 274 of the Environmental Protection Law.

costs, in line with the rule that "the ultimate perpetrator pays", unlike in the case of environmental fees, where the "polluter pays" principle applies [Kryk, Kłos and Łucka 2001, p. 27].

In the Environmental Protection Law, the legislator indicates that tax rates (especially excise duty rates) should be differentiated in terms of reaching environmental goals. According to Article 283(2), excise duty should be calculated so as to ensure a lower market price of:

1) unleaded petrol as compared to leaded petrol;

2) diesel oils and fuel oils with a lower content of sulphur as compared to oils with a higher content of sulphur;

3) diesel and lubricating oils manufactured using components obtained from reclamation of used oils as compared to oils manufactured without such components;

4) biofuels based on biomass, in particular cultivable plants, as compared to fuels from non-renewable sources.

Therefore, when implementing the strategy of eco-efficiency, it is worth considering investments in technologies that are powered by fuel charged with a lower excise duty, which may lead to a reduction in costs.

It is also worth mentioning that a company may be motivated by public authorities not only by means of restrictive instruments but also in a positive way – through subsidies or grants. Subsidies can be combined with taxes. This may occur in the case where the "subsidies – decreasing taxes on emissions" scheme is implemented. It can be used when the rate of return on environmental investments is too small to justify these expenses. In such a case, subsidies reduce costs of an investment and motivate the investor to undertake it. On the other hand, in case of the implementation of the "subsidies – decreasing taxes" scheme, the tax amount is returned to the company provided it is invested in technologies aimed at environmental protection [Głuchowski 2002, p. 20].

8.5. Estimation of Investment Expenditure in Environmental Projects

In case of an evaluation of project effectiveness, an investment expense is any future undetermined expense necessary for the purchased assets to be complete and useable and to give an opportunity for accomplishing the expected results. In order to fulfil the requirement of completeness imposed on investment expenditure, not only all expenses directly relating to the purchase of assets, but also expenses arising from their preparation for use should be taken into account. Thus, investment expenditure includes not only the price of fixed assets, but also costs of their transportation, insurance, loading, unloading and assembly [Gryko et al. 2011, pp. 71–72].

Proceeds from investment activities associated with the sale of fixed assets should also be considered in planning in the situation where these assets become superfluous, for example due to the purchase of new assets related to the planned investment. These receipts should be reduced by expenses that will be incurred on the sale and by income tax charged on the surplus of the predicted sale price of assets over their book value.

In the assessment of the investment profitability, one considers future expenses to be incurred after a decision to carry out the investment is made. However, future expenses already sealed should not be included in investment expenditure. Sealed expenses are those which must be made due to decisions taken by the company in the past (e.g. resulting from already concluded agreements) [Gryko et al. 2011, p 71].

However, as part of the assessment of the investment effectiveness, costs incurred in the past should be taken into account, but only those that represent the current market value. Cash flows used to evaluate the project effectiveness include those expenses already incurred which can be recovered, in whole or in part, by reselling the previously acquired assets. Then their market value should be charged to planned investment outlays as, by including them in the project, investors resign from an immediate conversion of these assets into cash flows [Mielcarz and Słoński 2010, pp. 317–318].

Only incremental inflows and outflows resulting from the project implementation should be considered when assessing the investment profitability [Brealey and Myers 1999, pp. 180–183]. Incremental cash flows constitute a difference between the value of the company's cash flows including a proposed project and the value of these cash flows without this project. The cash flows so defined are said to be closely related to the investment. The identification and calculation of incremental cash flows belong to the most important and most difficult issues concerning the correct assessment of project benefits. The problem of estimating these cash flows applies, in particular, to the implementation of projects in already operating companies. In such a case, it is difficult to present the project plan as an independent undertaking. Only those changes in cash flows that will be a direct result of the project should be analysed. The evaluation of the value of incremental cash flows may be difficult, for example, in case of investments aimed at the replacement of assets relating to manufacturing processes, resulting in changes in productivity and quality of production, as well as in manufacturing costs of products. This situation may relate to projects involving introduction of environmentally-friendly technologies to replace old technologies generating far more pollution. An estimation of incremental cash flows in such projects not only should focus on differences in efficiency of devices and their energy consumption, but should also capture the difference in the burden associated with environmental fees which will occur after the implementation of new solutions.

8.6. Financing of Environmental Projects

The planning of the financing of the company's activities is an important part of the financial plan construction. It requires a schedule for handling credits, loans and other sources of debt financing. The source selection should be preceded by a calculation of the cost of capital. In achievements of the theory of capital structure there are described various determinants in respect of the choice of financing methods, such as asset structure, variability of the value of assets, size of the company and growth rate, tax shields, asymmetry of information, belonging to an industry, costs of financial distress, profitability and risk [Titman and Wessels 1998; Frank and Goyal 2009; Bharat, Pasquariello and Wu 2009; Kühnhausen and Stieber 2014]. These factors may affect the cost of capital and the choice of optimal financing⁹. From the point of view of environmental projects, it is worth focusing on the identification of sources dedicated to the financing of such projects.

Being aware of the importance of the natural environment, public authorities support the process of environmental investment financing. In Poland, the financing of such investments with subsidies from public funds has been offered by Bank Ochrony Środowiska S.A. (BOŚ S.A.) for more than 20 years. At present (in 2015), funding can be obtained, for example, for new technologies and equipment that reduce energy consumption, for the improvement of energy ef-

 $^{^{\}rm 9}\,$ More detailed discussion of determinants of the cost of capital can be found in Chapter 16, Section 3.

ficiency, thermal modernisation of buildings, construction of renewable energy sources, reduction in the consumption of water and raw materials used in production, reduction in costs of waste disposal, as well as sewage and water treatment. These loans are subsidised from the National Fund for Environmental Protection and Water Management (or its provincial branches), as well as from foreign funds. One example is a possibility to obtain funding deriving from a foreign credit line of the European Investment Bank under the Energy Efficiency Programme for Small and Medium-Sized Enterprises (SMEFF EE loan), which is partially repaid from an EU grant in the form of a financial incentive for the borrower. Another example of foreign support for the process of financing environmental investments is funding from the German bank KfW, which is also handled by BOŚ S.A. The SME Finance Facility Phase 2 line offered by KfW is co-financed by the Council of Europe Development Bank (CEB) and supported by the European Commission [BOŚ 2005]¹⁰ Subsidised loans intended for environmental investments can also be obtained in provincial branches of the Environment Protection Fund.

Apart from using sources of financing with preferential terms resulting from the support offered by public institutions, it is worth noting that implementation by a company of the strategy of eco-efficiency or, more broadly, of sustainable development may contribute to benefits relating to a reduction in costs of commercial financing. As noted by Schröder [2014], enterprises with a high CSR rating incur lower average costs of debt financing. The same applies to equity. As shown by El Ghoul, Guedhami, Kwok and Mishra [2011] and Reverte [2012], a higher CSR rating is associated with a lower cost of equity. Therefore, socially responsible activities enable the company to lower the cost of capital.

8.7. Concept of Risk Recognition in the Financial Plan

Enterprises do not operate in conditions providing certainty with regard to financial results. Values adopted in the plan should be considered as expected values. A risk is a possibility of a different state than the expected value. Therefore, the determination of risk is an essential element of financial planning for the purpose of decision-making. The most popular method for risk assessment

 $^{^{\}rm 10}\,$ Detailed description of the role of BOŚ S.A. in the financing of environmental investments can be found in [Gwizdała 2014].

in the financial plan is an one-factor analysis (often also called a sensitivity analysis) and an scenario analysis¹¹.

The one-factor analysis allows one to examine a change in company's performance or in the project the company implements (e.g. profit or NPV) in case of a change of the level of only one input parameter. It is assumed that other variables remain at the same level. Input parameters most often examined are those that produce the greatest changes of a dependent variable (profit, NPV). These are the following: volume of sales (demand), sales price, prices for individual items of variable costs and level of fixed costs. This analysis comes down to answering the question how the dependent variable changes if a given explanatory variable rises or falls by a certain percentage.

When assessing risk with the use of the one-factor analysis, it is worth determining the critical level of a given parameter, namely to determine the percentage by which it can be changed so that the project would cease to be profitable or the financial result of the entire company's operation would be equal to 0. The determination of these levels for the analysed input variables allows one to define the hierarchy of risk factors and makes the choice easier in respect of activities aimed at optimisation of the risk management process.

Another method for examining a degree of change in input parameters is the calculation of the coefficient of sensitivity that determines how NPV (or another dependent variable) changes when an input variable changes by 1% [Wiśniewski 2008, p. 172].

$$W_{\rm wr} = \frac{\frac{NPV_1 - NPV_2}{NPV_2}}{\frac{Z_1 - Z_2}{Z_2} \cdot 100},$$
(8.8)

where:

 NPV_1 – value of NPV when the input variable equals Z_1 ,

 NPV_2 – value of NPV when the input variable equals Z_2 ,

 Z_1 – value of the input variable after the change,

 Z_2 – base value of the input variable.

A disadvantage of the one-factor analysis is the fact that only one variable changes (as its very name suggests). This method does not assume any links leading to a simultaneous change in multiple parameters. Another limitation

¹¹ The application of these methods will be presented in Chapter 15, Section 7 of this paper.

lies in that the method leaves out the probability of a change occurring in parameter values [Wiśniewski 2008, pp. 178–179].

If even a small change in the value of a specified variable causes that a decision becomes disadvantageous for the company, then it is sensitive to a particular value. W. Pluta emphasises that by using the sensitivity analysis, the company's management obtains information which variables should be particularly monitored as changes in their values may prevent the company from achieving its planned objectives. Therefore, paying particular attention to such values is supposed to prevent undesirable effects occurring in the future [Pluta 2003, p. 35].

A scenario analysis is an extension of the one-factor analysis (sensitivity analysis). It allows one to observe simultaneously the impact of multiple input variables on a dependent variable. It also takes into account the relationship between these parameters and their probability distributions. It enables one to examine consequences of a change of various factors and to determine their impact on the outcome of a project with different (consistent) variants and with maintaining real economic relations between them.

The first step in the scenario analysis is to build the base-case scenario – the most likely one. Then, both optimistic (input variables are set at a level "more favourable" than the expected one in relation to a dependent variable (e.g. profit, NPV)) and pessimistic (input variables are set at a level less favourable than the expected one) variants are prepared. The occurrence probability should be assigned (arbitrarily) to individual scenarios. The result of the analysis should be statistical parameters that describe the identified scenarios – the expected value of the project (e.g. NPV), its standard deviation and coefficient of variation [Wiśniewski 2008, p. 185].

Limitations of the scenario analysis include the fact that it is an estimate of only a few (dozen) possible future variants and parameters may take values other than the assumed ones. The subjective assessment of the occurrence probability of individual situations may be considered another drawback. Negative consequences of these limitations can be reduced by using a methodology which is a special variant of the scenario analysis – Monte Carlo simulation. It allows one to consider a much larger number of possible combinations of variables. It involves creating a very large number of scenarios on the basis of random and independent substitutions of each value of a given parameter. These values are drawn from a previously assumed probability distribution with given characteristics. These scenarios, placed at the model entry, generate a probability distribution of a given dependent variable (e.g. NPV) with the defined characteristics (expected value, standard deviation).

A risk analysis performed with the use of the methods described above is of great importance when making decisions on projects characterised by high difficulty in the assessment of their effects. Such projects certainly include environmental projects, particularly due to serious problems relating to the assessment of social effects (costs and benefits) of these investments.

8.8. Final Remarks

The presented specification of conditions of the correct construction of a financial plan and the description of possible effects of this process have enabled us to identify the importance of financial planning for a company implementing the strategy of eco-efficiency. Financial planning makes it possible for companies to verify the possibility of achieving their adopted objectives and to identify financial effect of the process. Moreover, it enables them to assess the risk of accomplishing the expected results of the enterprise's operation. The procedure proposed in this chapter for the construction of a financial plan may help companies in achieving their adopted strategic goals, including those related to environmental activities.

9 Budgeting and Variance Analysis in Green Controlling

9.1. Introductory Remarks

Budgeting and budget variance analysis belong to the most important instruments used in controlling. This value summary of planned organisation development is particularly important in companies focused on ecological and social goals.

Due to the importance of this problem, the main purpose of this chapter is a comprehensive presentation of budgeting and budget variance analysis in green controlling. The following chapters presents basic definitions and budget types, taking into account stakeholders of the entire process. Particular emphasis is laid on describing a modern budgeting approach, namely green budgeting and modern green budget variance analysis, as well as lean reporting.

9.2. Budgeting in Green Controlling

Data from literature indicates that budgeting is an effective managing tool aimed to improve the efficiency of company resources [Nowak and Nita, 2010]. Through budgeting, the company's overarching objectives and action plans aimed at their achievement are translated into value standards [Goliszewski, 2015]. Budgeting is a form of planning which allows the management board to communicate its intentions in the form of stated objectives, as well as to monitor the performance of specific tasks.

The process of short-term planning for the following financial year begins annually in many companies and organisations of different sizes and sectors [Egger and Winterheller, 2007]. A budget is an annual financial result of a company. According to the International Controller Association (ICV), operational planning and budgets are instruments of controlling revenues, costs, results and liquidity.

The budget forms an action plan that includes an adequate amount of funds for its implementation, assigned to a given decision-making unit in accounting period. It performs specific functions in a company and, as one of useful managing tools, it leads the company to achieving its intended objectives in a precisely defined period [Sierpińska and Niedbała, 2003]. Budgets are usually short-term plans in nature, with formally defined objectives and a high degree of obligation as regards their implementation [Horvath, 2011].

According to Horngren et al. [2004], the most important advantages of budgets are as follows: reduction of uncertainty that occurs during an attempt to predict future events on the basis of past experience and current expectations, creation of a plan linked to the company's strategy, systematically facilitating the implementation of this strategy, making it easier for the company to achieve its adopted objectives, especially those of general nature, as well as enabling the company to measure its performance and, finally, providing a reference point for the monitoring of the accomplishment of the adopted objectives.

The budget of a company performs many functions, among which Jaruga et al. [2001] point out:

▶ motivation for periodic planning, which is a kind of compulsion to break away "from the daily routine" in order to focus attention on the objectives of the entire organisation and to allow one to discern operational activities being the subject of decisions made in the company;

▶ the strengthening of coordination, cooperation and communication – the budget is a bond linking the entire organisation, a certain "platform of communication" and cooperation;

▶ facilitation of the quantification of descriptive goals and objectives – the budget enables the company to specify expectations towards its subordinates as to the results and other values they are to achieve;

▶ providing a basis for monitoring and evaluation of performance – information from budgets constitutes a better criterion for the assessment of ongoing performance than data from past periods; • providing data for the development of incentive systems in the company – budgets should be seen as feasible and should provide a kind of challenge for people implementing them rather than result from an order;

▶ creation of awareness, mainly in the area of operating expenses – the budget is a translation of planned activities into numbers presenting costs and benefits;

▶ fulfilment of legal and contractual requirements – in case of certain entities, the budgeting system is an obligatory element of their information systems due to the requirement to plan expenses and account for sources of financing operations (e.g. when applying for a loan to finance investments).

9.2.1. Green Budget in Terms of Division Criteria (Types of Budgets)

When constructing a budget, it is possible to use a variety of methods, whose classification is based on various criteria of division. Such criteria can include, for example, methods for budget reconciliation or the scope of participation of workers in the budgeting process, as well as a manner of determining the value of budget items, changes in the size of company's operations and frequency of constructing budgets.

As regards methods for budget reconciliation, there can be distinguished a method of "budgeting from the bottom up" (called participatory budgeting) and a method of "budgeting from the top down", as well as a "mixed" method. Top-down (prescriptive) budgeting is characterised by the fact that budgets are drawn up by top executives and imposed on lower levels. In the bottom-up budgeting, at the very beginning, budgets are created at the lowest executive level, and then they are consolidated at the highest managerial level. Mixed budgeting, in turn, is characterised by the fact that general strategic objectives for the next planning period are presented by the management board to executives of lower levels. Then, based on this information, managers develop budgets in their individual responsibility centres.

Considering the manner of determining the value of budget items, we can distinguish "zero-based budgeting", in which each item is determined for the first time. On the other hand, in the method of "incremental budgeting" data is updated taking into account the implementation of the budget of the previous period, e.g. by the inflation rate, change in the value of money or an increase

in productivity and efficiency improvement. Flexible budgets, distinguished on the basis of the criterion of changes in the size of the company's operations, take into consideration the actual changes in the sales and production volumes, in contrast to rigid budgets, fixed once and not changed during a financial year. The frequency of budget creation defines a static budget, which is drawn up for a given budgetary period, after which it no longer applies. Its opposite is a rolling budget, which requires constant updating and is created more frequently than once a year (e.g. on a monthly or quarterly basis) [Ossowski, 2005; Nowak, 2003].

The budgeting process in a company takes a whole new meaning according to a green growth model leading to a low-carbon, climate-resilient and resource-efficient economy; it is used to present structural economic changes that occur mainly due to the scarcity of resources, technological changes and innovations, new markets and changes in industrial models, as well as changes concerning consumer demand [European Commission, 2009]¹. Prices of resources, energy and raw materials already affect the cost structure of companies, as global demand for these resources will continue to grow due to an increase in consumption in emerging economies. Gradually, we will diverge from today's linear model based on the principle "take, process, use and throw away" in favour of a model based on a closed circuit, where it is possible to get more added value and obtain a greater benefit from each ton of material, every joule of energy and each hectare of land, by saving, reusing and recycling materials, and where resource productivity will determine the future of competitiveness [European Commission, 2014]².

Reporting in the area of environmental protection, based on such legal instruments as the Environmental Protection Law, the Act on Duties of Entrepreneurs as Regards Managing Certain Types of Waste, Product Fee and Deposit Fee, the Act on Waste and Packaging Management and the Environmental Policy, stemming from respect for the principles of balanced and sustainable development, makes it necessary to include environmental effects of entities' activities in the economic measurement, and most of all, environmental costs

¹ COM [2009] 433 final; also COM SWD [2013] 303 final, Commission staff working document on "Progress on 'GDP and beyond'", also OECD [2011], Towards green growth; UNEP [2011], Towards a green economy.

² COM [2014] 015 final, "A policy framework for climate and energy in the period from 2020 to 2030" and COM [2014] 021 final, "Energy prices and costs in Europe", and COM [2014] "Towards a circular economy: A zero waste programme for Europe".

including costs of environmental protection and costs of burden on the environment resulting from its degradation (release of gas and dust, discharge of sewage into water and soil, water abstraction and fees for dumping of waste in a landfill).

Taking into consideration the above regulations, operational and environmental budgeting allows a company to use natural resources more efficiently and improves its control over environmental costs it incurs. First of all, it is important that budgeting should cover significant environmental aspects of the entity's operation. Those include, in particular, consumption of materials, water and energy, emissions of pollutants, gases and dust into air, formation of noise and vibration, sewage disposal, pollution of land and groundwater, generation and disposal of waste, neutralisation of packaging and finished products after their lifetime. Hence, environmental budgeting in a company is a tool that allows it, among other things, to optimise the use of natural resources, properly monitor and control environmental costs and calculate environmental indicators necessary to assess the impact of business activity on the environment, as well as reduce the environmental risk [Szadziewska, 2014].

9.2.2. Multiple Dimensions of Green Budgeting (Economic, Environmental and Social Aspects; a Diamond)

Pursuant to the Regulations of the European Commission of 2014, corporate social responsibility (CSR) means that companies take actions not only for the benefit of the environment but also for society, on their own initiative and regardless of legal regulations. According to Janik [2014 p. 30], sustainable development includes three main dimensions: ecological, socio-cultural and economic. On the other hand, Samelak [2013 p. 18] defines the scope of basic subject areas of a socially responsible company, which are the environment, society and corporate governance.

The concept of Triple Bottom Line (TBL) – a triple line of results, which derives from the paradigm of sustainable development, seeks balance between the three perspectives: economics – profit, ecology – environmental impact, and society – people (employees) [Elkington 1997, p. 12]. This concept suggests that results of a socially responsible company include its financial, social and environmental performance. The division of CSR, according to different criteria, into three or four dimensions can also be encountered in literature. The triple
bottom line is, therefore, a metaphor that combines tasks in the area of management, measurement and reporting to stakeholders on multi-dimensional business performance [Jonker et al. 2011].

As it follows from the above observations, the key role in a socially responsible company is played by communication between the company and its stakeholders as CSR is a management strategy based on their needs and expectations. Thus, it is important that the entity should disclose relevant and reliable information with respect to the implementation of the CSR strategy, which will enable all concerned to assess the company in this area of operation. Entities directly influencing the company's operations are called stakeholders, in other words individuals "without whose support the organisation would cease to exist" [Stanford Research Institute, cited in Freeman, Reed, 1983]; whereas the indirect environment shapes the climate in which a particular organisation operates, and it may also be converted into elements of a direct impact [Stoner, Freeman, 2001]. An outline of the organisation's direct and indirect environment is shown in Figure 9.1.





Source: Based on [Stoner, Freeman, Gilbert 2001, p. 80].

As already mentioned, a company and its environment interact with each other. Therefore, in the course of the company's activities, its goals may repeatedly be in conformity with its environment, as well as conflicts may arise between them. In a free market economy, the system of relations and interests mainly depends on the bargaining power of a given entity or stakeholder.

In view of the fact that a budget is a financial reflection of the company's objectives, within it there can also be observed an impact of various groups of stakeholders. The systematisation of this issue is tabulated in Table 9.1.

To meet current environmental conditions and requirements, ICV has proposed, in cooperation with representatives of science and business, a modern concept of budgeting [ICV 2012]. A characteristic feature of improved budgeting is that it does not undermine the necessity of classical procedures. The essence of the concept lies in gradual changes in budgeting, leading to an increase in its efficiency, as well as to simplification and reduction [Goliszewski 2015]. The fundament for this concept is the creation of a diamond consisting of the following elements:

Table J. T. Company S stateholders and budgeting					
Aspect	Stakeholders	Main and partial objectives	Method for achieving the objective through budgeting		
1	2	3	4		
Economic	Owner	Increase in the company's value	Creation of a budget oriented toward an increase in the company's value and linking its implementation with the incentive scheme		
	Managers	Increase in their own power and influence Increase in salaries Professional satisfaction	Increase in salary costs of the management board		
	Employees	Increase in salaries Professional satisfaction	Increase in salary costs Increase in costs of equipment and third party services		
	Clients	Reduction in prices of products	Increase in production costs and marketing costs Reduction in individual revenues		
Social	Owners	Formulation of a mission statement of the company also including non- financial objectives	Creation of a budget taking into account the company's mission statement Reports on corporate social responsibility		

Table 9.1. Company's stakeholders and budgeting

9. Budgeting and Variance Analysis in Green Controlling

1	2	3	4
Social	Employees	Improvement in working conditions Reconciliation of work, family life and intellectual development	Increase in costs of equipment and third party services (e.g. training)
	Clients	Increase in quality of products Increase in availability of products Satisfaction of needs	Increase in production costs and marketing costs Reduction in individual revenues Satisfaction of demand for green products
	Suppliers	Obtaining favourable prices and payment conditions Ensuring existence and development Verification of practices of "social responsibility" throughout the supply chain	Change in cash budgets
	Local community Public opinion	Sensitivity to local culture and customs Partnership with community-based organisations Involvement in charity	Increasing in costs associated with sponsorship Respect for social values
	Suppliers	Obtaining favourable prices Development	Use of environmentally-friendly raw materials
Environmental	Local community Public opinion	Reduction in harmful effects of the company's operation Analysis of the entire product life cycle Obtaining benefits in connection with the company's operation Ensuring equitable future	Increasing in costs associated with sponsorship and environmental investments

Source: Based on [Nowak, Nita 2010, p. 23, Kryński and all (eds), 2004, p. 477, Szot-Gabryś 2013].

▶ Simplicity – simplified and lean processes that should focus exclusively on issues of control and management accounting, and should introduce beneficial tools and methods with several input variables at the optimum level of detail,

▶ Flexibility – it means openness to changes, sensitivity and creation of scenarios through setting targets based on benchmarking; it is also forecasting, a flexible and controlled distribution of resources,

▶ Integrity – it is a combination of strategy, planning, reporting and forecasting, where established norms should not differ from one other,

• Mapping of the organisation – specific and clear objectives oriented at an unambiguous main goal; in the organisation there should be established a short and quick decision-making process,

• Mapping of the value chain – it results from the understanding of the value chain and business model in which planning is determined by goals, bottle-necks and constrictions,

▶ Specified and comprehensible intentions – clear and simple objectives and intentions which communicate in a comprehensible way the essence of the plan in compliance with terms of its implementation.

By using improved budgeting, Coenenberg et al. [2012] include in the process of budget control and assessment, among other things, the use of systems of achievement measurements and progressive planning, which also takes into account non-financial values, and the use of more general budgets, though it does not apply to entities operating in a rapidly changing environment, for which detailed budgets are drawn up.

In modern companies, planning through improved Modern Budgeting also means taking into consideration environmental, social and economic aspects, relating to all of its elements (Fig. 9.2).



Fig. 9.2. Green Controlling Modern Budgeting

Source: author's study based on ICV, 2012.

9.3. Variance Analysis from the Perspective of Green Controlling

9.3.1. Analysis of Budget Variance

Budgeting Process in a Company

In the budgeting process, there are at least three successive stages relating to the use of budgets. Individual phases and interrelationships between them are shown in Figure 9.3.



Fig. 9.3. Phases of the budgeting process

Source: [Nowak 2002, p. 13].

The creation of the budget covers all activities aimed at determining tasks, as well as funds necessary for their implementation for individual centres of responsibility. This process can be carried out within the framework of the following actions [Drury 1995, p. 375]:

• providing detailed data on the adopted budget policy and guidelines for those responsible for preparing budgets,

- determination of factors limiting the size of production (output)
- preparation of sales budget,
- preliminary preparation of various budgets,
- negotiations on budgets with superiors,
- coordination and verification of budgets,
- final approval and adoption of budgets.

The implementation of the budget involves performing "tasks formulated in the prepared budget. Budget implementation occurs through taking appropriate actions, which should lead to achieving the tasks in question. The funds allocated to the organisational unit responsible for a specific scope of the company's activities constitute the basis for performing these actions" [Nowak 2010, p. 42].

The main participants in the budget implementation phase are:

• employees (persons directly performing tasks and related budgets)

• managers (managing activities undertaken by employees).

The control of the budget involves comparing achieved results (the level of performance of tasks and compliance with budgetary discipline) with planned results. It may be of continuous or periodic nature (e.g. after each ended week or month). The primary result of control activities is the determination of variance of the achieved values from the planned values. These variances may be positive (e.g. achieving the target level of the task fulfilment with lower financial expenditure) or negative (e.g. achieving a lower level of the task fulfilment with the assumed financial expenditure). The phase of budgetary control should enable one to [Nita, 2010, pp. 210–211]:

▶ reveal variances of the actual or predicted values from the values assumed in the budget,

- identify areas where variances occur,
- recognise causes of variance,
- determine *ex post* persons responsible for the occurrence of variance,
- examine effects of variance in different areas of the company's operation,
- indicate activities to correct the occurring variances,
- postulate corrective measures to eliminate the occurrence of variances in the future,
 - propose changes in the company's operations,
 - put forward specific improvements in the very budgeting process.

Analysis of Budget Variance

Taking actions based on a variance analysis with respect the budget implementation relates to, among others, the form of management by exception, which means that "a comparison between target and achieved values and consequent variance analyses are the basis for the company management oriented at solving problems" [Vollmuth, 1996, p. 70]. Management by exception involves the implementation of corrective³ and preventive⁴ processes aimed at counteracting operational and financial problems. Through budgeting and variance analysis, managers focus their attention on and take actions only in problem areas

³ An action to eliminate the cause of the detected non-conformity or another undesirable situation [ISO Dictionary, 2015].

⁴ An action to eliminate the cause of the potential non-conformity or another potential undesirable situation [ISO Dictionary, 2015].

(generating variance). As a result, the management is much more effective and efficient.

The preparation of an analysis of budget variance can be divided into two parts. The first one covers all activities with respect to the determination of the size and sources of variance, whereas the second one involves the preparation of a report on this subject for persons responsible for the implementation of budgets. In order to be capable to serve as a basis for managers to run responsibility centres, prepared information must meet certain criteria with respect to the form of reporting and construction of the information system [Wierzbicki, 1996]:

▶ recipient-centred, which means that provided reports should be tailored to the needs of the recipient (director general, his/her deputies, heads of organisational units, if any),

▶ repeatability of the information source and reliability of data, which requirements can be met by using financial and accounting records,

• up-to-date status of reports, which means providing information that may be considered in the decision-making process,

▶ comprehensibility of reports, which means using a language understood and commonly used in economic life, without unnecessary definitions and theoretical concepts having their counterparts in the daily practice of corporate management,

• objectivity of information, in other words elimination of any manipulation and juggling with indicators,

• economy of reports, which means that, depending on their purpose, submitted reports should provide all relevant data and, at the same time, should not contain unnecessary information,

▶ stability of the order of reports and uniformity of forms used in the company, which makes it easier to assimilate provided information due to existing habits of recipients who receive the reports.

It is important to accurately define the size and causes of variances, but equally (if not more) significant is the way of providing this information. If a report on budget variance is not prepared in a proper manner, managers may not use it or may take inefficient or ineffective actions.

In synthetic presentation of the issue of sources of budget variance, there can be distinguished two reasons, namely misguided planning or improper implementation of the plan. "Misguided planning may include misconceptions about the company and its environment or adoption of unrealistic goals. Improper implementation of the plan consists of failure to pursue the set objectives, to use the planned resources or to perform the agreed actions. Both types of variance do not constitute grounds for seeking a person to blame, but the basis for learning so as to avoid the recurrence of variance" [Sierpińska, Niedbała, 2003, p. 106]. Therefore, an analysis of variance from budget should also include, in addition to the variance value and its place of origin, the reason for its occurrence (including the aspect of misguided planning or improper implementation of the plan).

9.3.2. Analysis of Results across the Company; Lean Reporting

Lean Approach in Business Management

Lean approach in business management (Lean Management) was introduced at the Toyota Company. Originally, it concerned only the aspect of production management (Toyota Production System). S. Toyoda, K. Toyada and T. Ohno are considered the creators of the concept. Their main objective in production management was to eliminate all activities and use of materials that do not create value for the customer; in other words, to get rid of the so-called waste (*muda* in Japanese) T. Ohno [1988] identified seven types of waste:

- defects (as well as repairs, corrections),
- excessive processing (improper technological process),

• unnecessary motion (employees performing activities not provided for in the technological process),

- unnecessary transport (before, during and after production),
- overproduction (failure to adjust supply to demand),
- inventory (including inventory before and during production),

• waiting time (noticeable through much longer time of completion of a production order than performance time of technological operations).

The above production management concept was popularised as the concept of Lean Manufacturing by Krafcik [1988], as well as Womack, Jones and Roos [1990]. Along with further implementations of the Lean Manufacturing system in different types of production, there was noted the versatility of this approach. Over time, the lean approach was no longer confined only to production but also started being used in other areas of activity (e.g. trade, administration), thereby creating the Lean Management. It is "a method for managing a company, the core principles of which are elimination of waste, continuous improvement and focus on the value added for the customer, and which can be introduced in every company, regardless of its line of business and specialisation, as well as different types of organisations, state institutions and medical facilities. What determines its wide application is the fact that it contributes to the elimination of recurring problems in various structures and entities, regardless of the sector or industry" [Lean Enterprise Institute Polska, 2015].

Lean Reporting

No managerial concept or method can operate effectively without adequate techniques of measuring performance. Also in the case of Lean Management, a specific information system has been developed, which helps managers (and executives) to observe effects of taken actions; this is Lean Accounting⁵. Its main global promoters are, among others, Maskell, Baggaley and Grasso. In 2005, the first conference on Lean Accounting took place. Certain basic definitions and related assumptions were formulated during the conference. It was established that Lean Accounting should [Maskell, Baggaley 2006]:

▶ provide accurate, timely and understandable information to motivate the lean transformation throughout the organisation, and for decision-making leading to increased customer value, growth, profitability, and cash flow,

• use lean tools to eliminate waste from the accounting processes while maintaining thorough financial control,

▶ fully comply with generally accepted accounting principles (GAAP), external reporting regulations, and internal reporting requirements,

• support the lean culture by motivating investment in people, providing information that is relevant and actionable, and empowering continuous improvement at every level of the organisation.

One of the basic goals of Lean Accounting is to provide managers and employees with up-to-date financial and non-financial data presented in such a way as to be intelligible and easy to use for any recipient in the places where activities are carried out, "communicated in the form of frequent reports (not just

⁵ Szczupła Rachunkowość – the Polish equivalent for the concept of Lean Accounting was proposed by a Research Team of the Department of the University of Lodz under the management of Prof. Irena Sobańska [Michalak 2009, p. 169].

on a monthly basis) and in visual forms by using new methods of management accounting and communication tools" [Sobańska, 2013).

Lean Accounting is intended to be a comprehensive information system including quantitative, qualitative and value data, which is used at all levels of an organisation. This task should be carried out in three stages [Maskell, Baggaley, Grasso 2011]:

- Cell Performance Measurements,
- Benefits of Lean Manufacturing,
- Lean Financial Accounting.

The first stage includes an ongoing measurement and analysis of key aspects of organisational units from the point of view of the Lean Management objectives. It aim is to provide up-to-date information on conducted processes. The accomplishments are measured and the results are presented in the place where actions are performed. Its purpose is to monitor results achieved not only by managers, but also employees. As a result, a self-regulatory mechanism is created. Due to the fact that the provided information is to be up-to-date and analysed by different groups of employees, it should be presented in a graphic form (more accessible to analyse) and should also be characterised by ease and speed of preparation. In addition, it must include only key objectives from the point of view of the lean approach – so as to focus attention on really important aspects.

The second stage of implementation is aimed at calculating and presenting benefits of the applied solutions and lean improvements. This is done primarily by using a box score in which the results are presented in three dimensions:

- operational,
- performance,
- financial.

The last phase of the implementation of the Lean Accounting Information System is the reorganisation of the accounting system for the needs of Lean Management. It includes both changes in the functioning of financial departments and the use of alternative forms of accounts, for example [Sobańska 2013]:

- objective-based costing,
- kaizen costing,
- cost accounting by types and characteristics of products,
- accounting of costs and value stream results.

9.3.3. Analysis of Budget Variance according to the Green Approach

Analysis of Causes of Budget Variance

During an analysis of budget variance, it is important to be aware of a direct relation between its financial area (revenues, expenses, cash flows) and its area of business operations (activities and use of resources). This relation is shown in Figure 9.4.



Fig. 9.4. Relation between the operational and financial areas of a company Source: author's study.

A company's financial area affects its operational area. The determination of individual amounts in a budget (causes) results in undertaking actions of specific forms (effects). On the other hand, the method for performing actions in the operational area (cause) has a direct impact on the company's financial area (effects). The two areas can be mutually supportive (e.g. establishing budgets at a certain level will enable the proper performance of actions, which will lead to achieving desired financial results) or limit each other (insufficient funds provided for in a budget will result in inadequate implementation of tasks, which will have a negative impact on financial results). An example of relations between the operational and financial aspects in the area of ecology is presented in Table 9.2.

In order to reduce the environmental burden caused by pollution, a company must ensure adequate financial resources for this purpose. A decrease in the environmental burden caused by pollution will result in cost reduction, e.g. by reducing the share of environmental charges.

Table 9.2	Relation	between the	environmental	(operational)	and	economic	(financial)
			areas of a con	npany			

Environmental (operational) cause	Economical (financial) result
reduction in the environmental burden caused by pollution	reduction in costs through a decrease in the share of environmental charges they include
better use of raw materials in quantitative terms	postponement of the prospected emergence of ecological barriers and an increase in costs of obtaining scarce resources
better use of raw materials in qualitative terms	reduction in manufacturing costs and costs of warranty service
more efficient use of natural resources	cost reduction and increase in economic efficiency
meeting of environmental tastes of consumers	increase in sales revenues
creation of an eco-friendly image of the company	strengthening of the competitive market position, decrease in sales costs

Source: Based on [Czaja, Becla 2007, p. 246].

The creation of an eco-friendly image of a company requires financial expenditure; but due to its creation it is possible to increase sales revenues and decrease sales costs.

The examples mentioned above show how strongly the operational and financial aspects of companies are interrelated. Therefore, it is very important that they be mutually supportive rather than restrictive for each other.

Due to a direct connection and interaction between these two company areas, it should also be considered during a variance analysis. An analysis of budget variance cannot be limited only to financial information; it must also include quantitative and qualitative data (with respect to the operational area). Furthermore, it is necessary to create such an information system that will deal with the issue of causes of budget variance rather than just communicate the impact of these causes (or occurring variances). For such a system to be effective, it must operate in a current or *ex-ante* mode (at least in relation to the area of causes). It will allow managers to take actions in order to eliminate potential variances already during an accounting period (instead of waiting until the end of that period and for the determination of the real value of budget variance).

The phase of budget implementation involves, in particular, employees (people who actually implement budgets) and managers (coordinators of employees' actions). Accordingly, the system of the analyses of budget variance should provide information to both these groups. Actions of employees (or their absence) affect the level of budget implementation, which is why they should also be involved and included in the analysis of variance. It ought to take place at least at the level of causes, i.e. during a current (or *ex-ante*) analysis of quantitative and qualitative data from the operational area. This is to make the employees aware that the decisions they make have a key impact on the achieved level of budget implementation. Along with an increase in awareness and sense of responsibility of employees, quantitative and qualitative measures may be supplemented with value (financial) data.

In both of the discussed cases, the approach to measuring the efficiency of organisational units, which is also applied in Lean Accounting, can also be used; it requires using a simplified form of reporting on the implementation of the key budget task in the place where actions are performed. It may take the form of a chart, meter or a small table so that employees (or managers) could keep track of the performance of tasks (which have a critical impact on budget implementation) almost without breaking away from the activities they are carrying out.

Such a proactive analysis of budget variance, carried out in different areas of the company's operation (production, sales, administration), results in an increase in employees' awareness of and involvement in the execution of budgetary targets. In the case of Green Controlling and Finance, the measurement of the completion of key tasks should include, in particular, environmental and social aspects.

Analysis of Budget Variance according to the Green Approach

An analysis of budget variance according to the green approach should be performed in compliance with the concept of the Triple Bottom Line. Therefore, budget reporting should allow one to examine results in all green areas of the company's operation (economic, social and environmental) in one place. Moreover, pursuant to the postulates referred to in the previous section, an analysis of budget variance should be supplemented with quantitative and qualitative information. For this purpose, a (properly modified) tool used in Lean Accounting, namely a box score, can also be used. Examples of its application in reporting relating to the analysis of budget variance are presented in Tables 9.3 and 9.4.



Source: author's study.

	Table 9.4. Social / environmental / economic box score							
	responsible centre	January	February	March	April		December	budget / objective
1	2	3	4	5	6	7	8	9
ive	1							
intitat	2							
enb	3							
tive	I							
ntitat	II							
qua	Ш							

9. Budgeting and Variance Analysis in Green Controlling

1	2	3	4	5	6	7	8	9
	Α							
au	В							
val	С							
	Σ value							

Source: author's study.

Both tables can present the implementation of budgets (or objectives), as well as a variance from the same (nominal or percentage). In this case, the first table shows the implementation of the budget in sums in each month, as well as the planned values. All this is divided into different areas (social, environmental and economic), as well as responsibility centres appearing therein. The second table complements the first one. In addition to data on budget implementation in a particular area, it also contains information on the implementation of quantitative and qualitative tasks planned in the budget. Data on the level of implementation of operational objectives is very important as it provides information about the extent to which its achieved results translate into financial results. The presented box scores are characterised by a large number of advantages, including in particular:

- ease and speed of preparation,
- ▶ versatility,
- possibility of modifications,
- complexity in discussing issues,
- simplicity of the message.

Obviously, the presented tables belong to the many possibilities for analysing budget implementation and budget variance as regards Green Controlling and Finance. Due to their numerous advantages, on the one hand, and a small amount of work, on the other hand, they should be used particularly in the early stages of green budgeting implementation. Once a certain advanced level of the application of green budgets has already been reached, there should be taken actions e.g. to develop a dashboard⁶, which will present the analysed issues in an even more comprehensive manner.

⁶ An extended graphic form of presenting data, usually supplemented with small tables containing key values or indicators.

9.4. Final Remarks

The chapter presents comprehensively the issue of budgeting and variance analysis in green controlling. In the initial sections, the concept of budgeting and variance analysis has been characterised. It is followed by the presentation of its application in green controlling. The chapter shows multiple dimensions of green budgets that take into account economic, environmental and social aspects and, in addition, combine objectives of different groups of stakeholders in these areas.

The presented findings elaborate on existing conclusions and theories presented by other authors. At the same time, they combine concepts used independently, such as the triple bottom line, modern budgeting or lean accounting; thus they have created the foundations for the development of the issue of budgeting and variance analysis in green controlling.

In the authors' opinion, further works related to the issue of budgeting and variance analysis in green controlling should be focused, in particular, on an empirical verification of the presented theses and the further development of the theory of this area through, among other things, identification of ways to combine budgeting and variance analysis with other fields of green controlling.

10 Measures and Indicators in Green Controlling

10.1. Introductory Remarks

Today's companies are increasingly taking action in the area of environmental and social development, encountering difficulties when including them in the system of controlling processes¹. One of the reasons for this situation is the lack of established theoretical grounding with respect to measures and indicators relating to all areas of operations of a sustainable company.

The aim of the chapter is to present an appropriate approach to develop a system of measures and indicators of sustainable development of a company by controlling services. The structure of the chapter is organised to achieve this aim; thus, at the beginning there is presented the essence of and the need to integrate measures and indicators as a basis for green controlling. Next, individual areas of sustainable development are shown with separated examples of economic, social and environmental measures and indicators, as well as with the presentation of solutions of international organisations in this regard. Subsequently, main controlling processes are characterised. The quintessence of the chapter is a description of designing rules and elements of a casual system of measures and indicators of sustainable development. In the chapter there are also shown ready-made integrated measurement tools to use in green controlling.

¹ The eco-industry is treated as a strategic concept, able to be used by an industrial company [Janasz, 2010].

10.2. Measures and Indicators as a Basis for Green Controlling

It is possible to develop and coordinate processes of planning, control and providing information, aimed at managing the whole company from the viewpoint of its objectives, which constitutes the essence of controlling, thanks to the use of an appropriate system of measures and indicators. Activities of companies in social and environmental areas, coinciding with the concept of sustainable development, require modification of commonly used systems of measures and indicators of economic activity.

Although the terms "measure" and "indicator" are often used interchangeably, their scope of meaning is not identical. A measure is a denominated number expressed in any unit², whereas an indicator is a denominated number compared to another number constituting the reference basis for the denominated number [Kochalski 2011, p. 198]. Therefore, indicators can take both denominated and non-denominated values³.

Despite many initiatives undertaken by academic institutions, non-profit organisations or consulting companies, the methodology for measuring sustainable development requires continuous improvement in terms of integration of economic, social and environmental issues, as well as comparability and usefulness of applied measures and indicators [Delai and Takahashi 2011]. In this regard, it is worth considering the polymorphism of socially responsible activities and, as a consequence, a complex taxonomy of measures and indicators, which can be grouped with respect to, among other things:

- unit of measurement (e.g. natural, monetary, and value measures),
- desirable value (e.g. stimulants, destimulants, nominants),
- object of measurement (e.g. performance and expenditure measures),

• measuring time in relation to the examined phenomenon (e.g. lagging and leading indicators).

When designing the system of measures and indicators, the main task is to ensure their usefulness in terms of controlling processes. To this end, measures

² Depending on the adopted typology, measures can be expressed with the use of monetary, value, quantitative, natural, technical, and economic measurements, etc.

 $^{^{\}scriptscriptstyle 3}$ As opposed to a non-denominated number, a denominated number is a number next to which the name of a unit is given.

and indicators of sustainable development should meet a number of requirements [Schwarz, Beloff and Beaver 2002; Bossel 1999]:

- low costs of data collection,
- simplicity of calculation and interpretation of results,
- significance for making management decisions,
- comparability of time and objects,
- comprehensibility for different groups of recipients,
- usefulness for different areas of company's operations,

• information capacity adjusted to the policy of revealing confidential information,

• cohesion with legal requirements.

10.3. Integration of Measures and Indicators in Green Controlling

Controlling of sustainable development covers economic, social and environmental areas of company's operation; therefore, its integrity is the fundamental problem of both theoretical and practical nature. Measures and indicators used in green controlling should reflect relationships occurring among all areas of sustainable development. Such an assumption constitutes the basis for controlling services to correctly design and use measures and indicators of sustainable development in a company.

An integrated approach to measures and indicators of sustainable development involves three basic problems:

• divergence of measurement units regarding effects of company's operations in the economic area in relation to the social and environmental areas,

▶ a measurement system of economic effects established in theory and practice, compared to an unstructured set of measures and indicators of social and environmental activities [Schaltegger and Wagner 2006, p. 11],

• difficulty with measurable determination of the impact of undertaken socially responsible activities on economic results of a company.

Despite these methodological problems, the integration of all areas of sustainable development in a system of measures and indicators is essential for those companies that intend to use green controlling. Otherwise, it will be impossible to include social and environmental activities in processes of planning, control and providing information. This approach may reduce the idea of sustainable development to a marketing tool only, which could be detrimental to both company's owners and stakeholders. Halme and Laurila [2009] point out that the scale of benefits which results from undertaking socially responsible activities is a consequence of a degree of integration of these activities with the core operational activity of a company. The need for an integrated approach is also indicated in the Communication of the European Commission [2011], stressing that for the complete fulfilment of obligations of sustainable development, "enterprises should have a process to integrate social, environmental, ethical, human rights and consumer concerns into their business operations and core strategy".

The problem of integration of measures and indicators of sustainable development can be solved in two ways, through:

▶ development of holistic indicators covering the economic, social and environmental areas of a company's operation⁴,

▶ presentation of cause-and-effect relationships among separate measures and indicators of individual areas of sustainable development.

Holistic indicators of sustainable development are difficult to apply in practice, and they preclude proper planning, control and providing information; therefore, for the needs of green controlling, it is especially important to recognise interdependencies among economic, social and environmental results when designing a system of measures and indicators.

The integration of measures and indicators of sustainable development should involve not only individual areas of company's operations, but also elements of the system of company's strategic⁵ and operational objectives. It is worth emphasising that socially responsible activities that are not related to a company's strategy are less beneficial for both the owners and other stakeholders of a company [Ratajczak, 2014].

The basis for achieving cohesion of measures and indicators among broadly defined strategic and operational objectives is to identify cause-and-effect relationships among different objectives of a company.

⁴ An example of a holistic indicator of sustainable development can be the Sustainable Value Added (SVA), in literature on the subject also called the Sustainable Economic Value Added (SEVA).

⁵ The system of strategic objectives of a company includes the following elements: mission statement, vision, main strategic objective (qualitative), secondary strategic objectives of the first level (qualitative goals of functional areas), secondary strategic objectives of the second level (qualitative strategic tasks), and goal-achievement measures (quantitative strategic tasks) [Urbanowska-Sojkin, Banaszyk and Witczak 2004, p. 311].

The integration of measures and indicators of sustainable development should be provided in two basic dimensions of both goals and areas of operation, which is shown in Figure 10.1.



Fig. 10.1. Main dimensions of integration of measures and indicators of sustainable development Source: author's study.

The integration of measures and indicators of sustainable development in terms of objectives and areas of company's operation contributes to the fact that socially responsible activities can constitute a matter of interest of controlling services in the field of planning, control and providing information. Otherwise, socially responsible activities would be a matter of interest only for services responsible for corporate social responsibility or relations of the company with its stakeholders.

10.4. Measures and Indicators of Individual Areas of Sustainable Development

Sustainable development of a company focuses on three core areas of its activities: economic, social and environmental, according to the concept of the Triple Bottom Line commonly referred to in literature⁶ [Elkington 1997]. This division can be expanded by isolating other areas such as institutional, consumer, employee, ethical, logistics fields, etc. Areas of sustainable development identified in a company may constitute a criterion for selection of measures and indicators used by controlling services.

Companies can measure the level of sustainable development in all its areas by using for this purpose standards developed by external institutions such as the Global Reporting Initiative⁷, thanks to which calculated measures and indicators can be used simultaneously for the purposes of management, voluntary reporting for the needs of external stakeholders and mandatory fulfilment of reporting obligations. The number of measures and indicators determined by adopted basic standards may be increased or decreased for management purposes, depending on the decision of controlling services.

Reporting in compliance with standards of external institutions usually involves the necessity to calculate and interpret a very large number of measures and indicators, some of which can be selected by controlling services for management purposes. Although such a solution integrates management and reporting systems, it is not without drawbacks. Firstly, selection of indicators, even according to aptly defined criteria such as the ability to control or relevance of performance types measured, is a subjective decision. Secondly, indicators selected in this way are neither integrated with a company's strategy nor reflect cause-and-effect relationships occurring therein.

Table 10.1 presents examples of measures and indicators of economic development of a company, assigned to eight groups: business profile, competitiveness, costs, profitability, assets, financing, liquidity and capital market.

This table mostly demonstrates examples of indicators of economic development because measures are reflected in the different components of financial statements, particularly in a balance sheet, income statement, statement of changes in equity, cash flow statement, as well as notes and comments.

Table 10.2 shows examples of measures and indicators of social development of a company, which have been divided into fifteen groups allocated to four categories: employees, human rights, local society, and products.

 $^{^6}$ Elkington [1997] defined the Triple Bottom Line concept with the use of three dimensions: people, planet and profit.

⁷ The Global Reporting Initiative is an organisation founded in 1997 to promote the principles of sustainable development, mainly through the creation of reporting standards.

Groups of	Examples of tupos of measures and indicators
indicators	Examples of types of measures and mutcators
Business profile	structure of sales by product type and regionnumber of employees by region
Competitiveness	 market share and sales volume of competitors by product type and region number of suppliers and customers by purchase and sales volume
Costs	structure and dynamics of costs by typeshare of costs in individual revenue categories
Profitability	 return on assets, return on equity, return on sales level of operating leverage
Assets	 productivity of fixed assets, turnover of current assets degree of wear of fixed assets
Financing	level of coverage of equity by interest debtlevel of financial leverage
Liquidity	 current liquidity, quick liquidity level of cash solvency, degree of cash efficiency
Capital market	 dividend rate, level of dividend payment, rate of return earnings per share ratio, book value per share ratio

Table 10.1. Examples of measures and indicators of economic development of a company

Source: author's study.

Table 10.2. Examples of measures and indicators of social development of a company

Groups of measures and indicators	Examples of types of measures and indicators
1	2
	Employees
Employment	 number of employees by type of employment, type of employment contract and region rate of employee turnover by age group, gender, and region
Relations between employees and the management	 percentage of employees covered by collective bargaining agreements minimum notice period with which employees are informed about significant operational changes

1	2			
Occupational health and safety	 rate of injuries, occupational diseases, lost days, and absence from work total expenditure on training in occupational health and safety 			
Education and training	 average number of training hours per employee by structure of employment percentage of employees undergoing regular assessments as regards work quality and reviews of career development 			
Diversity and equal opportunities	 ratio of basic salary of men and women by positions held percentage of employees broken down by gender, age and other indicators of diversity 			
	Human rights			
Procurement and investment procedures	 share of significant suppliers and sub-contractors that have undergone screening in terms of observance of human rights number of training hours on procedures concerning aspects of human rights 			
Combating discrimination	total number of discrimination casestotal number of cases of violation of rights of indigenous peoples			
Child labour	 number of audits with suppliers in terms of child labour total expenditure on combating child labour 			
	Local society			
Local community	 number of complaints, petitions and grievances from local communities total expenditure on local social initiatives 			
Corruption	 share of employees trained in the area of anti-corruption policies and procedures of the organisation number of registered incidents of corruption 			
Participation in public life	 total value of financial and in-kind donations to political parties and politicians ownership interests in public benefit organisations 			
Regulatory compliance	number of imposed sanctionstotal value of imposed penalties			
Products				
Health and safety of the customer	 number of cases of non-compliance with regulations concerning the impact of products and services on health and safety of customers total costs incurred to repurchase products and services considered to be hazardous to health from the market 			
Product and service labelling	 number of cases of non-compliance with regulations concerning product labelling indicator of customer satisfaction in terms of product labelling 			

1	2
Marketing communication	 number of complaints regarding breaches of customer privacy and loss of personal data number of complaints concerning breach of moral standards in the advertising area

Source: author's study based on [GRI 2006; Samelak 2013].

Table 10.3 presents examples of measures and indicators of environmental development of a company, which are divided into eight groups.

 Table 10.3. Examples of measures and indicators of environmental development of a company

Groups of measures and indicators	Examples of types of measures and indicators
Raw materials and consumables	used raw materials and consumables by weight and volumeshare of recycled materials used in the production process
Energy	direct energy consumption by primary sourcesamount of energy saved thanks to renovation of infrastructure
Water	total water abstraction by sourceshare and total volume of recyclable water
Biodiversity	 area of land owned in protected areas number of animal and plant species protected on the owned land
Emissions, effluents and waste	 total direct and indirect emissions of greenhouse gases by weight total weight of waste by type of waste
Products and services	 share of recovered materials from sold products and their packaging share of environmentally-friendly products in total sales
Compliance with regulations	 monetary value of fines and total number of non-monetary sanctions for non-compliance with laws and regulations concerning environmental protection number of lawsuits for failure to comply with the law on environmental protection
Transport	total mileage of transport fleetshare of vehicle fleet by average fuel consumption

Source: author's study based on [GRI 2006; Samelak 2013].

The types of measures and indicators of economic, social and environmental development presented in the tables do not constitute an exhaustive list but an example that can steer a company towards selection and categorisation of appropriate performance types, useful from the point of view of controlling services.

Measures and indicators of sustainable development cannot disregard characteristics of a company. However, when developing an ultimate set of measures and indicators, it is worth backing oneself up with ready-made solutions published by a number of international organisations, among which the best known are:

▶ Global Reporting Initiative (GRI) – an international organisation founded in the USA in 1997 to develop and propagate reporting standards with respect to sustainable development,

▶ United Nations Commission on Sustainable Development (CSD) – an organisation established at the UN General Assembly in December 1992 in order to fulfil the provisions of the United Nations Conference in Rio de Janeiro on Environment and Development, known as the Earth Summit,

▶ Institution of Chemical Engineers (IChemE) – an international organisation founded in 1922 to support the community of engineers from the field of chemistry,

• Ethos Institute of Business and Social Responsibility – an organisation established in Brazil in 1998 to support Brazilian companies on the path of sustainable development,

▶ International Institute for Sustainable Development (IISD) – an international organisation founded in Canada in 1990 to promote social development and environmental protection through innovative research and international cooperation.

All the organisations mentioned above have created ready-made sets of dozens or even hundreds of measures and indicators of sustainable development that can be used by companies in the controlling system.

10.5. Measures and Indicators of Sustainable Development in Controlling Processes

Proper design, implementation and use of measures and indicators of sustainable development by the controlling services in a company are the basis for green controlling. Controllers' commitment to sustainable development mainly relies on determining appropriate measures and indicators, evaluating investment projects and solving contentious situations among stakeholders, together with company's management.

A set of applied measures and indicators should be integrated into all controlling processes to eliminate, for example, a situation in which planning and control of investment projects is based on a different performance type than planning and control of implementation of periodic budgets.

According to the International Group of Controlling, the main controlling processes include strategic planning, operational planning and budgeting, forecasting, cost accounting, management reporting, and project and investment controlling, as well as risk management. Furthermore, three types of additional processes can be distinguished: functional controlling, supporting the management as well as developing the organisation in terms of applied processes, systems and instruments [Lehmann 2012].

Figure 10.2 presents the main controlling processes. They can be carried out, among other things, thanks to the use of appropriate measures and indicators of sustainable development to planning and control.



Fig. 10.2. Measures and indicators of sustainable development in the system of controlling processes Source: author's study.

As a superior controlling process, strategic planning is aimed at supporting the management in ensuring the existence of a company and an increase in its value in the long run. Operational planning and budgeting involve establishing and systematically revising targets and partial budgets for individual centres of responsibility in the company. Thanks to operational planning and budgeting, it is possible to coordinate medium- and long-term objectives arising from strategic assumptions. Forecasting, as a controlling process is aimed at providing information on deviations expected in the future and working out appropriate remedial measures to ensure the achievement of objectives. Cost accounting, as a controlling process, consists in transparent and appropriate allocation of costs to cost objects for the purpose of supporting decision-making processes. Management reporting involves providing information that is relevant in terms of decisions made by the management board of a company. Project and investment controlling is aimed, in particular, at ensuring transparency in assessing the cost-effectiveness and compliance of projects and investments with the agreed schedule and budget. Risk management is aimed at ensuring the long-term existence of the company and improvement of the quality of planning by identifying and controlling emerging risks affecting the company's operation.

Planning and control carried out in individual major controlling processes can be effective only thanks to the use of an integrated system of measures and indicators of economic, social and environmental development of the company.

10.6. Casual System of Measures and Indicators

The recognition of different elements making up the chain of connections among economic, social and environmental results is crucial for the senior management and participants of the financial market to develop analytical tools and make appropriate decisions in line with tenets of sustainable development [Piñeiro and Romero, 2006]. The lack of knowledge about interrelationships among undertaken socially responsible activities can lead to uncontrolled results in individual areas of sustainable development and difficulties in finding their causes.

The identification of cause-and-effect relationships with respect to objectives of sustainable development of a company allows it to isolate necessary and eliminate unnecessary activities from the point of view of the set objectives, as well as to understand the role that individual employees play in achieving company's goals. It is worth emphasising that causality relationships should be regularly updated and communicated to all employees.

Figure 10.3 presents six dimensions concerning causality relationships on the path of sustainable development of a company, which are resources, conditions, processes, sustainable results⁸, reactions of stakeholders and financial results.



Fig. 10.3. Elements of the causal system of measures and indicators of sustainable development Source: author's study based on [Epstein and Buhovac 2014].

The resources and conditions shown in Figure 10.3 determine processes carried out in a company for the purpose of achieving sustainable results. These, in turn, affect reactions of various groups of stakeholders and contribute to achieving specified financial results. It is worth noting that some of the processes of sustainable development affect financial results indirectly, for example by improving the company's image as environmentally friendly, while other processes, expressed for example by expenses incurred to improve combustion filters, affect the financial results directly.

Human and financial resources constitute the main determinant of the processes undertaken in order to achieve results of sustainable development. Insufficient or inadequate resources cause that managers cannot execute the desired strategy in the area of economic, social and environmental development.

Table 10.4 lists examples of measures and indicators concerning resources as an element of the causal system of measures and indicators of sustainable development.

⁸ Sustainable results in this study mean results of sustainable development, thus results of economic, social and environmental development.

Table 10.4. Examples of measures and indicators of human and financial resources

- funds for the training of employees
- > funds for research and development concerning reduction of pollution
- > number of employees who have undergone training in the area of environmental protection
- > cost of training in the field of sustainable development per employee
- number of employees with higher education
- > share of managers who have undergone training in the area of sustainable development

Source: author's study.

Just like resources, conditions influence decisions concerning the adoption or cancellation of individual processes of sustainable development. The three main groups of conditions include [Epstein and Buhovac 2014]:

▶ external conditions – conditions at a local and global level, resulting in particular from legal regulations in the field of sustainable development but also from demographic or geographical characteristics of the area in which a company operates,

▶ internal conditions – conditions resulting from the adopted mission statement, vision and strategy of a company, as well as developed organisational culture and applied organisational structures,

▶ business conditions – conditions resulting from belonging to a particular sector, characteristics of competitors and consumers, as well as properties of manufactured products or provided services.

Table 10.5 enumerates examples of measures and indicators concerning conditions as an element of the causal system of measures and indicators of sustainable development.

Table 10.5. Examples of measures and indicators of conditions of sustainable development

- ratio of dust emitted to the atmosphere to the applicable legal limit
- ratio of the lowest wage to the statutory amount of the minimum wage
- share of minors in the structure of customers by sales volume
- average air temperature by sales region
- number and relative size of competitors
- > number of strategic business units in a company's organisational structure

Source: author's study.

As an element of the causal system of planning and control of sustainable development, processes arise from resources and determinants of a company and lead to achieving sustainable results. Epstein and Bukovac [2014] distinguish four groups of processes of sustainable development:

▶ management – processes aimed at increasing the management's involvement in sustainable development, leading to changes in the organisational culture and enabling the management to better communicate objectives of sustainable development,

▶ strategy – processes oriented at focusing a company's strategy on aspects of sustainable development,

▶ structure – processes relating to efficient use of human resources and leading to an adjustment of the organisational structure to objectives of sustainable development,

▶ systems and projects – processes aimed at the realisation of investment projects and improvement of the risk management system, payroll system, reporting system, or accounting system so that they would be adjusted to planning and control of all aspects of sustainable development in the best possible way.

In Table 10.6 there are listed examples of measures and indicators concerning processes as an element of the causal system of measures and indicators of sustainable development.

Table 10.6. Examples of measures and indicators of processes of sustainable development

- costs of adapting IT systems to green controlling
- number of internal inspections with respect to product quality
- > working time of managers, dedicated to environmental issues
- number of quantitative targets concerning environmental protection included in a company's strategy
- size of the department of sustainable development
- share of employees with additional health insurance
- > expenditure made for the needs of the local community
- > expenditure made on disabled children of employees
- > expenditure made to improve fuel combustion filters
- > working time of volunteers in relation to working time of employees in total

Source: author's study.

Sustainable results are an effect of the conducted processes and lead to the triggering of a certain reaction of stakeholders. They constitute achievements of a company in the economic, social and environmental areas. It should be stressed that in case of some companies, results of sustainable development, e.g. in the form of reduced emissions, will be the ultimate goal, regardless of how it will affect reactions of stakeholders and financial results.

Table 10.7 lists examples of measures and indicators concerning sustainable results as an element of the causal system of measures and indicators of sustainable development.

Table 10.7. Examples of measures and indicators of results of sustainable development

- > number of prizes and awards in the field of sustainable development
- > assessment by points of the safety of sold products
- > volume of emission of gases emitted into the atmosphere
- volume of water abstraction by source
- > share of local entrepreneurs in the total value of supplies
- share of environmentally-friendly investment projects approved for implementation by the management
- share of recyclable products
- average durability of manufactured products
- number of incidents of corruption recorded in a company
- average level of wages of line workers

Source: author's study.

Reactions of stakeholders constitute an outcome of results of processes achieved in the field of sustainable development and lead to the achievement of certain financial results. These relationships are not always measurable; therefore, they should often be seen through the prism of experience, knowledge and logic, or even intuition. This difficulty arises from the fact that reactions of stakeholders, as human beings, are not uniform and are sometimes unpredictable. However, it does not release controllers and managers from the necessity to recognise the impact of sustainable results on reactions of those stakeholders who have been identified to be of key importance to company's operations, e.g. customers, employees, local authorities or shareholders.

In Table 10.8 there are listed examples of measures and indicators concerning reactions of stakeholders as an element of the causal system of measures and indicators of sustainable development.

Table 10.8. Examples of measures and indicators of reactions of stakeholders

- share of loyal customers
- > number of complaints and lawsuits from business partners
- assessment by points of the corporate image
- number of received reports on sustainable development
- assessment by points of employee satisfaction
- personnel turnover
- duration of phone calls in the area of product use
- share of sales with the use of word-of-mouth marketing
- number of job applications
- number of shareholders
- number of employees coming forward to social voluntary service
- > assessment by points of company's compliance in terms of the environment

Source: author's study.

Financial results are the final element of the causal system of measures and indicators of sustainable development provided that a company does not perceive certain results in the area of society or the natural environment as the ultimate goal included in a company's strategy.

In Table 10.9 there are listed examples of measures and indicators concerning financial results as an element of the causal system of measures and indicators of sustainable development.

 Table 10.9. Examples of measures and indicators of financial results of sustainable development

- Economic Value Added
- return on equity
- return on total sales
- return on sales of green products
- revenues from total sales
- ▶ revenue per employee
- share of green products in total sales
- revenues from recycled materials
- cost of electricity consumption
- cost of removing soil pollution
- cost of recruitment of employees

Source: the author's own work.

Measures and indicators of financial results of sustainable development should reflect both short-term and long-term outcomes of sustainable results and reactions of investors. When choosing an appropriate set of measures and indicators of financial results, one should also keep in mind that some of them arise directly from ongoing processes of sustainable development, for example, revenues from recycled materials or costs of removing soil pollution are a direct outcome of activities taken in the area of environmental protection, while other measures and indicators, e.g. return on total sales, result from many cause-and-effect outcomes. A correct set of measures and indicators should refer to both overall and detailed financial results relevant to controlling processes of a company.

10.7. Integrated Measurement Tools in Green Controlling

The development of a set of measures and indicators in green controlling should be based on the identification of cause-and-effect relationships of sustainable development of a company. Each element forming a web of relations should be expressed numerically with the use of appropriate measures and indicators. During the development of such a system of measures and indicators, readymade tools may be of help, among which the following three are especially worth mentioning:

- Sustainable Du Pont Model,
- Sustainability Balanced Scorecard,
- ▶ London Benchmarking Group Model (LBG Model).

Return on equity is one of the most important indicators for the assessment of a company's operation, because it is closely related to the growth in company's value, and this value is a widely recognised objective of company's activities in a market economy [Nowicki 2010]. In the Du Pont Model, return on equity is subjected to disaggregation into three factors that have the nature of stimulants, which means that an increase in each of them is associated with an increase in return on equity⁹. The classic Du Pont Model is expressed according to the following formula [Hamrol 2010]:

$$\frac{return}{on \ equity} = \frac{net \ profit}{equity} = \frac{net \ profit}{sales} \cdot \frac{sales}{assets} \cdot \frac{assets}{equity}.$$
 (10.1)

⁹ This is a simplified approach not reflecting characteristics of a financial leverage, which may have both positive and negative impact on return on equity.

The factors presented in the formula are, respectively:

- net return on sales,
- asset productivity (turnover),

▶ asset financing structure expressed in the form of the so-called equity multiplier.

The sustainable Du Pont Model is a modification of the classic Du Pont Model, highlighting social and environmental aspects of sustainable development of a company. Its essence lies in further disaggregation of factors so as to reflect the impact of social and environmental aspects on return on equity.

Figure 10.4 presents an example of disaggregation of net return on sales of a company, emphasising the incurred environmental costs. In order to consider environmental aspects, a detailed disaggregation of the Du Pont Model may consist of even several dozens of factors [Piñeiro and Romero 2006].



Fig. 10.4. Example of disaggregation of the Du Pont Model considering environmental aspects Source: author's study.

Based on the Du Pont Model, it is also possible to determine eco-efficiency as profitability of environmental resources, according to the following formula [Figge and Hahn 2013]:

$$\begin{array}{l} profitability of\\ environmental resources \end{array} = \frac{net \ profit}{environmental \ resources} \\ = \frac{net \ profit}{sales} \cdot \frac{sales}{equity} \cdot \frac{equity}{environmental \ resources}. \tag{10.2}$$

The presentation of eco-efficiency as profitability of environmental resources allows one to notice that in order to obtain tangible results of activities, a company uses not only equity but also environmental resources. When caring for lesser use of environmental resources, the company increases its eco-efficiency.

The Balanced Scorecard is a strategic management tool that combines the system of measures and indicators of results of company's activities with its strategy [Epstein and Buhovac 2014], based on four fundamental assumptions:

- ▶ focus on strategic issues,
- link between strategic and operational actions,
- use of a small number of measures and indicators,
- use of financial and non-financial data.

The Balanced Scorecard does not include the entirety of operations of the organisation, but it refers only to key processes and operation areas of a company, thanks to which it is a simple and practical tool. It also worth noting that for the Balanced Scorecard, cause-and-effect relationships occurring between different activities are of special importance [Kochalski 2011]. Another feature of this tool proving its usefulness in terms of planning and control of social and environmental development of companies is the fact that it does not focus solely on financial data.

The classic scorecard consists of four perspectives that are associated with vision and strategy:

▶ financial perspective, which defines financial consequences of company's activities,

• customer perspective, which presents aspects of creating value for the customer,

▶ internal process perspective, which determines issues relating to key processes of a company,

• learning and growth perspective, which shows issues relating to company's resources.

Figure 10.5 shows a diagram of the classic Balanced Scorecard, including four perspectives.


Fig. 10.5. Balanced Scorecard

Source: author's study based on [Urbanowska-Sojkin, Banaszyk and Witczak 2004].

In the case of each of the presented perspectives there should be considered strategic objectives, measures and indicators, tasks and undertaken initiatives which are a reflection of vision and strategy. In accordance with the concept of Balanced Scorecard, the presented perspectives and their elements should be shown as a map of cause-and-effect relationships.

The Balanced Scorecard in its classic form, has not been developed for the needs of sustainable development of a company; therefore, it requires modification in order to use it to achieve strategic economic, social and environmental objectives. To this end, companies can use the following solutions:

▶ take into account strategic objectives, measures and indicators, tasks and initiatives concerning sustainable development in all four perspectives of the Balanced Scorecard,

• transform the customer perspective into a stakeholder perspective in which aspects of sustainable development will be particularly emphasised [Epstein and Buhovac 2014],

▶ add the fifth perspective, as a social and environmental perspective¹⁰. Such a solution should be used primarily by companies whose strategy is based on sustainable development.

¹⁰ Epstein and Bukovac [2014] propose adding the fifth perspective as a perspective taking into account economic, social and environmental aspects. However, such a solution would cause problems with distinguishing in practice the new perspective from the financial perspective.

Aside from the Sustainable Du Pont Model and Sustainability Balanced Scorecard, another tool which supports green controlling is the London Benchmarking Group Model. This model, developed by the Corporate Citizenship organisation in the UK, is a standard for measuring and presenting efficiency of a company in the area of sustainable development. The LBG Model allows one to measure in a holistic manner inputs, outputs and impacts of undertaken involvement in the social and environmental area. The essence of the model is the standardisation of effectiveness measurement of socially responsible activities, due to which it can be used to assess sustainable development compared to competitors or the industry.

In Figure 10.6 is presented the conceptual framework of the London Benchmarking Group Model (LBG Model).



Fig. 10.6. Conceptual framework of the London Benchmarking Group Model

Source: author's study based on [Corporate Citizenship 2014].

London Benchmarking Group Model determines standards for measurement and presentation of inputs, outputs (activities) and impacts (results). In respect of inputs, a company applying the model should determine their type (cash resources, time, physical resources, know-how), motivation for undertaking selected initiatives and their recipients, along with the geographical range of their influence. Outputs are a direct consequence of incurred inputs and lead to achieving measurable impacts in the form of intended changes in the social, environmental and business area, expressed by all sorts of measures and indicators¹¹.

¹¹ An exemplary activity expressed with the use of a measure may be the number of employees participating in training devoted to arranging their free time. A measurable result of such an activity, in turn, can be the number of employees who experience change in satisfaction with how they spend their free time.

10.8. Final Remarks

The application of the correct approach to the development of a system of measures and indicators of sustainable development by controlling services is one of conditions for the proper formation and coordination of processes of planning, control and providing information, aimed at managing the whole company from the point of view of sustainable objectives.

The development of a system of measures and indicators in green controlling should be based on the identification of cause-and-effect relationships occurring between economic, social and environmental objectives, both in operational and strategic dimensions. The chapter presents not only many theoretical aspects, but also a number of examples of measures and indicators. The presented issues allow one to properly develop a system of measures and indicators or use ready-made solutions with respect to integrated measurement tools in green controlling.

11.1. Introductory Remarks

Growing human concern for the environment and its excessive exploitation have caused that managers of companies have focused their attention on designing green products and services, as well as business processes less harmful to the environment.

The issue of eco-development, which is identified in this textbook with sustainable development of a company, includes not only environmental but also social problems. Due to the complexity of both issues and intention to consider in detail the problem of eco-development from the perspective of business entities, the chapter focuses on the problem of determining of environmental costs incurred by companies and their appropriate recognition in green accounting.

Environmental costs are becoming increasingly important in cost accounting of modern companies. This is caused by both the fact that governments of individual countries tighten environmental standards in the form of legal regulations and attention paid to the image of a company in the eyes of more and more environmentally-friendly customers.

Environmentally-friendly activity of a company is associated with undertaking multiple initiatives and projects which engage resources from many functional areas of the company. These projects may relate to specific products, processes, product groups, operations, regions, and they may also affect the entire business of the company.

Multiple aspects of an environmentally-friendly activity present a challenge to managers with respect to the development of green accounting that will be able to reflect the complexity and multiple dimensions of incurred environmental costs and allocate properly these costs to particular products, product groups and customers.

The purpose of this chapter is to present the essence of green accounting and the use of the concept of resource and process consumption accounting (RPCA) as a basis for the green accounting system.

11.2. Place of Green Accounting in the Environmental Accounting System

The concept of environmental accounting and related environmental costs has been widely discussed in literature on the subject. This issue is addressed by global organisations of accountants [IFAC 2005], associations of specialists in the area of management accounting [IMA 1996], as well as foreign authors, for example [Gray, Owen and Maunders 1991; Gauthier et al. 1997; Bartolomeo et al. 2000; Schaltegger et al. 2003) and Polish authors (for example, Burzym 1990; Szadziewska 2006, 2013].

As regards Poland, the issue of environmental accounting is a relatively new concept, and it requires conducting theoretical and empirical research in this area.

The main task of environmental accounting is to reflect accurately and faithfully the course and results of the company's operation in terms of its impact on the natural environment, as well as to inform about results of conducted activities in the sphere of protection of this environment. This requires systematic identification, measurement, analysis, and interpretation of information on environmental aspects of the company's activities, which should allow the company to assess them in terms of both internal rationality and social responsibility [Szadziewska 2013, pp. 143 and 149]. The task so formulated poses challenges to the environmental accounting system in terms of meeting the information needs of internal and external users and enables the division of environmental accounting into two sub-systems [Schaltegger et al. 2003 p. 259]:

 environmental financial accounting oriented towards external reporting, and

• environmental management accounting oriented towards meeting internal information needs of managers.

Both of these sub-systems of environmental accounting are supplied with information flowing from green accounting. Green accounting is a narrower concept and is part of the broader environmental accounting system. The basic tasks of green accounting are as follows [Szadziewska 2013, p. 150]:

• determination of the volume of natural resource consumption,

• determination of the impact of the amount of environmental costs on product prices and the financial results,

• assessment of the effectiveness of conducted protective activities,

• determination of the amount of charges on account of using or polluting the environment (for the purpose of determining fees and taxes of environmental nature),

• estimation of costs associated with the removal of environmental damage,

▶ management of costs resulting from the company's impact on the environment.

It should be noted that the tasks so formulated with respect to green accounting orient the same towards meeting the needs of both external and internal recipients of information.

In environmental cost accounting there are recognised costs incurred by the company in connection with the exploitation of the environment, as well as projects aimed at its protection. The basic division of environmental costs is their division into internal and external costs [Schaltegger and Burritt 2000, pp. 94–102; Gale and Stokoe 2001, p. 122; Gajda 2002, p. 26; Graczyk 2004, p. 8; Szadziewska 2006, p. 147; 2013, p. 160].

The first group of environmental costs includes internal costs. These costs are associated with prevention, removal, planning, control and repair of damage, as well as avoiding any other environmental losses caused by activities of the company. Among internal environmental costs incurred by companies there should be distinguished¹:

▶ operating costs of the so-called "end of pipe" projects, i.e. concerning neutralisation and reduction of already produced pollution²:

- costs of depreciation, operation, servicing and maintenance of equipment not affecting the production process (production can be carried out without these devices), but reducing or eliminating pollution after it has been generated, for example, sewage treatment plants, landfills, waste incineration plants,

¹ Cf.: [Gajda 2002, p. 26; Szadziewska 2006, p. 152; 2013, p. 170]; the Central Statistical Office (CSO) – explanations to questionnaire OS 29/k for 2014 on current costs incurred for environmental protection).

 $^{^{\}rm 2}\,$ According to explanations of the CSO to the questionnaire OS 29/k for 2014, these costs are entirely included in environmental costs.

devices reducing the amount of dust and gas in waste gases, systems for collection and recovery of steam, noise barriers, embankments, noise muffling windows, acoustic insulation of equipment, soundproofing structures, etc.,

- costs of own transport of waste,

– costs of all activities aimed at reduction in pollution in the environment (e.g. excavation and neutralisation of waste, degassing and leaching of pollutants),

 – cost of reconstruction activities with respect to landscape and species (e.g. restitution of mining areas and excavations, restoration of endangered species of fauna and flora, etc.)

▶ operating costs of pollution prevention projects – costs of integrated technologies³,

– additional costs of depreciation, operation, servicing and maintenance of anti-pollution devices (it applies to devices (technologies) that constitute the whole or part of the production process and are adapted to reduce the quantity and quality of pollution generated in the production process). These include, among other things, devices for reuse of exhaust, replacement of technologies with those that enable the use of environmentally-friendly materials and plastics, replacement of technologies with those that are more expensive but produce less gas pollution released into the air, replacement of suction pumps with vacuum pumps, steam replacement systems, replacement of water cooling systems with air cooling systems, low- and non-waste technologies etc.,

 – cost of measures to prevent pollution of soil, as well as surface and ground water,

 – current costs relating to protection of species and ecosystems, legally protected areas and natural objects, as well as aesthetic values,

– costs of implementation of modern environmental management systems [ISO 14001], EMAS,

• costs of research and development concerning reduction in the environmental impact of the company,

▶ costs of control, monitoring, and laboratory studies relating to environmental protection,

³ According to explanations of the CSO to the questionnaire OS 29/k for 2014, these costs are partially included in current costs of environmental protection. These are additional costs compared with operating costs of alternative technologies not taking into account environmental aspects.

▶ other costs such as costs of administration, creation and maintenance of environmental information systems, preparation of environmental permits, registration and certification of environmental management systems, education and information in the field of environmental protection.

The second group of environmental costs includes external costs. These costs are related to environmental degradation and the company's impact on human health and the quality and expectancy of human life. Initially, external costs have not been reflected in cost accounting of companies; however, over time, they have been internalised in the form of taxes and environmental fees. This approach has caused that external costs are reflected in green accounting. Among environmental fees and taxes of environmental nature applicable in Poland there should be distinguished [Kryk, Kłos and Łucka 2011]:

• environmental fees, including

 fees for the use of the environment, e.g. for releasing gases and dusts into the air, water consumption, discharge of sewage into water and soil, and waste storage,

 other fees, e.g. for mining activities and activities relating to protection of agricultural and forest land or on account of trading in pollution emission allowances,

– product fees, e.g. for packaging, batteries, lubricating oils, electrical and electronic equipment, and recycling of vehicles,

- deposit fees,

- environmental fees of punitive nature,

▶ taxes of environmental nature (VAT and excise duty).

The tasks of green accounting presented in the chapter, considerable diversity of internal and external environmental costs, the need to specify additional (incremental) costs resulting from environmentally-friendly activities, evaluation of costs of carried out environmental projects and a desire to accurately allocate these costs to products, services and customers require the adoption of a systematic and comprehensive approach in terms of identifying, collecting, and processing, as well as presenting and interpreting information about environmental costs⁴.

In order to meet the challenges placed before green accounting, companies use various concepts of cost accounting, for example, traditional cost accounting, American activity-based costing (ABC), German *Grenzplankostenrechnung*

⁴ Cf. [Świderska 2010, p. 25].

(GPK) or recently developed advanced costing methodologies the essence of which is to integrate assumptions of ABC and GPK in one advanced costing system.

Traditional cost accounting focuses on the calculation of production costs and determination of the company's financial results. The approach applied in this type of cost accounting results in the overall recognition of indirect production costs, as well as sales and management costs, which makes it difficult to precisely extract from the scope of these costs their part which relates to environmentally-friendly activities of the company.

Activity-based costing is oriented towards more accurate allocation of costs to the company's products and customers seen from the angle of production and sales activities carried out to their benefit. Assumptions of ABC provide a basis for the calculation of costs of activities constituting environmentally-friendly projects undertaken in the company; however, the presented approach to the recognition of costs of resources, assuming the requirement to account for all costs of activities, does not provide a basis for sufficiently detailed determination of environmental costs (especially those external ones) and their direct attribution to individual products and services.

Resource-based recognition of costs, in turn, is typical of German *Grenzplankostenrechnung*. This approach makes it possible to recognise various types of environmental costs and properly attribute them directly to particular products and services. However, this costing does not address the problem of the calculation of costs of activities, which results in the lack of assumptions for determining costs of environmental projects involving organisational resources of the company.

The signalled problems in conducting green accounting are met by the concept of resource and process consumption accounting. This type of cost accounting provides assumptions for the recognition of environmental costs and their direct allocation to products and services, as well as guidelines for the calculation of costs of environmental projects involving organisational resources from different functional areas of the company.

In the following part of this chapter there will be presented the application of the concept of resource and process consumption accounting (RPCA) as a basis for green accounting.

11.3. Resource and Process Consumption Accounting (RPCA) as a Basis for Green Accounting

11.3.1. Structure of Resource and Process Consumption Accounting (RPCA)

Resource and Process Consumption Accounting (RPCA) is part of the latest global trend in research on cost accounting, the essence of which is the integration of German *Grenzplankostenrechnung* (GPK) and American Activity Based Costing (ABC) within the framework of single resource-and-process-based costing.

Today, the integration of these two concepts of cost accounting is researched globally. Attempts to link GPK and ABC are presented in the USA under the name Resource Consumption Accounting (RCA) [Keys and van der Merwe 2001] and in Germany under the name *Prozesskonforme Grenzplankostenrechnung* [Müller 1994]. Studies on the resource-and-process-based approach to cost accounting are also carried out in Poland, where they are presented under the name *zasobowo-procesowy rachunek kosztów* (Zieliński 2014).

Resource and process consumption accounting (RPCA⁵) has been defined as systematic and comprehensive management cost accounting which integrates assumptions of German *Grenzplankostenrechnung* (GPK) and American Activity Based Costing (ABC), processing financial and non-financial data, according to strictly defined rules, into management information about costs of resources and processes, as well as costs and profitability of products, services, and customers, presented in a multi-dimensional way with maintaining divisibility of cost information in terms of both actual and planned costs necessary to support short-, medium- and long-term decisions at all management tiers of the company [Zielinski 2014, p. 84].

RPCA is a combination of detailed information on resources, their costs and usage (GPK) with information on costs and effectiveness of activities and processes (ABC), made in a manner ensuring cause-and-effect allocation of costs to products, services and customers, as well as high interpretation quality of costing information.

 $^{^5}$ The purpose of adopting the name Resource and Process Consumption Accounting – RPCA is to distinguish this type of cost accounting from Resource Consumption Accounting – RCA, which is also an attempt to combine GPK and ABC within the framework of single cost accounting.

RPCA is cost accounting that has already been successfully implemented in several dozen Polish companies of production, service and trade industries. This type of cost accounting has been implemented in large and medium, as well as small companies. Extensive application of this type of cost accounting in various industries and sizes of companies indicates its versatility and potential for use in controlling processes of many organisations.

The structure of resource and process consumption accounting presented in Figure 11.1 shows that this concept involves the multi-stage allocation of costs between twelve types of objects, which are organised in four main categories: resources (resource cost centres), activities, cost objects and direct costs. These objects are connected through eleven relationships based on three main types of cost drivers: resource cost drivers (relationships no. [1], [3], [5], [9] and [10]), activity cost drivers (relationships no. [2], [4] and [6]), and cost object cost drivers (relationships no. [7], [8] and [11]). These relationships reflect the allocation of costs in RPCA, from resource cost centres and direct costs to final cost objects of products, services and customers.



Fig. 11.1. Structure of resource and process consumption accounting (RPCA)

Source: [Zieliński 2014, p. 88].

The purpose of the approach to defining objects and relationships between them developed under RPCA is to provide complete, financial information at all management tiers of the company while maintaining divisibility of cost levels⁶. The adopted assumptions allow one to recognise costs of a given level as relevant or irrelevant cost in terms of making a specific decision and use of RPCA in making short-, medium- and long-term decisions.

The issue of environmental costs is reflected in cost accounting aspects concerning resources, processes and cost objects, which allows one to use the concept of RPCA as a basis for green accounting.

On the one hand, environmental costs, as defined elements of internal and external environmental costs, are recognised in the resource part of RPCA (e.g. taxes and fees for exploitation of natural resources, environmental product fees, costs of equipment modernisation, costs of employee training in the area of ecology and environmental protection, costs of employees responsible for environmental aspects, or costs of environmental audits). On the other hand, companies carry out activities for the protection of the environment (e.g. preventive, modernisation, protective, and administrative activities) and implement environmental projects (the process part of RPCA), under which they engage and consume resources from different functional areas. These activities often involve engagement of employee teams, equipment, as well as production and laboratory devices from various organisational units, and calculation of costs of these activities requires collecting data on the use and consumption of resources.

An increase in the level of environmental costs on both resource and process (project) sides is also reflected in the cost object (results) part of RPCA, where environmental costs are presented on appropriate cost levels and lower profitability of adequate products, product groups, customers, customer segments, or the entire company.

The application of the concept of indirect cost objects (ICO) enables the separate identification of costs of individual projects relating to environmental protection in RPCA, and their further allocation to specific products, services and

⁶ The divisibility of cost levels under RPCA is based on "five basic levels of costs" and enables the separation of cost information arising from a specific management level of products and customers of the company. The basic cost levels are as follows: product level costs (costs of manufacturing products / services), product group level costs (general costs of maintaining product groups), customer level costs (costs of servicing of and selling to the customer), customer segment level costs (general costs of maintaining customer segments) and company level costs (general and administrative costs of the company) [Zielinski 2014, p. 166].

customers. The calculation of costs of projects occurs through the allocation of resource costs directly associated with a given project (e.g. used materials, specialised third party services, environmental fees) and costs of activities carried out by internal resources of the company to those projects.

Figure 11.2 presents a simplified concept of costing of a hypothetical environmental project "Air protection against emission of dust and gas pollution relating to the production of products of Group A" with the use of assumptions of RPCA. The presented example shows that the problem of extracting environmental costs for an environmental project is of complex nature and requires both an appropriate approach to collecting cost and calculation of full cost of the project. Moreover, the purpose of the example is also to show the scope of information provided by the RPCA concept and potential managerial applications of green accounting organised in this manner.



Fig. 11.2. Concept of using RPCA in the calculation of costs of an environmental project – example Source: author's study.

The determination of costs of an environmental project starts with recording cost elements (depreciation, salaries, materials, third party services, etc.) within the framework of (both primary⁷ and secondary) resource cost centres⁸. In the example, the resource cost centres are individual types of mechanical and spray absorbers, employee teams, measurement and research services, environmental fees, electricity, and buildings. Cost elements assigned to individual resource cost centres make up the amount of direct costs of these resources.

In the second step, the allocation of costs of secondary resources takes place with maintaining the distinction between shared resources⁹ (relationship no. [3] in Figure 2) and resources performing internal services and relationship no. [4] marked in Figure 2). As a result of this allocation, indirect costs resulting from the use and consumption of shared resources (electricity and buildings) and performed internal services (secondary activities – repairs, preventive inspections, human resources services) are added to direct costs of primary resources. This approach enables the determination of full costs of resources involved in an environmental protection project and reflection of engagement of supporting (auxiliary) organisational units in environmental projects.

The next step is the allocation of fully burdened costs of primary resources to primary activities¹¹ of environmental projects (relationship no. [1] for primary resources in Figure 2). As a result, costs of activities are calculated¹² (in the example: mechanical absorption of gases and dusts, spray absorption of gases and dusts, supervision of environmental projects) taking into account costs of all the resources directly and indirectly involved in the environmental activities. The presented approach to the calculation of costs of activities enables more accurate determination of environmental costs and reflection of costs of engagement of all organisational units (even those only partially involved in projects for the protection of the environment).

⁷ Primary resources from the point of view of a given environmental protection project.

 $^{^{\}rm 8}\,$ More on the subject of resource-based recognition of environmental costs in RPCA can be found in the following section of this chapter.

 $^{^{\}rm 9}\,$ Shared resources are by direct consumption by other resources and their costs are allocated to other resources in a single step.

¹⁰ Resources performing internal services – their costs are allocated to other resources in two stages through objects of secondary activities.

¹¹ Primary activities from the point of view of a given environmental protection project.

 $^{^{\}rm 12}\,$ More on the subject of process-based recognition of environmental costs in RPCA can be found in the following section of this chapter.

The next step is the calculation of total costs of a given environmental protection project (in the example in Figure 2: air protection against emission of dust and gas pollution relating to the production of products of Group A) by accounting for primary activities (relationship no. [2] for primary activities in Figure 2) and primary resources (relationship no. [5] in Figure 2). As a result, the total cost of a given project includes costs of performed activities and primary resources (including costs of secondary resources contained therein). This approach enables more precise determination of costs of engagement of all corporate resources in a specific environmental project.

A separate calculation of costs of each environmental project also enables more accurate attribution of costs to specific products, services and customers. This is accomplished in RPCA through the allocation of project costs to specified products (in the example, the allocation is made to products of Group A – relationship no. [7] in Figure 2) and then to buyers of these products (relationship no. [8] in Figure 2). The level of detail of the recognition of environmental projects enables more precise attribution¹³ of their costs to relevant products and product groups and, as a result, more accurate determination of their costs for the purpose of determining their selling prices, and a profitability analysis of the products and customers¹⁴.

11.3.2. Resource View of Environmental Costs

In RPCA, resource costs are organised in the so-called resource cost centres¹⁵. The concept of resource cost centres is applied in both German *Grenzplankostenrechnung*¹⁶ [Lere and Portz 2010, p. 47; Smith 2005, p. 38; Sharman 2003, p. 32], as well as Resource Consumption Accounting based thereon¹⁷ [IFAC 2009, p. 17; Ahmed and Moosa 2011, p. 761; Clinton and Webber 2004, p. 3; Benjamin and Simon 2003, p. 21].

¹³ The concept of attributability is applied in RPCA [Zielinski 2014, p. 108].

¹⁴ More on the subject of final presentation of environmental costs in RPCA can be found in the following section of this chapter.

¹⁵ Because of the practice of using the term "cost centre" as an object on which costs are collected (accounted), applied by Polish companies and finance and accounting systems used therein, the term "resource cost centre" has been adopted so as to clearly emphasise the level of detail of cost accounting that takes place in RPCA.

¹⁶ In GPK, the term "cost centre" (*Kostenstellen*) is used.

 $^{^{\}rm 17}\,$ In RCA, the term "resource pool" is used.

Resource and process consumption accounting (RPCA) treats resources as the first costing object and, for their purpose, resource cost centres are created. Resources in this sense are, for example, particular employee teams, groups of homogeneous machines, particular types of materials, fees, or services, etc. As in the case of GPK and RCA, the basic criterion for the defining of resource cost centres is homogeneity. Homogeneity is defined as a characteristic of one or more resources or inputs of similar technology or skill that allow for their costs to be governed by the same set of determinants and in an identical manner [Clinton et al. 2012, p 57].

Resource view of environmental costs requires adopting a particular approach to collecting these costs in resource cost centres. The aim of such detailed recognition of environmental costs is to ensure their transparency for the purpose of allocating them and managing the level of environmental costs.

Table 11.1 presents an example of RPCA resource view of environmental costs.

	"End of pipe" devices	Costs included in environmental costs			
Resource Cost Centres	Sewage treatment plant	Entire costs of depreciation, operation, servicing and maintenance of the devices along with costs of shared resources (e.g. energy, buildings) and internal services of the company (e.g. repair services)			
	Landfill				
	Waste incineration plant				
	Steam recovery system				
	Spray absorbers				
	Mechanical absorbers				
"End of pipe" external services		Costs included in environmental costs			
Resource Cost Centres	Measurement and research services	Entire costs of the services			
	Waste neutralisation services	along with costs of internal services of the company relating to the organisation of commissioned works			
	Pollutant leaching services				

Table 11.1. Example of RPCA resource view of environmental costs

	Environmental Protection Teams (labour)	Costs included in environmental costs	
urce entres	Environmental Protection Team	Entire or partial costs relating to the labour intensity of conducted environmental activities and projects	
Reso Cost C	Team for ISO 14001		
Produc	tion resources (included in pollution prevention projects)	Costs included in environmental costs	
	Production Line No. 1	Additional costs of depreciation, servicing and maintenance of devices along with costs of shared resources (e.g. energy, buildings) and internal services of the company (e.g. repair services) caused by environmental projects	
Resource Cost Centres	Production Line No. 2		
	Production Line No. 3		
	Packaging devices		
	Team of line operators		
	Team of packers		
	Environmental fees	Costs included in environmental costs	
Resource Cost Centres	Fees for emission of gases and dusts to the air	Entire costs arising from environmental fees	
	Water consumption fees		
	Waste storage fees		
	Product fees – Product Group No. 1		
	Product fees – Product Group No. 2		
	Product fees – Product Group No. 2		

Source: author's study.

The resource cost centres indicated in the table have been defined for individual homogeneous types of devices, employee teams, external services, and environmental fees.

As part of the presented resource cost centres there are also listed costs centres of primary resources presented in the example in Figure 11.2 (e.g. absorbers, employee teams). It should be noted that the indicated resource cost centres can be recognised in costs of production, ancillary, sales, as well as general depertments of the company. It means that environmental costs are incurred in different areas of the company's operation. The resource view approach to the recognition of costs enables, in the first place, the precise determination of the direct costs of resources (e.g. depreciation, salaries, external services, use of materials, etc.) and, secondly, adding costs of secondary resources thereto (electricity, buildings, repair teams, human recourses personnel). The cause-and-effect reflection of interdependences between resources (allocation of costs of secondary resources to primary resources) allows one to determine the full costs of resources engaged in environmental protection. The level of detail in the determination of resources enables their more precise allocation to environmental activities and projects and, as a result, to relevant products, services and customers.

11.3.3. Process View of Environmental Costs

The application of Activity Based Costing (ABC) in green accounting is mentioned by both foreign authors [IMA 1996, p. 14; Capusneanu 2008, p. 58; Tsai, Lin and Chou 2010, p. 187; Domil, Peres and Peres 2010, p. 719; Moorthy and Yacob 2013, p. 6] and Polish authors [Szadziewska 2013, p. 219]. They argue that the costing of activities in green accounting will enable more accurate determination of environmental costs incurred by companies, and their allocation to products, services and customers. RPCA also applies assumptions of this costing but adopts its own definition that an activity is a homogeneous, identifiable and measurable part of work performed by specific resources for the purpose of achieving countable outputs [Zieliński 2014, p. 153]. Maintaining cause-and-effect relationships in RPCA requires defining activities in detail, in a way that allows one to carry out the measurement of the number of completed activities (or their outputs) and their duration, as well as to identify resources engaged in performing these activities. The presented approach to the identification of activities results in defining a relatively large number of homogeneous and precisely defined activities, which considerably improves the accuracy of costing and increases interpretation quality of managerial information.

Table 11.2 presents an example of RPCA process view of environmental costs. The activities indicated in the table have been defined for individual environmental projects, including for environmental projects shown in Figure 11.2 (mechanical absorption of gases and dusts, spray absorption of gases and dusts, supervision of environmental projects).

	· · · · · · · · · · · · · · · · · · ·			
	Activities of project no. 1	Costs included in environmental costs		
	Collection of waste from production buildings			
	Transport of waste to a landfill	Frein and of the activities		
vities	Waste unloading			
Activ	Waste sorting	Entire costs of the activities		
	Incineration of waste			
	Storage of other waste at the landfill			
	Activities of project no. 2	Costs included in environmental costs		
es	Mechanical absorption of gases and dusts			
ctiviti	Spray absorption of gases and dusts	Entire costs of the activities		
A	Supervision of environmental projects			
	Activities of project no. 3	Costs included in environmental costs		
ties	Steam recovery	Entire costs of the activities		
Activi	Transport of steam in pipelines			
	Activities of project no. 4	Costs included in environmental costs		
Activities	Updating of environmental documentation	Entire costs of the activities		
	Preparation of materials for audits			
	Conducting of internal audits			
	Internal training of employees			

Table 11.2. Example of RPCA process view of environmental costs

Source: author's study.

The use of activity objects in green accounting allows one to determine environmental costs resulting from the engagement of resources from different functional areas of the company in these activities, including those resources that are only partially or indirectly involved in environmental projects of the company.

The RPCA approach thanks to the detailed identification of activities enables an increase in accuracy and more precise allocation of costs of activities to individual environmental projects and, consequently, allocation of these costs to relevant products, services and customers. Furthermore, the use of process-based costing creates an opportunity to rationalise costs of environmental activities through their improvement, as well as prevention, elimination or outsourcing.

11.3.4. Cost Object View of Environmental Costs

The basic RPCA cost and profitability presentation concept is the hierarchy of costs based on the concept of "five basic cost levels". This hierarchy is also used to present environmental costs. Table 11.3 presents an example of the attribution of environmental costs to cost levels (at the level of product group costs, it also includes costs of the environmental project shown in Figure 2¹⁸). The hierarchy of costs is achieved through the concept of attributability¹⁹, which assumes the allocation of costs to such a level on which they are considered to be relevant to making decisions. The previous considerations concerning environmental projects have shown that environmental costs can be presented in result terms on different levels of product and customer management of the company.

The adopted assumptions allow one to recognise costs of a given level as relevant or irrelevant costs in terms of making a specific decision and presentation of environmental costs on appriopriate hierarchy levels of products and customers.

Some companies underestimate environmental costs relating to specific products or product groups because they treat these costs as general costs of the company [Moorthy and Yacob 2013, p. 4, Szadziewska 2013, p. 219]. This approach may be caused by the lack of a structured approach to the recognition of these costs, and the application of traditional and arbitrary costing methodologies. The underestimation of costs of products carries the risk of incorrect determination of selling prices, generation of losses, and even making wrong strategic decisions concerning the future structure of the product portfolio. In order to prevent such situations, an appropriate level of detail of costing and appropriate assumptions as regards the allocation of costs to levels of the hierarchy of products and customers are required. The application of the concept

¹⁸ The recognition of these costs on the product group level can be justified by the fact that the environmental project presented in Figure 2 was undertaken solely in connection with products of a particular product group.

¹⁹ Attributability is understood as responsiveness of inputs to decisions that change the provision and/or consumption of resources [Clinton et al. 2012, p. 53].

of attributability, as well as indirect and final cost objects in RPCA enables appropriate allocation of project and environmental costs and their presentation on the level of relevant products, product groups or on the level of the company.

Table 11.3. Example of attribution of environmental costs to cost levels				
	Environmental costs of the product level, including			
	Environmental product fees for packaging of Product 1			
	Environmental product fees for packaging of Product 2			
Product Level	Other environmental product fees for Product 3			
	Other environmental product fees for Product 4			
En	vironmental costs of the product group level, including			
	Air protection against emission of dust and gas pollution relating to the production of products of group A			
Product Group Level	Neutralisation, incineration and storage of waste relating to the production of products of Group \ensuremath{B}			
	Purification of sewage sludge relating to the production of products of Group C $$			
	Environmental costs of the customer level, including			
Customer Louel	Costs of changes of sales and distribution processes caused by Customer A			
Customer Lever	Costs of changes of sales and distribution processes caused by Customer B			
Environmental costs of the customer segment level, including				
Customer	Costs of environmental campaign in region 1			
Segment Level	Costs of environmental campaign in region 2			
Environmental costs of the company level, including				
	Maintenance of acoustic protection devices			
	Maintenance of devices protecting against ionising radiation			
Company Level	Decontamination of soil around the production site			
	Costs of maintaining the ISO 14001 system			
	Costs of prevention of air and soil pollution			

Source: author's study.

The culmination of deliberations presented in the chapter is a report on total costs of an environmental project. Table 11.4 presents costs incurred in connection with the implementation of the environmental project presented in Figure 11.2 (i.e. Air protection against emission of dust and gas pollution relating to the production of products of Group A). It should be emphasised that costs of the project in result terms (analysis of costs and profitability) are available only on the level of the product group "A" or its component products, and they do not affect costs and profitability of other product groups.

environmental protection				
Project	Activities	Resources	Resource Cost Elements	Cost
1	2	3	4	5
to production of	Mechanical absorption of gases and dusts	Mechanical absorbers	Direct cost elements	PLN 20,600
			Depreciation	PLN 17,000
			External repair services	PLN 3,000
			Insurance	PLN 600
atinç			Indirect cost elements	PLN 9,100
ind gas pollution rel of Group A			Electricity	PLN 3,100
			Buildings	PLN 1,400
			Internal services – Repairing	PLN 4,600
			Direct cost elements	PLN 5,700
dust a ucts			Depreciation	PLN 4,000
Air protection against emission of c prod			Materials – spare parts	PLN 1,300
	Soray		Insurance	PLN 400
	absorption Spray of gases and absorbers dusts	Spray absorbers	Indirect cost elements	PLN 8,000
			Electricity	PLN 1,200
			Buildings	PLN 800
			Internal services – Repairing	PLN 4,600
			Internal services – Preventive inspections	PLN 1,400

Table 11.4. Example of resource and process view of costs of a project for environmental protection

1	2	3	4	5
s of Group A	Supervision of	Environmental Protection Team	Direct cost elements	PLN 7,700
			Salaries	PLN 5,600
			Benefits for employees	PLN 1,900
			Office supplies	PLN 200
oduc			Indirect cost elements	PLN 600
of pr			Buildings	PLN 400
ction			Internal services – Payrol processing	PLN 200
rodu	environmental		Direct cost elements	PLN 16,800
g to p	projects		Salaries	PLN 12,000
latin			Benefits for employees	PLN 3,600
on re		Team for ISO	Office supplies	PLN 400
olluti		14001	External training	PLN 800
gas p			Indirect cost elements	PLN 1,200
and			Buildings	PLN 800
dust			Internal services – Payrol processing	PLN 400
on of	Project direct cost	Measurement and research services	Direct cost elements	PLN 3,400
Air protection against emissio			Third party measurement and research services	PLN 3,400
			Indirect cost elements	PLN 1,200
			Internal services – Supervision of the performance of services	PLN 1,200
		Fees for emission of gases and dusts to the air	Direct cost elements	PLN 15,700
			Taxes and fees	PLN 15,700
TOTAL				PLN 90,000

Source: author's study.

In the first place, costs of an environmental project are presented in terms of individual activities (mechanical absorption of gases and dusts, spray absorption of gases and dusts, supervision of environmental projects) and direct costs of the project. Next, environmental costs are decomposed into individual resources (absorbers, employee teams, external services, and fees), and resources are decomposed into their respective direct cost elements (depreciation, salaries, etc.) and indirect cost elements (resulting from the allocation of secondary resources). The divisibility of activities and resources presented in the table is aimed at showing the logical links and providing proof of cause-and-effect nature of green RPCA.

The final information provided by green RPCA allows one to determine full costs of individual environmental projects through more precise identification of the part of total costs which is associated with company engagement in environmental protection.

11.4. Final Remarks

Taking into consideration increasing expectations of societies and economies in the area of environmental protection, companies conduct more and more environmental activities and projects. Environmental costs incurred by companies are of complex nature in terms of both different types of environmental costs and engagement in environmentally-friendly activities that consume resources from many functional areas of the company.

The comprehensive RPCA approach to the problem of green accounting presented in this chapter enables more reliable determination of costs of involvement of all resources of the company in environmental protection, precise attribution of costs of environmental projects to relevant products, services and customers, meeting external reporting requirements, and supporting managers in making decisions concerning rationalisation and reduction of environmental costs.

The concentration of economic entities on the issue of environmental costs and implementation of green accounting can bring the company a number of important benefits:²⁰

• taking activities aimed at the efficient use of natural resources,

▶ providing correct information for determining costs and selling prices of products,

▶ reduction in costs resulting from environmental fees and taxes,

²⁰ Cf. [Szadziewska 2013, p. 234; Pahuja 2009, p. 17].

▶ reduction in costs resulting from removal of damage caused to the environment,

• increase in the efficiency of the use of resources, and elimination of waste and inefficiency resulting in the incurring of environmental costs,

▶ facilitation of activities and reduction in costs of resources involved in projects in the area of environmental protection,

• providing motivation to employees to seek possibilities for reducing and avoiding environmental costs, both internal and external,

• investing in products and technologies of environmentally-friendly nature,

▶ reduction in risk relating to an adverse impact of the company on the environment,

▶ creation of the image of an environmentally-friendly company and improvement of this image in the eyes of customers.

12 Reporting in Green Controlling – Part One

12.1. Introductory Remarks

The importance of sustainability reporting is indisputable (we use the term "corporate sustainability report" interchangeably with terms "responsibility report", "our responsibility report", "corporate responsibility report", etc.). Numerous analyses prepared by consulting companies and other subjects interested in sustainability reporting clearly confirm that numbers of organisations which publish corporate responsibility reports are on the increase. This development is convincingly demonstrated especially by the surveys prepared by KPMG. The first survey by KPMG aimed at corporate responsibility reporting was published in 1993 and according to this survey corporate responsibility reporting was "a new and niche activity", which was practiced by few companies. The last report by KPMG was published in 2013 and we can find there that "CR reporting has evolved into a mainstream business practice over the last two decades" [KPMG 2013, p. 4].

This chapter is, therefore, aimed at the issues related to reporting in green controlling. The key objective of the chapter is to sum up the crucial developments in the field of corporate responsibility (sustainability) reporting as well as indicate the possible future advances. We also aim to outline the standard content and structure of contemporary corporate sustainability reports, which is today to a large extent defined by the organisation Global Reporting Initiative. In this regard, it is important to notice that standards in the area of sustainability reporting are still in development and, therefore, it is possible to expect substantial changes.

12.2. Outlook of Key Institutions, Principles, Standards and Guidelines in Sustainability Reporting

Increased interest in sustainability issues was accompanied by the intensified activity of various individuals and organisations. There are thousands of subjects involved in sustainability-related activities today and it is, therefore, impossible to provide a comprehensive overview of all these subjects.

Contemporary institutional framework of sustainability reporting (key institutions, high-level principles, standards and guidelines) has been crystallising for a relatively long time and in this chapter we provide a bird's-eye view of the landscape of sustainability reporting infrastructure. We pay attention to key institutions and their fundamental documents (including principles, standards and guidelines), which have an influence on the contemporary mainstream approach to sustainability reporting.

Because the analysed field is really crowded with various institutions and rapidly evolving, it is not easy to provide its synoptic overview and some kind of taxonomy is needed. We highly appreciate the framework applied by Waddock [2008, p. 89], who distinguished three types of initiatives in the corporate responsibility infrastructure: market/business institutions; civil society/societal institutions; and state/government institutions. It is necessary to note that while Waddock [2008] provided an extremely detailed inventory of institutions related to sustainability, our goal is more modest and related to sustainability reporting. Historical development has led to a situation where the strongest influence on sustainability-related reporting is in the hands of market/business institutions and state/government institutions.

Civil society institutions in principle failed to obtain a significant and stable influence on sustainability reporting and it is beyond the scope of this chapter to analyse in detail the reasons for this fact. Nevertheless, it is important to notice that this development was partially caused by the fact that power relations in the area of sustainability reporting to a large extent replicate power relations which exist in the area of financial reporting.

State/government institutions undoubtedly have a significant influence on the practice of sustainability reporting, especially in the countries where such reporting is mandatory and regulated by legislation. On the other hand, regulation of sustainability-related reporting is not internationally unified and it is practically impossible to cover all different approaches. Because of the above mentioned reasons, in this chapter we aim our analysis at market/business institutions and their outputs (principles, guidelines, codes of conduct and standards), which have a very strong influence on sustainability reporting and to a large extent serve as a foundation for possible governmental regulation in this area. Additional information about the discussed institutions and related subjects can be found on respective Web pages (see the list of important Web links in the bibliography section). Market/Business institutions can be further classified into:

responsibility assurance infrastructure:

- codes of conduct, sustainability-related standards and principles;
- credible verification, monitoring and certification services;

 generally accepted reporting systems for environmental, social and governance issues related to corporations (ESG reporting);

• consultancies;

▶ business and other associations (e.g. Carbon Disclosure Project, responsible investment movement).

12.2.1. Responsibility Assurance Infrastructure

Codes of Conduct, Sustainability-Related Standards and Principles

Early codes of conduct tended to focus on issues related to bribery and corruption [Waddock, 2008, p. 90]. Today, there are numerous codes of conduct that address various issues and together they create strong pressure on organisations to behave responsibly by providing guidance on acceptable and unacceptable practices. Below we offer an overview of the most influential organisations and initiatives.

In 1976, the **Organisation for Economic Co-operation and Development** issued **Guidelines for Multi-national Enterprises** (hereinafter abbreviated as "OECD Guidelines") as part of the OECD Declaration on International Investment and Multi-national Enterprises. The OECD Guidelines are recommendations (especially in the areas of environment, employment, human rights, consumer protection, industrial relations, corruption and information disclosure) addressed by governments to multi-national enterprises operating in or from adhering countries (i.e. all 34 OECD member countries and 12 non-member

countries). The OECD Guidelines provide non-binding principles and standards for responsible business conduct in a global context and their ambition is to be a leading international instrument for the promotion of responsible business conduct. In order to fulfil this aim, the OECD Guidelines have been reviewed five times since their introduction. The latest revision started in May 2010 and the updated OECD Guidelines were adopted in May 2011. Sustainability-related organisations and initiatives are highly interconnected today and the Organisation for Economic Co-operation and Development is well aware of this fact. This claim is confirmed by the statement of the OECD about partner organisations, which include the International Labour Organisation, the International Organisation for Standardisation, the World Bank, the UN Working Group on Business and Human Rights, the UN Global Compact, the UN Finance Initiative, the Global Reporting Initiative, and the International Coordinating Committee of Human Rights Institutions.

In 1977, Reverend Sullivan introduced "**Sullivan Principles**" with the aim to strengthen economic pressure against South African apartheid. These principles included [Bernasek & Porter, 1997, p. 174]:

1) non-segregation of the races in all eating, comfort, and work facilities;

2) equal and fair employment practices for all employees;

3) equal pay for all employees doing equal or comparable work for the same period of time;

4) initiation of and development of training programmes that will prepare, in substantial numbers, blacks and other non-whites for supervisory, administrative, clerical, and technical jobs;

5) increasing the number of blacks and other non-whites in management and supervisory positions;

6) improving the quality of life for blacks and other non-whites outside the work environment in such areas as housing, transportation, school, recreation, and health facilities.

The seventh principle – "Working to eliminate laws and customs that impede social, economic, and political justice" was added in 1984. In the year 1999, Reverend Sullivan together with the United Nations Secretary-General Kofi Annan introduced the **Global Sullivan Principles** of Corporate Social Responsibility. These expanded principles requested multi-national corporations to do the following: support human rights; promote equal opportunities for all employees; respect freedom of association; provide sufficient rewards and opportunities for improvement of employees' skills and capabilities; provide safe and healthy workplace and protect human health and the environment; promote fair competition; cooperate with governments and communities to improve the quality of life; and promote the application of these principles across the supply chain. Furthermore, corporations were requested to be transparent in the implementation of the Global Sullivan Principles and provide information that demonstrates commitment to these principles publicly. The Global Sullivan Principles were signed by numerous large multi-national companies and nowadays Sullivan's principles belong to the most important global codes of conduct. Moreover, because Sullivan's principles were among the first really influential sets of voluntary codes of conduct, these principles are by some authors considered to be a "turning point that crystallised the then ongoing debate as to the changing societal expectations of corporate conduct" [Sethi & Williams, 2000, p. 172] and serve as a "role model" for other global codes of conduct.

The **International Labour Organisation (ILO)** adopted "Tripartite Declaration of Principles concerning Multi-national Enterprises and Social Policy" in 1977. It addressed issues of employment, training, conditions of work and life, and industrial relations. Nowadays these principles are still relevant and the fourth version of the document is in effect, i.e. "Tripartite declaration of principles concerning multi-national enterprises and social policy (**MNE Declaration**) – 4th Edition."

The **Caux Round Table** (hereinafter abbreviated as "CRT") was founded in 1986 and it defines itself as an "international network of experienced business leaders, who work with business and political leaders to design the intellectual strategies, management tools and practices to strengthen private enterprise and public governance to improve our global community." In 1994, the CRT released an important "code of conduct" named "**Principles for Business**" aimed at responsible stewardship, living and working for mutual advantage (inspired by the Japanese concept of Kyosei) and respecting and protecting human dignity. In 2009, the CRT published "Principles for Responsible Business". These principles were updated in May 2010 and are freely available from the CRT website. The CRT principles are accompanied by Self-Assessment and Improvement (SAIP) methodology.

In July 2000, the **United Nations Global Compact** (hereinafter abbreviated as "UNGC") was launched as a leadership platform for the development, implementation and disclosure of responsible and sustainable corporate policies and practices. Today, the UNGC is the largest voluntary corporate sustainability ini-

tiative (with nearly 8,000 participants at the beginning of 2014) and promotes 10 principles of conduct from four areas:

Human Rights:

1. Businesses should support and respect the protection of internationally proclaimed human rights; and

2. make sure that they are not complicit in human rights abuses.

Labour:

3. Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;

4. the elimination of all forms of forced and compulsory labour;

5. the effective abolition of child labour; and

6. the elimination of discrimination in respect of employment and occupation.

• Environment:

7. Businesses should support a precautionary approach to environmental challenges;

8. undertake initiatives to promote greater environmental responsibility; and

9. encourage the development and diffusion of environmentally-friendly technologies.

Anti-corruption

10. Businesses should work against corruption in all its forms, including extortion and bribery.

From the viewpoint of reporting, it is important that companies which participate in the UNGC commit to issue an annual Communication on Progress (COP), i.e. public disclosure to stakeholders on progress made in implementing the ten principles and in supporting broader UN development goals. Furthermore, the Global Compact Office suggests to utilise the Global Reporting Initiative Guidelines for reporting.

The **Bellagio Principles** were developed in 1997 as a tool for measuring sustainable development. Based on these principles, **Bellagio Sustainability and Measurement Principles** (hereinafter abbreviated as "Bellagio STAMP") were prepared by a group of international experts led by the International Institute for Sustainable Development in 2008. These principles are intended to be used for measurement and strategic assessment of progress towards sustainability and their profound analysis can be found in [Pintér, Hardi, Martinuzzi, & Hall, 2012].

Credible Verification, Monitoring and Certification Services

Waddock [2008, p. 91] points out that the second element of responsibility assurance involves actually "assuring" the public that what is claimed is what is being done. Although already in the 1990s many large companies began disclosing their social, environmental and governance performance and impacts (usually in reports based on the so-called triple bottom line, i.e. economy, environment and social dimensions), these reports have been often criticised for the absence of external assurance.

This situation led to the proliferation of companies offering services in the area of verification, certification etc. as well as to the development of assurance standards.

The following belong to the most important standard-setting bodies in the area of sustainability reporting:

• AccountAbility, which develops AA 1000 standards (see chapter 12.3.3);

▶ Social Accountability International (SAI), which develops SA 8000 standards (see chapter 12.3.4);

- > Fédération des Experts Comtables Européens (FEE);
- International Auditing and Assurance Standards Board (IAASB).

Interest in the topic of assurance services for sustainability reports is growing also in the academic environment, see for example [Manetti and Becatti, 2009], [Manetti and Toccafondi, 2012], [Moroney, Windsor and Aw 2012].

In the area of certification, also the "**International Organisation for Standardisation**" (hereinafter abbreviated as "the ISO") is extremely influential and acknowledged worldwide. It is a global federation of national standard bodies (ISO member bodies). For more information about key sustainability-related standards issued by this organisation, see chapter 12.3.1.

Generally Accepted Reporting Systems for Environmental, Social and Governance Issues Related to Corporations (ESG Reporting)

It is possible to say that before the Global Reporting Initiative Guidelines there were no globally/generally accepted standards for reporting on sustainability. As a result, organisations often published unbalanced (ignoring negative information) reports according to their own standards without clearly defined criteria for report content and report quality.

The need for standardisation was obvious and the answer came in the form of the Global Reporting Initiative, which developed a reporting framework with a primary objective to guide organisations on how to prepare standardised, balanced, and comparable reports. The analogy with standardisation in the area of financial reporting is obvious and was often used by the GRI to obtain support from organisations. The rationale behind this approach is simple and clear – the necessity of standardisation in financial reporting is generally accepted by corporations, so why should the situation in non-financial reporting be different? Below we provide brief information about the GRI as an organisation; reporting standards *per se* are addressed in chapter 12.3.5.

The **Global Reporting Initiative** (hereinafter abbreviated as "GRI") is an international, non-governmental, not-for-profit multi-stakeholder, networkbased organisation of global participants from business, academic, civil society, labour, and other professional institutions. The GRI was founded in 1997 and it is rooted in the Coalition for Environmentally Responsible Economies (CERES) and the Tellus Institute. The main objective of the GRI is to develop and promote a framework for sustainability reporting. In order to achieve this goal, GRI regularly updates its sustainability reporting framework through intensive multi-stakeholder processes.

Next to issuing the Guidelines, the GRI organisation is very active also in regard to numerous other areas, e.g.:

• collaboration with other organisations;

▶ providing various services (coaching and training, software certification, "beginner" reporting guidance for small and medium-sized enterprises, and certifying completed reports);

• organisation of various meetings and conferences (it fosters a multi-stakeholder approach).

Detailed analyses of the GRI's success are provided in several academic papers written by scholars in the area of sustainability reporting. Prominent examples include an article about the development of the GRI by Brown, de Jong, and Lessidrenska [2009], an article analysing institutional logic of the GRI by Brown, de Jong, M., and Levy [2009], and an article addressing the role of analogy in the process of institutionalisation by Etzion and Ferraro [2010].

12.2.2. Consultancies

Although consultancy companies represent an important part of institutional framework, they usually do not play a role of a primary mover of the development in the area of sustainability and, therefore, we do not address them here.

12.2.3. Business and Other Associations

Numerous business and other associations are active in the area of sustainability and sustainability reporting. From the viewpoint of impact on reporting practices, it is necessary to mention **CDP (Carbon Disclosure Project)** organisation, which "works to transform the way the world does business to prevent dangerous climate change and protect our natural resources" and closely cooperates with the GRI.

Responsible investment movement is very influential. These investors advocate the idea that their capital should be provided primarily to responsible corporations and this is obviously a strong motivation for corporations to be (or at least to seem to be) responsible. Responsible investors obtain necessary information from various resources, e.g. corporate responsibility reports, various consultancy companies as well as from indices that track social/environmental performance and impact of corporations. A prominent example of such index is the Dow Jones Sustainability Index (DJSI). It is beyond the scope of this chapter to deal with the methodology of corporate sustainability assessment behind this index, but we should at least note that the detailed methodology is freely available from the website of company RobecoSAM.

12.3. A Closer Look at Standards and Guidelines in Sustainability Reporting

This chapter provides more detailed information on selected standards and guidelines. It is important to understand that the only "pure" reporting standard discussed in this sub-chapter are the GRI Guidelines. Although other standards are not purely related to the reporting *per se*, they provide important guidelines for the selection of important topics, aims and indicators, which can be

consequently measured and reported. Some of these standards can be certified and other cannot be certified and serve "only" as guidance on how organisations can tackle a given set of issues.

12.3.1. ISO Standards

ISO 14000 – environmental management and ISO 26000 – social responsibility standards are most relevant from the viewpoint of reporting on sustainability topics. In regard to these standards, it is important to mention that, on the one hand, they provide important clues for the identification and management of important sustainability-related topics, setting aims and selecting key indicators, but, on the other hand, they do not require external corporate responsibility reporting.

ISO 26000 was launched in 2010 as a result of multi-stakeholder process and provides guidance on how organisations can operate in a socially responsible way (i.e. in an ethical and transparent way, which contributes to the health and welfare of society). The important feature of this standard is that it is a guidance standard and is not intended for certification purposes. This means that organisations cannot be certified according to this standard. ISO 26000 is intended for use by organisations beginning to address social responsibility as well as by more experienced organisations to integrate social responsibility throughout an organisation. ISO 26000 addresses 6 core subjects – human rights, labour practices, the environment, fair operating practices, consumer issues and community involvement, and development.

ISO 14000 is a family of standards, which deal with environmental responsibilities of organisations. The basic standard is ISO 14001:2004, which is supported by several other standards. Unlike in case of ISO 26000 standard, organisations can be certified according to the ISO 14001 standard, which is a globally acknowledged standard providing a framework for environmental management systems (EMS). ISO 14001 urges organisations to develop procedures for identifying important environmental aspects, continual improvement of the EMS, commit to comply with relevant legal requirements and communicate relevant procedures to suppliers and contractors.

From the viewpoint of sustainability reporting, it is important that dialogue with external stakeholders is not required by the ISO 14001 standard and the same goes for external reporting. On the other hand, the ISO 14001 standard is highly relevant for sustainability reporting because the issues addressed by this standard are probably also issues that should be reported in respective sections of sustainability reports.

12.3.2. EMAS

The Eco-Management and Audit Scheme (hereinafter abbreviated as "EMAS") is a voluntary environmental management tool with similar objectives like ISO 14001; nevertheless, the EMAS standard goes above and beyond the requirements posed by ISO 14001.

The EMAS standard aims at evaluating, reporting and improving environmental performance of its adopters. The detailed comparison of EMAS with ISO 14001 and ISO 26000 as well as numerous other relevant documents can be found on the website dedicated to EMAS (see the list of important websites in the bibliography section).

Basically, EMAS can be understood as a more demanding standard because compared to ISO 14001 EMAS brings some additional requirements. From the viewpoint of reporting, it is important that the EMAS requires its adopters to regularly report externally on specified topics.

12.3.3. AA1000, ISAE 3000 (Assurance Standards)

Probably the most influential assurance standards in the area of sustainability reporting (next to various national general and sustainability standards) are AA1000 and ISAE 3000.

The series of AA1000 standards is published by AccountAbility and it is freely available from the website of this organisation (see the list of important websites in the bibliography section). The following standards are included (AccountAbility, n.d.):

▶ The AA1000 AccountAbility Principles Standard (AA1000APS), which provides a framework for an organisation to identify, prioritise and respond to its sustainability challenges. The key three principles include: inclusivity (related to the importance of stakeholder participation); materiality (significance to the organisation or stakeholders); responsiveness (demonstration of accountability).
▶ The AA1000 Assurance Standard (AA1000AS) provides the methodology for assurance practitioners to evaluate the nature and extent to which an organisation adheres to the AccountAbility Principles. This standard distinguishes two types of assurance engagement. The first ("basic") type is aimed at providing assurance about the way an organisation manages sustainability performance and how it communicates this in its sustainability reporting, and the reliability of the reported information is not verified within this type of assurance. The second type is more advanced in the sense that the reliability of the reported information is verified and high and moderate levels of assurance are distinguished. The higher the level of assurance, the lower is the risk of error and therefore the users of reports with a high level of assurance may be more confident in relation to the reliability of these reports.

▶ The AA1000 Stakeholder Engagement Standard (AA1000SES) provides a framework to help organisations ensure stakeholder engagement processes are purpose driven, robust and they deliver results. Shortly, the standard aims to help companies to identify the stakeholders and to improve stakeholder engagement processes.

The International Standard on Assurance Engagements (ISAE) 3000 is issued by the International Federation of Accountants (IFAC) and accepted worldwide. The latest issue of this standard was published in December 2013 and is effective for assurance engagements when the assurance report is dated on or after 15 December 2015. The ISAE 3000 is relevant to all assurance engagements other than audits or reviews of historical financial information and is not aimed specifically at sustainability reports, its applicability is broader. The ISAE 3000 is in comparison with standards issued by the AccountAbility organisation more focused on "formal" aspects of sustainability reports and on verifying the accuracy of published data and less strategically oriented (e.g. it does not include stress on the importance of stakeholder engagement).

12.3.4. SA8000

The "Social Accountability 8000" (SA8000) standard was launched in 1997 by an international non-governmental multi-stakeholder organisation – Social Accountability International (SAI).

SA8000 is a voluntary auditable standard for decent workplaces and is based on UN Declaration of Human Rights, ILO and UN conventions as well as national law. The latest issue of SA8000 was released in 2014 and it covered the following nine areas: child labour; forced or compulsory labour; health and safety; freedom of association and right to collective bargaining; discrimination; disciplinary practices; working hours; remuneration; management system.

The SA8000 standard is accompanied by "Performance Indicator Annex", which lists minimal performance expectations, which have to be met by organisations claiming conformance with the normative requirements of the SA8000 standard.

12.3.5. GRI Guidelines

Basic Characteristics of GRI Guidelines

The history of the Global Reporting Initiative can be found in chapter 12.2.1.3 and here we address the GRI's most important product, i.e. the GRI Guidelines, which are actually a worldwide standard in the field of corporate sustainability reporting today. These guidelines:

▶ have an ambition to provide help with the preparation of corporate sustainability reports for organisations of all sizes, sectors and locations; in order to fulfil this ambition, the GRI Guidelines take the form of a comprehensive and coherent framework for sustainability reporting, which includes recommendations related to the principles, procedures and structure of the reports;

▶ are developed through a multi-stakeholder process involving subjects from business, labour, civil society, financial markets, auditors, governmental agencies, etc.;

▶ utilise triple bottom line approach to sustainability reporting with some important extensions; specifically, the GRI Guidelines suggest disclosure on conventional dimensions of sustainability (environmental, social and economic performance and impacts) as well as disclosure of corporate governance approach; in this context, it is important to notice that because the GRI Guidelines are rooted in the triple bottom line (TBL) approach, the majority of possible properties and weaknesses, which are sometimes discussed in relation to the TBL approach, are valid also for the GRI Guidelines.

Historical Development of GRI Guidelines

The first version of the Guidelines (G1) was launched in 2000, the second generation of the Guidelines (G2) was launched in 2002, the third genera-

tion of the Guidelines (G3) was launched in 2006; the year 2011 saw the publication of G3.1 Guidelines – an update and completion of G3, with expanded guidance on reporting gender, community and human rights-related performance. The latest generation of the GRI Guidelines (hereinafter abbreviated as "G4") was released in May 2013. The GRI accentuates that the fourth version of the GRI Guidelines is a result of multi-stakeholder engagement process, which includes input from thousands of practitioners and experts. The GRI Guidelines G3 and G3.1 will stay in effect until 31 December 2015 and all reports published after this date should be prepared according to G4.

According to the Sustainability Disclosure Database (publication years: 1999–2015), a total of 18,743 GRI reports were registered in May 2015; the decomposition of these reports can be found in Figure 12.1:





Source: Sustainability Disclosure Database, author's analysis.

In absolute numbers, 307 reports were prepared utilising G1; 1,456 reports were prepared utilising G2; 10,901 reports were prepared utilising G3; 4,799 reports were prepared utilising G3.1 and 1280 were prepared utilising G4.

The decomposition of the reports according to the years of publication is depicted in Figure 12.2; values for 2015 are obviously incomplete (figure prepared in May 2015).

The above mentioned numbers clearly demonstrate growing numbers of reports prepared with the utilisation of the GRI Guidelines and the importance of these guidelines as an actual sustainability reporting standard. Obviously, the number of reports in 2015 will yet increase.



Fig. 12.2. GRI reports according to the year of publication

Source: Sustainability Disclosure Database, author's analysis.

GRI Guidelines G4

In the GRI terminology, the GRI Guidelines are part of the Sustainability Reporting Framework (hereinafter abbreviated as "the Framework"). Along with the GRI Guidelines (abbreviated as "G4"), the Framework includes also "sector guidance."

Because our primary attention is aimed at the GRI Guidelines, we provide only short information on sector guidance in this paragraph. **Sector guidance** provides organisations in diverse sectors with specific instructions and in case that such guidance is available, organisations should use it for the preparation of their sustainability report. In May 2015, sector guidance was available for airport operators, construction and real estate, electric utilities, event organisers, financial services, food processing, media, mining and metals, NGO, oil and gas. Sector guidance for new sectors was not in preparation in May 2015.

The G4 **GRI Guidelines** are covered in two basic publications: "Reporting Principles and Standard Disclosures" [Global Reporting Initiative 2013a] and "Implementation Manual" [Global Reporting Initiative 2013b]; they can be obtained from the website of the GRI organisation for free (see the list of important websites in the bibliography section). Reporting Principles and Standard

Disclosures provide reporting principles and standard disclosure criteria that should be used by an organisation preparing a CR report as well as definitions of key terms. The Implementation Manual offers e.g. detailed and specific guidance on how to apply the reporting principles, guidance on how to interpret various concepts, glossary and references to other relevant documents.

Specifically, G4 [Global Reporting Initiative 2013a, pp. 16–18] explicitly require organisations to follow the principles below in their sustainability reports:

principles for defining report content:

stakeholder inclusiveness (the organisation should identify its stakeholders, and explain how it has responded to their reasonable expectations and interests);

 sustainability context – the report should present the organisation's performance in the wider context of sustainability, materiality, completeness, balance, comparability, accuracy, timeliness, clarity, and reliability;

 materiality principle – the report should cover aspects that reflect the organisation's significant economic, environmental and social impacts; or substantively influence the assessments and decisions of stakeholders;

 completeness – the report should include coverage of material aspects and their boundaries, sufficient to reflect significant economic, environmental and social impacts, and to enable stakeholders to assess the organisation's performance in the reporting period;

• principles for defining report quality:

 balance – the report should reflect positive and negative aspects of the organisation's performance to enable a reasoned assessment of the overall performance;

comparability – the organisation should select, compile and report information consistently; the reported information should be presented in a manner that enables stakeholders to analyse changes in the organisation's performance over time, and that could support an analysis relative to other organisations;

 accuracy – the reported information should be sufficiently accurate and detailed for stakeholders to assess the organisation's performance;

 timeliness – the organisation should report on a regular basis so that information is available in time for stakeholders to make informed decisions;

clarity – the organisation should make information available in a manner that is understandable and accessible to stakeholders using the report;

 reliability – the organisation should gather, record, compile, analyse and disclose information and processes used in the preparation of a report in such a way that they can be subject to examination and that establishes the quality and materiality of the information.

The issue of boundary setting is very important and relatively complicated. It is possible to summarise that a sustainability report should include the entities which are under the control or under a significant influence of the reporting company.

The report prepared according to G4 should be structured into two different types of disclosures – "General standard disclosures" and "Specific standard disclosures."

General standard disclosures in total include 58 reporting topics (marked G4-1, G4-2, ..., G4-58), which are divided into the following seven groups:

- ▶ Strategy and Analysis (from G4-1 to G4-2);
- Organisational Profile (from G4-3 to G4-16);
- ▶ Identified Material Aspects and Boundaries (from G4-17 to G4-23);
- ▶ Stakeholder Engagement (from G4-24 to G4-27);
- ▶ Report Profile (from G4-28 to G4-33);
- ▶ Governance (from G4-34 to G4-55);
- Ethics and Integrity (from G4-56 to G4-58).

Some of the 58 reporting topics are very broad (e.g. G4-1, i.e. statement from the most senior decision-maker of the organisation about the relevance of sustainability to the organisation and the organisation's strategy for addressing sustainability) and some are very narrow (e.g. G4-3, i.e. name of the organisation). The detailed discussion of these topics can be found e.g. in [Global Reporting Initiative 2013b, pp. 22–61].

Strategy and analysis should provide a strategic overview of the organisation's relation to sustainability, vision and strategy, especially with regard to managing significant economic, environmental and social impacts that the organisation causes or contributes to.

The organisational profile encompasses an overview of organisational characteristics with the aim to provide context for subsequent more detailed reporting and includes e.g. the name of the organisation, primary brands, products and services, the number of countries where the organisation operates, the scale of the organisation and geographic locations.

The identified material aspects (see Table 1) and boundaries provide an overview of the process that the organisation has followed to define the report content, the identified material aspects and their boundaries, and restatements. Stakeholder engagement should inform about stakeholder engagement during the reporting period (e.g. list of engaged stakeholder groups, procedure for identification and selection of stakeholders with whom to engage, the organisation's approach to engagement, etc.).

The report profile informs about the reporting period, the date of the most recent previous report, the reporting cycle, contact for questions about the report, the chosen "in accordance" option, the table referencing standard disclosures, which are included in the report (GRI Context Index), reference to the external assurance report (if such a report exists). For more information about "in accordance" options and about external assurance see last paragraphs of this chapter.

Governance includes reporting topics related to governance structures, governance procedures, the role of the highest governance body in risk management, sustainability reporting, evaluating economic, environmental and social performance. Furthermore, it includes information about remuneration and incentives for the highest governance body.

Finally, in the "Ethics and Integrity" group the following is disclosed: especially information about organisation's values, principles, standards and norms, internal and external mechanisms for seeking advice on ethical and lawful behaviour and mechanisms for reporting concerns about unethical and unlawful behaviour.

Specific standard disclosures include the number of indicators divided into three categories (economic, environmental and social). The social category is further divided into four sub-categories (labour practices and decent work; human rights; society; product responsibility). Each of these categories and sub-categories is further divided into "aspects" and individual indicators are grouped into these aspects. A detailed description and discussion of specific standard disclosures, including individual indicators, can be found in [Global Reporting Initiative, 2013b, pp. 62–235] and the overview of the whole system is depicted in Table 12.1.

Within specific standard disclosures, the organisation also reveals "disclosures on management approach" (DMA), which are of two types: generic disclosures on management approach and aspect-specific disclosures on management approach [Global Reporting Initiative, 2013b, p. 63]. Organisations start with the generic DMA guidance and if aspect-specific guidance is available, the organisations consequently use this guidance to report their management approach for that aspect in detail.

Category	Aspect	Indicators
1	2	3
Economic	Economic Performance Market Presence Indirect Economic Impacts Procurement Practices	EC1-EC4 EC5-EC6 EC7-EC8 EC9
Environmental	Materials Energy Water Biodiversity Emissions Effluents and Waste Products and Services Compliance Transport Overall Supplier Environmental Assessment; Environmental Grievance Mechanisms	EN1-EN2 EN3-EN7 EN8-EN10 EN11-EN14 EN15-EN21 EN22-EN26 EN27-EN28 EN29 EN30 EN31 EN32-EN33 EN34
Social		
Labour Practices and Decent work	Employment Labour/Management Relations Occupational Health and Safety Training and Education Diversity and Equal Opportunity Equal Remuneration for Women and Men Supplier Assessment for Labour Practices Labour Practices Grievance Mechanisms	LA1-LA3 LA4 LA5-LA8 LA9-LA11 LA12 LA13 LA14-LA15 LA16
Human Rights	Investment Non-discrimination Freedom of Association and Collective Bargaining Child Labour Forced or Compulsory Labour Security Practices Indigenous Rights Assessment Supplier Human Rights Assessment Human Rights Grievance Mechanisms	HR1-HR2 HR3 HR4 HR5 HR6 HR7 HR8 HR9 HR10-HR11 HR12

Table 12.1. Specific standard disclosures - structure

12. Reporting in Green Controlling - Part One

1	2	3
Society	Local Communities Anti-corruption Public Policy Anti-competitive Behaviour Compliance Supplier Assessment for Impacts on Society Grievance Mechanisms for Impacts on Society	S01-S02 S03-S05 S06 S07 S08 S09-S010 S011
Product Responsibility	Customer Health and Safety Product and Service Labelling Marketing Communications Customer Privacy Compliance	PR1-PR2 PR3-PR5 PR6-PR7 PR8 PR9

Source: [Global Reporting Initiative 2013b, pp. 62-235].

In case that an organisation wants to declare that their report is in accordance with G4, it must explain how G4 has been applied and choose between two "in accordance" options, which indicate to which degree G4 has been applied. It is important to notice that it would be a mistake to interpret "core" and "comprehensive" options as related to the quality of reports or as related to the sustainable performance of the organisation.

The first option is called "the core." This option means that the report includes essential elements of a sustainability report and background against which an organisation communicates its economic, social, environmental and governance performance, and impacts. At least one indicator for all identified material aspects has to be reported.

The second option is called "the comprehensive", which in comparison with "the core" option requires lots of additional disclosures; the organisation is obliged to disclose all indicators for all identified material aspects.

G4 deals also with the issue of external assurance, which is by numerous experts considered to be important from the viewpoint of increasing trustworthiness of corporate sustainability reports. On the one hand, G4 recommends the use of external assurance, but, on the other hand, external assurance is not required. This means that an external audit is not necessary to declare the report to be "in accordance" with G4. After all, every organisation is obliged to reveal its policy and current practice regarding external assurance at least.

Linkage of GRI Guidelines to Other Relevant Documents

The GRI is well aware of the fact that in the area of sustainability there are numerous active subjects, which develop and publish their own standards, recommendations, etc. Therefore, for reporting organisations it is difficult to keep their sustainability activities integrated. The GRI is very active in seeking and deepening numerous partnerships and collaborations and on Web pages of the GRI can be found links to the relevant standards and initiatives (e.g. ISO 26000, UN Global Compact Principles, CDP, IFC – International Finance Corporation's Sustainability Framework, The Earth Charter and IRIS – the catalogue of generally accepted performance measures, which is managed by the Global Impact Investing Network).

It is possible to sum up that the above mentioned practices of the GRI substantially facilitate the orientation in a crowded landscape of various relevant organisations, standards and principles.

Critique of GRI Guidelines

Although the GRI Guidelines have won widespread acceptance, there are also critical opinions about these Guidelines and they are shortly addressed in this sub-chapter.

First, critique appears in the area of specific indicators suggested by the GRI Guidelines. As an example of such critique we can mention a paper written by Mudd [2008], where the issue of appropriate indicators for reporting on water resources is discussed. Obviously, critique of this type is important but may be overcome by improving the used indicators and it does not require radical change in reporting practices.

Second, numerous authors [Fonseca, McAllister and Fitzpatrick 2014) claim that reports according to the GRI Guidelines may be misleading or may disguise unsustainable practices, particularly at the site level (because organisations primarily report at company-wide level and there are no clear instructions and assurance procedures about the optimal level of detail in reporting).

Third, there are complaints about the proliferation of performance indicators, which may complicate especially long-term comparison and benchmarking. A possible solution to this issue lies in the construction of composite indicators. On the one hand, composite indicators are suitable for focusing attention, making comparisons, clarifying complex problems, etc. On the other hand,

some authors point out that numerous issues are connected with composite indicators. An excellent summary of objections can be found in a paper by Singh, Murty, Gupta, and Dikshit [2007, p. 567], where it is stated that "It is frequently argued that composite indicators are too subjective, due to the assumptions in estimating the measurement error in data, mechanism for including or excluding indicators in the index, transformation and/or trimming of indicators, normalisation scheme, choice of imputation algorithm, choice of weights and choice of aggregation system". Despite these problems, it is meaningful to work on constructing such indices because of their numerous advantages. It is beyond the scope of this chapter to address composite indices in detail; nevertheless, we would like to mention several works where more information on this subject can be found. For example, Krajnc and Glavic [2005] developed a "composite sustainable development index" for the assessment of sustainable development of a company. Another industry specific composite indicator was prepared by Singh, Murty, Gupta, and Dikshit [2007], who developed a "composite sustainability performance index" for the steel industry. Tokos, Pintaric, and Krajnc [2012] constructed a "composite index of sustainable development" for breweries. Finally, an overview of integrated approaches to the assessment of sustainable development can be found in [Singh, Murty, Gupta and Dikshit 2012].

Fourth, according to some researchers, the importance of inter-linkages and synergies between different sustainability indicators and sustainability dimensions is insufficiently addressed by the GRI Guidelines. Lozano and Huisingh [2011] proposed a two-tier model of sustainability. The first tier is focused on "conventional" dimensions of sustainability (economic, environmental and social) and the second tier is concentrated on the time dimension (short-time and long-time perspective). Lozano advocates that all dimensions, including time, are inter-related and suggests that sustainability reporting guidelines should add a new category (i.e. inter-linked issues and dimensions) to the three conventional dimensions. Lozano continued research of the mentioned inter-linkages and by analysing high-quality reports [Lozano 2013] he found that in spite of the absence of explicit demand for coverage of interlinking issues in reporting standards, companies which had high-quality reporting actively tried to report about inter-linking issues. Based on these findings, Lozano recommended updating the theory and the GRI guidelines (i.e. include coverage of inter-linking issues) to ensure a more systemic approach to reporting in business practice. Obviously, the issue of sustainability inter-linkages in reporting is closely related to the above discussed problem of composite indicators and integrated sustainability assessment methodologies.

Finally, objections are sometimes raised about insufficient instructions for the assurance of sustainability reports (but this objection is not specific for reporting according to the GRI Guidelines), unclear requirements for the setting of boundaries of corporations [Archel, Fernandez and Larrinaga 2008], as well as about insufficient control over respecting basic rules and principles underlying the GRI Guidelines (i.e. value, accessibility, comprehensibility, and comparability). Dingwerth and Eichinger [2010, p. 91] concluded that there is only weak monitoring whether principles of value, accessibility, comprehensibility, and comparability are really implemented.

12.4. Organisation and Practice of Sustainability Reporting

In this chapter, we discuss important issues related to the implementation of sustainability reporting in practice.

12.4.1. Users of Sustainability-Related Information

There are various potential users of sustainability-related information and different groups of users usually need specific kind of information. For example:

▶ Shareholders are typically interested especially in financial performance. Nevertheless, numerous investors realise that there are environmental and social factors, which substantially influence financial performance, but at the same time are insufficiently evaluated by conventional financial analysis.

• Employees are, on the other hand, interested in labour policies, human rights, remuneration policies and working environments.

▶ Customers are interested in a broad range of issues that include product safety, environmental and social impacts of production activities, and after-sales service. All these issues and areas of interest fit in the sustainability land-scape.

It is possible to conclude that information on sustainability issues, i.e. on economic, social and environmental performance as well as on corporate governance, is nowadays important for all kinds of users and that "conventional" historical financial information is not sufficient.

12.4.2. Motives, Goals and Benefits of Sustainability Reporting

It is possible to distinguish non-regulatory and regulatory motives for sustainability reporting.

Quite a comprehensive overview of goals and benefits of voluntary disclosure can be found e.g. in [Herzig and Schaltegger 2006, pp. 302–303]. These authors provide, for example, the following benefits of sustainability reporting for an organisation: legitimation of corporate activities; increase in corporate reputation and brand value; gaining a competitive advantage; benchmarking against competitors; increasing transparency and accountability within the company. Other frequently mentioned benefits of sustainability reporting are: support for a holistic view of business; fostering long-term managerial thinking; improvements in decision-making; internal benchmarking; benchmarking with respect to laws, norms and codes of conduct.

By informing stakeholders about sustainability-related activities, a company may legitimate its own activities and gain access to important resources. Moreover, proponents of sustainability reporting advocate that this activity leads to improving social and environmental performance and consequently to improved reputation, customer loyalty and better access to the capital (e.g. from funds invested into socially/environmentally responsible organisations).

KPMG [2013, p. 24] points out that although historically sustainability reporting has been voluntary, nowadays mandatory requirements for sustainability reporting (introduced both by governments and stock exchanges) are on the increase. Consequently, numbers of corporate responsibility reports grow substantially.

For example, on 29 September 2014 the European Commission [2014] announced the adoption of the directive on the disclosure of non-financial and diversity information by large companies and the European Parliament adopted the directive on 15 April 2014. According to this directive, concerned companies will disclose information on policies, risks and outcomes as regards environmental matters, social and employee-related aspects, respect for human rights, anti-corruption and bribery issues, and diversity in boards of directors. Concerned companies will start reporting as of their financial year 2017. The

Directive will only apply to some companies; in particular, large public-interest entities with more than 500 employees will be required to disclose certain non-financial information in their management reports. The scope includes approximately 6,000 large companies and groups across the European Union.

Also countries outside the EU introduce mandatory sustainability reporting (e.g. Norway and Australia). Integrated reporting is mandatory in South Africa [KPMG 2013, p. 12].

12.4.3. Arguments against Sustainability Reporting

Although the mainstream opinion today is inclined to support sustainability reporting, there are also opinions against such reporting. The most frequently mentioned issues include:

• Sustainability reports are too complicated, excessively full of insignificant details and in consequence, stakeholders are not interested in reading them.

▶ Sustainability reports serve primarily as a tool for greenwashing, which is defined as a practice when a company or organisation spends more time and money claiming to be "green" through advertising and marketing than actually implementing business practices that minimise environmental impact (definition retrieved from http://www.greenwashingindex.com/about-greenwashing/).

• Costs of sustainability reports are too high when compared to benefits for organisations.

Although there is some rationale in these opinions for sure, they usually do not challenge sustainability reporting *per se*, but specific implementation of sustainability reporting, which is a solvable issue.

12.4.4. Organisation of Sustainability Reporting – Linkages with Sustainability Accounting and Performance Measurement

Sustainability reporting is closely related to other parts of sustainability management. Especially important are linkages of sustainability reporting to sustainability accounting and performance measurement. Schaltegger, Bennett, and Burritt [2006, p. 15] define sustainability accounting as new information and accounting methods which strive to create and provide high quality information to support a corporation in its movement towards sustainability. Sustainability reporting is, in this context, defined as a new formalised means of communication which provides information about corporate sustainability. Linkage between sustainability accounting and reporting is of crucial importance because in order to have influence, accounting information must be communicated, and, at the same time, reporting is needed to document information about the actual status of and progress towards corporate sustainability.

Another important idea discussed by Schaltegger, Bennett, and Burritt [2006] is that sustainability management may be structured in two different ways:

• inside-out approach, which is based on the idea that reporting should be based on the analysis of sustainability factors that are crucial for the economic success of the company (i.e. reporting is driven by strategy and accounting);

• outside-in approach, which is based on the idea that sustainability reporting is primarily a tool for communication with stakeholders and has to, above all, respect external expectations (i.e. sustainability accounting is driven by reporting).

According to our opinion, this dichotomy is to a large extent only imaginary because an organisation has to utilise both approaches simultaneously. On the one hand, it is necessary to harmonise sustainability management (and reporting) with the overall company strategy. On the other hand, a good strategy cannot ignore external pressures (e.g. various codes of conduct, principles, standards and guidelines discussed in chapters 12.2 and 12.3).

Last but not least, it is important to discuss the relation of external and internal sustainability reporting. We advocate that these two reporting systems should be strongly interconnected and should use the same informational basis (sustainability accounting). Nevertheless, internal sustainability reporting differs from external sustainability reporting in several aspects (especially because of the fact that these two reporting systems primarily serve different groups of users with different informational needs). First, the structure of internal sustainability reporting should be more detailed and prepared not only company-wide, but also for strategic business (or smaller) units. Second, internal reporting should provide a detailed comparison of actual results with various standards (e.g. plan, performance in the previous periods, performance of external subjects, legal requirements). Third, the frequency of internal sustainability reporting should be higher to provide managers with critical information as soon as possible. Fourth, internal sustainability reporting does not have to follow any external regulations and may be highly company-specific. Finally, external sustainability reporting is prepared primarily for external users, i.e. reputational issues usually play a more significant role than in the case of internal sustainability reporting and the risk of the abuse of disclosed information by competitors or by media has to be taken into account.

12.4.5. Future of Sustainability Reporting

Approaches to corporate sustainability reporting are in development and it is possible to see the ongoing search for alternative ways of reporting. KPMG [2013, pp. 11–12] identified the following global trends in corporate responsibility reporting:

▶ First, corporate responsibility reporting sees exceptional growth in emerging economies (e.g. 71% of the 4,100 researched organisations, representing the top 100 companies from 41 countries across 15 sectors, issue corporate responsibility reports; 93% of the world's largest 250 companies issue corporate responsibility reports).

▶ Second, there is a narrowing gap between leading and lagging industry sectors.

▶ Third, 51% of companies worldwide include information about corporate responsibility into their annual financial reports. On the one hand, this means that companies consider information related to corporate responsibility as important enough to include it into this type of report. On the other hand, in the same survey [KPMG 2013, p. 28] it is stated that only 10% of companies claim that they publish an "integrated report" and only 3% of companies refer to the IIRC framework.

▶ Fourth, the use of the Global Reporting Initiative Guidelines is almost universal.

▶ Fifth, 59% of the world's largest companies invest in external assurance of corporate responsibility reports.

Similarly, Rassier and Roche [2014] stressed the following four trends:

- Proliferation and institutionalisation of sustainability reports.
- Moving towards integrated reporting.
- Making sense of excessive data with more context and meaningful impact.
- Emphasising company comparisons within sectors and industries.

It seems that numerous practitioners and scholars see the future in integrated reporting, which provides financial and sustainability-related information in one report and thus enables a holistic view of the organisation's performance. This approach is described e.g. by Eccles and Krzus [2010] and on the website of the International Integrated Reporting Council (IIRC). Nevertheless, it is important to note that integrated reporting is still in development and it is not certain how it will be accepted by organisations in the future.

Last but not least, the "Reporting 2025" project has been established by the Global Reporting Initiative together with global sponsors SAP, Boston College – Centre for Corporate Citizenship, and Enel. The aim of the project is to promote an international discussion about the purpose of sustainability reporting and disclosures looking ahead to 2025. According to the project's timeline, during the year 2015 GRI will generate articles, videos and analytical papers based on the interviews, and in October the "Reporting 2025 Forum" will take place. The final publication on the project results should be available in January 2016. Hopefully, this study will reveal the future of sustainability reporting more clearly.

12.5. Final Remarks

The key objective of this chapter is to sum up the crucial developments in the field of sustainability reporting, outline the standard content and structure of contemporary corporate sustainability reports and indicate the possible future advances in the field of sustainability reporting.

To fulfil this objective, we have provided an overview of the key types and specific examples of institutions, which are crucial for the development of sustainability reporting. Consequently we offer a closer look at selected standards and guidelines that influence the content and structure of corporate responsibility reporting. Attention is paid to the GRI Guidelines, which actually represent the sustainability reporting standard today. The principles which have to be respected within the reports prepared in accordance with the GRI Guidelines have been explained and attention has also been paid to sector guidance. In chapter 12.4, practical issues are discussed (key stakeholders and their informational needs, motives for and against sustainability reporting, internal organisation of sustainability reporting, including comparison of internal and external reporting). Last but not least, we have addressed the future prospects of sustainability reporting, which can be seen in integrated reporting and the growing importance of mandatory sustainability reporting. We have also pointed out at the existence of the "Reporting 2025" project, which strives to outline the key developments in sustainability reporting during the next ten years.

It is possible to conclude that the importance of sustainability reporting (especially in the case of large corporations) is unquestionable and that appropriate and effective communication about responsible activities of an organisation through sustainability reporting represent an important tool for persuading various groups of stakeholders (e.g. investors, banks, customers, employees, local communities) about the ability of an organisation to successfully tackle various risks and about its capability to overcome possible economic, social and environmental issues. Sustainability reporting also helps to improve internal managerial processes related to environmental, social and economic aspects of business.

An important feature of mainstream external sustainability reporting is its standardisation. The crucial role in this area is nowadays played by the guidelines released by the Global Reporting Initiative. For example, findings in [KPMG 2013, p. 31] confirm that the ratio of the world's largest companies referring to the GRI Guidelines has increased from 78% in 2011 to 82% in 2013. It is possible to summarise that sustainability reporting is a mainstream business practice today and that organisations should design their reporting systems so that these systems both support the overall strategy of an organisation and at the same time respect numerous external influences, which are posed by the existing institutional infrastructure around sustainability reporting.

13 Reporting in Green Controlling – Part Two

13.1. Introductory Remarks

For a long period of time, financial statements were the primary source of information about activities of business entities and their performance. However, the processes of international integration and globalisation have created the need to provide, in addition to financial information, also other data being the subject of interest of both existing and potential investors, as well as different stakeholder groups, such as customers, local communities, environmental organisations, etc. The purpose of reports is to provide a wide range of internal and external stakeholders with information on the impact of decisions and activities taken by managers in the company on society and the environment. A company achieves its environmental and development objectives only when related environmental, social and economic consequences are taken into account in a balanced and appropriate manner. "Preparing reports for stakeholders is now becoming a standard. They relate to sustainable development and are aimed at increasing transparency of organisations' operations and enhancing investment attractiveness of entities for investors"¹.

The purpose of this chapter is to present a data reporting system concerning data on impacts of business entities' operations on the natural environment, and achievements of these entities as regards mitigating the adverse effects of its use. Reporting is one of elements of environmental controlling, aside from

¹ The following terms are used as synonyms of sustainability reports: social reporting, CSR reporting, and disclosure of non-financial data [Sroka, Grzymisławski and Kustra, 2012].

budgeting, control of a degree of task implementation, or motivation. To accomplish the purpose so defined, a critical analysis of literature on the subject was carried out, and contents of reports published on websites and own empirical observations in two business entities were used. These observations were used to show a reporting path in entities with complex organisational structures.

13.2. The Need for Reporting Results in the Environmental Sphere

Growth in economic and social awareness of contemporary stakeholders of organisations causes that they expect information on impacts of entities on the environment. The information contained in reports presents value for stakeholders only if they are able to make appropriate decisions on the basis of this information. Information needs of report users do not come down to the ongoing provision of information but they are also of prospective nature, which means these reports should include a description of the economic future of the company. Therefore, it is becoming an extremely important issue to present achievements of entities not only in financial terms but also in terms of their impact on the environment, especially the natural environment. This information must be provided in a transparent way understandable to all interest groups [Zuchewicz 2014, p. 326].

A mechanism of proper selection and presentation of non-financial data plays the key role in the process of reporting on social and environmental issues. It is suggested in literature that if only economic aspects are taken into account in operations of a company, it makes the survival and development of the company impossible in the long run [Marcinkowska 2004, p. 19].

Reporting on achievements in economic, environmental and social areas is a subject of solutions provided for in directives of the European Union. The purpose of a directive adopted by the EU on 22 October 2014 is to harmonise the structure and scope of non-financial information that companies will be forced to disclose. Pursuant to this Directive, in Poland, in the first period, the obligation of reporting will apply only to those listed companies that meet at least two of the following three criteria [Dyrektywa Parlamentu Europejskiego 2014):

- ▶ the company's employment exceeds five hundred people,
- its turnover is over forty million euros,
- its balance sheet total is more than twenty million euros.

The purpose of this EU regulation is to introduce an obligation applying to large entities of public interest to present descriptions of policies implemented by these companies on environmental, social, labour and corporate issues, results achieved as a consequence of the implementation of the given policies, as well as risks associated with these issues and ways to manage these risks. The prepared report is to present the extent to which the organisation's strategy, management, results and prospects, in the context of the external environment, lead to the creation of value in both the short term and long term. The scope of non-financial data adopted by the Directive includes, in respect of environmental issues, detailed information on the current and expected impact of operations of business entities on the environment and, in some cases, on health and safety, use of renewable energy, greenhouse gas emissions, water consumption and air pollution.

13.3. Types of Reports and their Users

The reporting system in a company encompasses the whole set of information intended for the company's managers on different management levels, and external stakeholders. Hence, there are distinguished internal and external reports. The form, content, time of preparation and recipients of **internal reports** are set individually by the management board and heads of departments. Reports which provide information expressed in physical and financial terms, are not standardised. Therefore, management boards are free to create reporting systems, taking into account information needs arising from the specificity of operations, organisational culture and confidentiality of information.

Users of internal reports value the most the text reports containing numerical indicators, illustrated with tables and graphs. Figures and indicators are presented in tables according to time intervals and in incremental values. This facilitates comparing data and determining deviations from budgets not only for a given period, but also incrementally, from the beginning of the year. Assessments made in this way facilitate the determination of positive and negative changes in individual periods and their total results during the reporting period [Sierpińska 2007, p. 78].

Information included in internal reports is used by management boards to make decisions with respect to, among other things:

• enhancing the efficient use of natural resources,

• improving financial results of companies by reducing environmental fees, penalties and all kinds of sanctions for improper use of the environment,

• limiting conflicts of interest, which are a common cause of crises that worsen the effectiveness of companies' operations,

▶ preventing large fluctuations in share prices on the stock exchange which make it difficult to raise additional capital for the company's development,

▶ increasing the company's transparency, which affects the share prices and leads to an increase in the company's value, as well as allows the management board to achieve individual benefits in the form of bonuses, which are often associated with growth in the value of the company,

• improving the company's competitiveness and maintaining the competitive advantage in the long term,

- reducing the risk of losing business reputation,
- managing risks in the long term.

Organisational solutions with respect to reporting in environmental controlling are individualised. Normally, in individual companies there is no separate environmental controlling department, and internal environmental reports are prepared by environmental protection departments or operational controlling departments. Such reports are addressed to the company's management board. On the other hand, environmental controlling departments operate in those companies that impact the environment in a more significant way (companies of the chemical industry, heat and power plants, coal-fired power stations, and certain companies of the agri-food processing industry). These departments prepare environmental reports on the implementation of budgets concerning environmental costs and expenditure on projects in the area of environmental protection. They include data on environmental fees, penalties for exceeding permissible standards and limits concerning greenhouse gas emissions or generated waste, as well as costs of purchasing emission allowances, etc.

The scope and content of internal reports depend on the type of environmental impact of the company on individual elements of the environment. Some companies mainly affect the environment through disposal of sewage, others through emissions of greenhouse gases into the atmosphere and still others by producing large amounts of toxic waste.

In international corporations, environmental controlling departments usually operate only at the corporate headquarters level. They deal with budgeting and monitoring of the extent of implementation of budget environmental costs and investments in environmental projects. These departments provide information for the preparation of external reports. In national companies being part of corporations, these problems are concentrated in their operational controlling departments. The budgeting of costs and expenditure on environmental projects depends on solutions in the area of controlling structure of companies, and obligations of various centres of responsibility. Internal reports from individual production units - national companies - are usually sent to headquarters. They include a comparison of normative values and limits of parameters relating to the environment with results obtained within these parameters. Data is compiled in tables standardised in terms of their form and order of presenting individual elements of reports, which facilitates the consolidation of partial reports in a single consolidated report at the headquarters level. Internal reports also include explanations of reasons for deviations of obtained values from the model adopted for comparison. Single reports of subsidiaries are sent to the international corporation's headquarters, to its environmental controlling department. Summary sets of data from individual national entities along with a statement of reasons for deviations, prepared by this department in the form of a synthetic environmental report, are sent to the management board at the headquarters. Such a report includes results in the area of environmental parameters in comparison to norms and standards, in volume terms. The established variances are explained on the basis of information obtained from entities operating in individual countries. An abridged version of this report is sent to the investor relations department and forms part of the integrated report or sustainability report if the corporation still does not prepare integrated reports.

"Basic reporting requirements in environmental controlling include environmental criteria presented in the following three groups: eco-efficiency, the impact of the organisation's operation on the environment and environmental management. Eco-efficiency is generally understood as creating more value with a reduced environmental impact. This reduction is measured by determining the relationship between resource consumption and production or sales, taking into account energy and water consumption, the amount of rubbish taken away to landfill sites, and the use of recycled materials or renewable energy. The length of the lifespan of products and their possible subsequent disposal are also of importance. In reports on the environmental impact of a company there are also considered such criteria as a degree of contamination of water, soil, and air, or its impact on biodiversity, e.g. reduction in the population of animals or plants. The reports also contain information whether or not the company's operation destroys natural habitats and environmentally important natural resources such as forests and fisheries. The environmental management issues included in the reports focus on the involvement of the company's management in the development of assessment criteria of environmental impact. They include environmental management systems, which are aimed at documenting processes, recording results and monitoring progress. These systems should be subject to external and internal audits prepared by independent auditors. Data on the training of employees to develop their environmental awareness, and cooperation with non-governmental organisations engaged in environmental protection is also of great importance"².

External reports are prepared according to the formula suggested by various institutions undertaking initiatives with respect to reporting. The process of external reporting in companies must be well prepared. For this purpose, a team responsible for the reporting process should be appointed, which should master the requirements of the model selected by the company. Reporting models are described in the further part of this chapter. The team responsible for reporting should involve stakeholders in this process through consultations and determination of the issues they consider important. This process must be preceded by the determination of groups of stakeholders with whom talks should be held, as the circle of the company's stakeholders is so wide that it is impossible to hold talks with all of them. The next stage of the reporting process is to define the content of the report, which is determined by the adopted reporting model and the scope of information important for the selected groups of stakeholders. In the company, an appropriate procedure must be adopted for the transfer of information from different sections to the reporting team. Its tasks include compilation of the obtained partial information, preparation of a complete report taking into account the purposes of reporting on particular issues, and communication of the report to stakeholders.

External environmental reports that are part of sustainability reports are made public to a wide circle of stakeholders through the company's websites. If the company is listed on the capital market, such reports are sent to the stock exchange. Reports are also sent to local authorities, to their relevant environmental departments. The content and form of these reports do not coincide with internal reports for the management board and environmental reports sent to the stock exchange. They include information about [GRI 2006]:

- air and soil pollution,
- greenhouse gas emissions,
- noise and vibration,

² See Zasady ESG jako podstawa odpowiedzialnego inwestowania (www.seg.org.pl, 20.04.2015).

- waste management and recycling,
- packaging reduction,
- consumption of natural resources, including energy consumption,
- contamination and erosion of soil,
- biodiversity,
- animal rights and protection of endangered species,
- compliance with environmental regulations.

Moreover, comparison bases for the obtained values are also diversified. Typically, the comparison base is formed by standards, limits and norms established for a given company in individual countries. However, in some countries, the benchmark for the obtained values is formed by parameters achieved by five best companies of the industry in which the reporting corporation operates, or average values it achieves. External reports are used by legislative and supervisory bodies such as the European Union or national governments, as well as boards of international corporations to assess operations of their subsidiaries in particular countries. The reports facilitate making long-term strategic decisions, measuring and enhancing efficiency in important, but previously not analysed areas, and involving companies' management boards in issues of sustainable development important for the cooperation.

By publicising reports on their websites, companies provide reliable financial and non-financial information concerning not only the environment but also social issues. This information facilitates the process of making decisions by administrative authorities, analysts, investors and a wide circle of other stakeholders of the company, for example, suppliers, customers, or employees. The circle of external stakeholders also includes business chambers and associations, trade unions, expert and academic circles, as well as consultants and non-governmental organisations. Initiatives in the area of reporting attempt to find weaknesses of business self-regulation, which is possible through dialogue and taking into consideration opinions and expectations of many parties rather than only of the business [GRI 2006, s. 25]. As a result of this approach, a number of instruments have been created to manage and measure results concerning the impact of operations of organisations on the natural environment, such as the GRI, the Global Compact and ISO 26000. The area of the company's impact on the environment is part of broader sustainability reports.

Environmental information is a particular area of interest of stock market investors, especially institutional investors. Investors of this group are mainly interested in companies that have a strong impact on the environment. They use information from environmental reports to increase portfolio effectiveness, facilitate risk management, protect reputation and reduce information asymmetry and forecasting errors as regards the relationship between the risk and return on the investment portfolio. Insufficient quantity and quality of information relating to the environmental risk has a major impact on decisions made by stock market investors, concerning the sale and purchase of shares. They demand additional descriptions of data contained in reports on activities of entities so as to reduce the risk of buying shares in companies whose prices may fall sharply because of environmental contamination. For example, a company pollutes the environment and groundwater because of improper waste management. This may cause protests and complaints of local residents. Lawsuits against the company can lead to payment of compensations to the harmed. Penalties for pollution may be imposed on the company by state authorities or the European Union. The company must inform stock market investors about the resultant situation via stock announcements, and then in its financial statements. This can affect the share price on the stock exchange. Investors will start to worry about financial results of the company and sell off its shares, which will affect share prices. The stabilisation of the share price or its increase can occur only in the long term, once the company has remedied the environmental damage [Lulek 2014, p. 15]. However, the company must communicate clearly its activities in this area through its websites, meetings with the media, financial analysts and investment fund managers. In such a case, greater involvement of the investor relations department is necessary.

Stock market analysts, in turn, may use the information contained in the reports as a basis for short-term and long-term recommendations, a tool for creating the composition of portfolios and funds, and a rating tool for determining the best companies in a given sector or industry.

The reports are also used by other stakeholders – suppliers, customers, employees, consumer associations, environmentalists, etc. Employees' knowledge of the environmental aspect gives them a greater insight into the values highly regarded by the company and the relationship between productivity and results of the organisation. The reports meet expectations of customers and business partners as to the environmental aspect of the company. Environmental reports also provide an opportunity to reduce reputational risks in the supply chain through a greater impact on business partners.

13.4. Objectives and Tools of Environmental Reporting in the Context of Sustainability Reporting

The basic tools for reporting environmental data to external stakeholders are guidelines of the Global Reporting Initiative (GRI), the UN Global Compact, and ISO 26000.

13.4.1. Global Reporting Initiative Guidelines

The GRI guidelines are the globally most popular standard of uniform reporting rules in the area of sustainable development and reporting of non-financial data. They are designed to support the development of sustainable global economy, where organisations are responsible in a sustainable way for economic, environmental and social consequences of their actions. These guidelines were announced by the UN Secretary-General in 1999. Since then, they have been systematically developed. The first version of the Guidelines (G1) was released in 2000, the second one (G2) in 2002. In October 2006, the third generation of the Guidelines (G3) was announced, which was translated into Polish in 2009. In 2011, there were published the updated and supplemented Guidelines (G4) is applicable, which was published in May 2013. The GRI established a two-year transition period for the introduction of G4 – reports that will be issued after 31 December 2015 must be prepared according to the new G4 Guidelines. Until then, companies can draw up reports according to the G3/G3.1 Guidelines.

The new G4 Guidelines are divided into two parts [G4 Sustainability Reporting Guidelines..., p. 8]:

▶ Part 1 – Reporting Principles and Standard Disclosures; this part explains the principles and criteria of the guidelines and their scope,

▶ Part 2 – Implementation Manual presenting detailed information on how to apply different rules, prepare reporting data according to the G4 guidelines and interpret certain concepts contained in Part 1.

Before starting to compile a report, an organisation should choose the level of detail according to which the report is to be drawn up. Instead of the previously existing three A, B, and C levels of application, in G4 there were introduced two reporting levels: core level and comprehensive level. Both of these options determine in detail the content to be included in the report, suitable for organisations of any type and size, as well as operating in any industry in a given territory. Compared with the previous ones, the new G4 guidelines focus on the significance of reported information by encouraging reporting entities to concentrate on the most important issues in terms of their operations rather than on reporting about everything. However, organisations must formalise and document the process they apply to identify their "Material Aspects", describe the method for defining the content of reports and provide information on how stakeholders are involved in the process. This approach is to result in, among others, shorter reports that will deal with the most important areas affected by the company.

Key information, included in the so-called GENERAL STANDARD DISCLO-SURE, which is deemed by the majority of stakeholders as essential and which, according to GRI G4, should be included in the report, has been grouped in the following sections (the content of which is determined by the previously selected level of detail [core or comprehensive option]):

▶ STRATEGY AND ANALYSIS – including a statement of the President or another person of an equivalent position on the importance of sustainable development to the organisation and its strategy. This information forms the general context necessary to understand how a given organisation operates.

▶ ORGANISATIONAL PROFILE – this section includes, among other things, the name of the organisation, its primary brands, products and services, the location of the headquarters, the number of countries where the organisation conducts its operations, the nature of ownership and legal form, the markets served with the indication of geographical range, the sectors served or characteristics of the supply chain of the organisation. This section also includes information on whether and how the organisation applies the prudence principle, about adopted or supported external economic, environmental and social principles and other initiatives, as well as membership in associations (such as industry associations) and/or national or international advocacy organisations.

▶ IDENTIFIED MATERIAL ASPECTS AND BOUNDARIES – this section includes a list of all entities included in the organisation's consolidated financial statements or their equivalents and identifies those units that are not included in the report. Moreover, the company should include here a description of the process for defining the content and boundaries of the report, and explain how the organisation has implemented Reporting Principles for Defining Report Content, provide a list of all the identified material aspects and present key aspects of internal and external reporting of the organisation. At this point, there are also explanations concerning effects of adjustments (if any) of information contained in previous reports, with reasons for their introduction, and significant changes in the scope and boundaries of the report.

▶ STAKEHOLDER ENGAGEMENT – including a list of stakeholder groups engaged by the organisation as well as key topics and concerns raised by the stakeholders and how the organisation has responded to them.

▶ REPORT PROFILE – this section constitutes an overview of the basic characteristics of the organisation and provides context for the subsequent more detailed reporting. In this part, the organisation provides information on the reporting period and cycle, the date of the most recent previous report, the GRI Content Index, the contact point, as well as the policy and current practice as regards external verification of the report.

▶ In the GOVERNANCE section there is presented, above all, the governance structure of the organisation, the role of the highest governance body in setting the organisation's goal, values, and strategy, management of economic, environmental and social risks and sustainability reporting.

• ETHICS AND INTEGRITY include the organisation's values, principles, standards and norms of conduct, as well as internal and external mechanisms for reporting concerns and seeking advice on ethical and lawful behaviour.

• GENERAL STANDARD DISCLOSURES FOR SECTORS (required if they are available for the sector in which a given organisation operates).

The GRI has also identified specific indicators (Specific Standard Disclosure) concerning issues that may be relevant only to some organisations. The information content of individual categories depends on the level of detail selected by the company and whether a given aspect relates to the company's operation. A separate group consists of sectoral indicators characteristic of a given sector, included in sectoral supplements constituting complement to the GRI Guidelines.

		Guidelines
Category	Sub-Category	Aspect
1	2	3
Economic		Economic Performance, Market Presence, Indirect Economic Impacts, Procurement Practices

Table 13.1. Specific standard	disclosures and their	structure according to the	GRI G4
	Guidelines		

1	2	3
Environmental		Materials, Energy, Water, Biodiversity, Emissions, Effluents and Waste, Products and Services, Compliance with Environmental Regulations, Transport, Overall Expenditure on and Investment in Environmental Protection, Supplier Environmental Assessment, Environmental Grievance Mechanisms.
Social	Labour Practices and Decent Work	Employment, Labour/Management Relations, Occupational Health and Safety, Training and Education, Diversity and Equal Opportunity, Equal Remuneration for Women and Men, Supplier Assessment for Labour Practices, Labour Practices Grievance Mechanisms.
	Human Rights	Investments, Non-discrimination, Freedom of Association and Collective Bargaining, Child Labour, Forced or Compulsory Labour, Security Practices, Indigenous Rights, General Assessment, Supplier Human Rights Assessment, Human Rights Grievance Mechanisms.
	Society	Local Communities, Anti-corruption, Public Policy, Anti- competitive Behaviour, Compliance, Supplier Assessment for Impacts on Society, Grievance Mechanisms for Impacts on Society.
	Product Responsibility	Customer Health and Safety, Product and Service Labelling, Marketing Communications, Customer Privacy, Compliance.

Source: author's study based on [G4..., 2014, p. 9].

The GRI reporting guidelines are based on ten core principles, including transparency, verifiability, complexity, materiality, sustainability context, accuracy, neutrality, comparability, clarity, and regularity. The GRI is the standard of reporting on non-financial data most widely used in the world. More than 6.5 thousand organisations in the world draft their reports according to these guidelines [Grzymisławski 2014, p.19].

13.4.2. Global Compact Initiative

Another tool for reporting on results in the area of sustainable development is the Global Compact Initiative (GC). It was presented by the Secretary-General of the UN at the World Economic Forum in Davos in 1999. He appealed to business representatives worldwide to support, accept and apply nine fundamental principles for human rights, labour standards and the natural environment in all spheres of their activity. The initiative, the core of which is the GC Executive Office, consists of the following six UN agencies: the International Labour Organisation, the Office of the High Commissioner for Human Rights, the United Nations Environment Programme, the United Nations Development Programme, the United Nations Industrial Development Organisation and the United Nations Office on Drugs and Crime³.

By joining the Global Compact initiative, companies undertake to publish information on how they implement objectives and principles of the United Nations Global Compact programme in their annual reports. The GC is a global network of organisations declaring their cooperation and development under the Ten Principles of Responsibility. These are as follows [Makuch 2011]:

Human Rights

Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights; and

Principle 2: make sure that they are not complicit in human rights abuses.

Labour

Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;

Principle 4: the elimination of all forms of forced and compulsory labour; Principle 5: the effective abolition of child labour; and

Principle 6: the elimination of discrimination in respect of employment and occupation.

Environment

Principle 7: Businesses should support a precautionary approach to environmental challenges;

Principle 8: undertake initiatives to promote greater environmental responsibility; and

Principle 9: encourage the development and diffusion of environmentally friendly technologies.

Anti-Corruption

Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery.

³ See Global Compact. Podstawowe informacje. Global Compact Network Poland (http://ungc.org.pl/o-un-global-compact/, 10.01.2016).

The tenth principle was announced during the Global Compact Leaders Summit in June 2004.

The Global Compact adopted as its objective the promotion of corporate social responsibility on a global scale and "building towards sustainable growth of the world economy" [Jeżowski 2007, p. 108]. Participation in the GC is voluntary. Thus, any company that agrees to abide by the above-mentioned ten principles and to support the objectives of the UN may become a participant.

Such a report should include the following three elements [Grzymisławski 2012, p. 33]:

1. Statement of the Director General on continuous support for the Initiative.

2. Information on the core activities in the areas of the ten principles of the GC.

3. Presentation, in a measurable form, of the current and future impact of the company on the environment in comparison with historical data.

Participants may commit themselves to cooperation through [Jeżowski 2007, p. 109]:

▶ Social Dialogue and Analysis. A few times a year the Global Compact organises meetings taking up various issues relating, for example, to globalisation. Thanks to such meetings, problems can be solved by the UN agencies together with employers and non-governmental organisations.

• Knowledge Centre. Promotion of exchange of information among companies on websites of the Global Compact.

• Local Networks. The Global Compact, while striving to become a global initiative, supports networking at the local, national and regional levels.

▶ **Projects.** The Global Compact encourages participation of companies in partnership projects with the UN bodies or non-governmental organisations.

The GC initiative has already been joined by more than twelve thousand members from 145 countries. One of the commitments that companies joining the Initiative make is to publish annual reports on the progress in the implementation of the above-mentioned ten principles [Grzymisławski 2014, p. 19].

13.4.3. ISO 26000

In 2010, the International Organisation for Standardisation presented the ISO 26000 Standard in the area of corporate social responsibility. Its purpose is to encourage organisations to engage in CSR activities on a voluntary basis, and attempt to organise and arrange, together with stakeholders, principles, defini-

tions and methods of evaluation relating to this concept. This document was created in consultation with a wide group of stakeholders so that the presented standard would represent, as far as possible, opinions of all circles. ISO 26000 is intended for all organisations, including business entities and governmental bodies, as well as institutions of the third sector, in both developed and developing countries. Unlike most ISO standards, ISO 26000 is not a technical standard but it includes guidelines ("Guidance on Social Responsibility"); at the same time, it should be clearly emphasised that this standard is not intended for certification.

The structure of ISO 26000 consists of seven chapters, which contain a procedure leading towards a socially responsible organisation. These are as follows [Adamczyk, 2011, p. 26]:

1. *Scope* – this chapter defines the scope of the standard and identifies certain limitations and exclusions.

2. *Terms and definitions* – this chapter contains twenty-seven terms of fundamental importance for understanding social responsibility and using this standard.

3. Understanding social responsibility – this chapter describes the important factors and conditions that have influenced the development of social responsibility, as well as its nature and practice.

4. *Principles of social responsibility* – identification of the fundamental principles of social responsibility as regards accountability, transparency of decisions and activities, ethical behaviours, respect for stakeholder interests, respect for the rule of law, respect for international norms of behaviour, and respect for human rights.

5. *Recognising social responsibility and engaging stakeholders* – organisation's recognition of its social responsibility and identification of its stakeholders in order to establish dialogue and engage them in the management process.

6. *Guidance on social responsibility core subjects* – the chapter presents a guide to sections relating to the core subjects of responsibility. As the core subjects of CSR there were indicated:

- organisational governance,

- human rights,
- labour practices,
- the environment,

 fair operating practices towards government agencies, business partners, and suppliers,

- fair competition,
- consumer issues,
- community involvement and development.

7. Guidance on integrating social responsibility throughout an organisation – includes guidelines for integration of social responsibility throughout an organisation and provides procedures for communications relating to social responsibility, raising the awareness of employees, evaluation of initiatives under CSR and improvement of the social responsibility of the organisation.

ISO 26000 defines corporate social responsibility as "Responsibility of an organisation for the impacts of its decisions and activities (products, services, processes) on society and the environment", through transparent and ethical behaviour that contributes to sustainable development, including health and the welfare of society, takes into account the expectations of stakeholders, is in compliance with applicable law and consistent with international norms of behaviour, and is integrated throughout the organisation and practised in its relationships [Makuch 2011].

The advantage of ISO 26000 is its potential for liquidation of terminological chaos, the broad definition of corporate social responsibility, as well as guidelines for the implementation of the standard. The standard also includes a bibliography that refers to a number of recognised international documents on individual areas of corporate social responsibility and the Annex illustrating a list of international initiatives.

The most important benefits of introducing ISO 26000 in the organisation include [Jedynak 2011, p. 28]:

- strengthening the capacity to build competitive advantage,
- improvement in reputation,

• increase in an ability to attract and maintain employees, customers and suppliers,

• achieving the high morale of employees, as well as their commitment and productivity,

▶ taking into account expectations of investors, owners, sponsors and financial markets,

• improvement in relationships with other organisations, authorities, the media, suppliers, partners, customers, and communities of different types.

13.5. Integrated Reports

The idea of integrated reporting is to consider different spheres of the company's operation in a single report in a coherent manner. The process of developing the framework for integrated reporting began in September 2011, when the first version of recommendations on the issue of integrated reporting was published by the International Integrated Reporting Council (IIRC).

Previously, business entities provided stakeholders with several, separately developed reports and types of disclosures (financial statements, reports on corporate social responsibility and sustainable development, as well as intellectual capital reports). Although stakeholders received a broad range of information about various aspects of entities' operations, the disclosed information was repeated in different sections of the report, its pieces were unrelated and often difficult to interpret. Thus, an initiative was conceived of preparing only a single document - an integrated report. However, it should not come down only to piecing together a series of documents into a whole. To raise the value of the published report, there should be emphasised connections among the organisation's strategy, governance, financial results and the social, environmental and economic context of its activities. The integrated report should be strategically oriented, and it should present the organisation's ability to create value in a clear and concise manner. It should also show the context of individual disclosures and interrelationships among them. It is also assumed that key stakeholders of the reporting entity should be involved in the reporting process [IIRC, Jędrzejka 2012, p. 316].

According to J. Samelak [2013, p.180], the integrated report should form a coherent whole in which financial and non-financial information has been integrated. Hence, it should consist of two coherent parts: financial and non-financial. Data and information contained therein should give a complete picture of the business entity's operations in its business environment, taking into account its impact on society and the environment.

The first part of the integrated report covers annual financial statements together with an auditor's report and opinion. These statements reveal to stakeholders risks relating to the economic situation and financial standing, as well as the current financial result. However, they do not disclose a number of other risks associated with the complex activity of the company, the environment of this activity, capital markets, management and measurement of undisclosed intangible assets and corporate social responsibility. Meanwhile, stakeholders communicate their need for extensive information about operations of the company. They often point out the lack of cohesion between different elements of financial statements and an insufficient level of detail of the presented data, including with respect to business risk, which significantly limits the usefulness of the financial statements for making decisions [Szczepankiewicz 2013, p. 72].

Table 13.2. Model approach to the structure of the integrated report according to the annual report concept	
Division into parts	Content of individual parts
Part 1	 Introduction to the financial statements Balance sheet Profit and loss account Statement of changes in equity Cash flow statement Notes, excluding information on employment, and management and
Financial statements	supervisory bodies Annex containing an auditor's opinion and report
Part 2	 Clear explanation of the relationship between non-financial information
Report on activities	presented in this part and financial information included in the first part. Social responsibility strategy adopted in the company. Information on activities required by law to be included in the report, with
and intangible assets	the exception of risks and the environment. Information on economic risk and management of that risk. Information on the impact of the company's activities on the environment. Information on the social commitment of the company. Information on intellectual capital, including data excluded from the notes
not included in the	regarding employment. Information on independent external verification (audit) of the second part
financial statements	of the report along with an auditor's report.

Source: [Samelak 2013, p.180].

The second part of the integrated report fills the gaps identified by stakeholders. It contains a report on activities as well as a report on intangible resources and activities in the area of corporate social responsibility not included in the financial part.

This part includes a report containing environmental aspects of the company's activities [Samelak 2013, p. 183]:

- indicators on consumption of raw materials/consumables,
- energy consumption indicators,
- water consumption indicators,
- biodiversity indicators,
- indicators on emissions, effluents and waste,
- indicators on products and services,
- indicators on compliance with environmental regulations,
- transport indicators,
- indicators concerning the overall environmental aspect.

When promoting the concept of sustainability reporting, a number of resulting benefits are pointed out for both reporting entities and recipients of this information. The main of them include [Jędrzejka 2012, p. 318]:

• better meeting of the information needs of long-term investors,

• higher level of trust of key investors, which may result from greater transparency of the report and their deeper involvement in the reporting process,

• more effective identification of risks and opportunities on the part of the entity preparing the report and on the part of recipients of the information,

• lower risk of reputation loss,

• presentation of broad and long-term consequences of decisions made by the reporting entity,

▶ rational decisions on the allocation of resources, enabling reduction in costs and efficient allocation of scarce resources,

• presentation of clear connections between internal and external factors shaping the performance of the entity and its impact on other entities in the supply chain,

• narrowing the focus on measurement and monitoring of short-term results by presenting a wide range of factors determining the success of the organisation,

• easier access to capital and lower cost of the same,

• efficient allocation of capital, which, in turn, may encourage entities to launch and continue environmental investments,

• integration and harmonisation of reporting requirements,

• market stability – greater transparency can limit price changeability.

To sum up, it should be emphasised that the uniform preparation of the integrated report across all companies will increase the comparability of reports published in different countries having different legal systems. The greater transparency of reports will be the basis for investors and other stakeholder groups to make rational decisions.

13.6. The Environment as a Special Reporting Area

One of the most important areas of sustainability reporting is information on impacts of operational activities of companies on the environment. These reports are based on standards relating to environmental protection and key indicators developed for a given industrial sector as regards environmental efficiency. Environmental reporting can be viewed as an examination of the impact of a business entity on the environment and as a financial picture of environmentally-friendly activities. The form of environmental information presentation is also of importance as it only gives comprehensive knowledge of the entity and its results in combination with general information on achievements of the company in the area of environment.

A company may present environmental information in [Antczak 2014, p. 15]:

- notes being part of the financial statements, as a separate part of the notes,
- a report on activities, as its separate section,

• an additional environmental report being a supplement to the financial statements.

The annual financial statements contain information on conducted activities, together with the determination of the impact of these activities on the environment. This information is used to define a strategy in the environmental area and to take decisions on projects relating to environmental protection.

The most commonly reported information relating to the environment concerns:

• adherence to standards and compliance with legal provisions relating to the use of the environment,

• improvement of efficiency and quality of production through reduction in the use of natural resources (reduction in the consumption of materials, energy, water, etc. per production unit),

• environmental investments and technical and technological measures intended to reduce the company's nuisance to the environment,

▶ increase in the environmental awareness of employees through training and undertaking environmental projects, e.g. Clean Up the World.

▶ sponsorship of green initiatives undertaken in the local environment in which the company operates.

Uniform reporting on business entities' impact on the environment is currently being sought around the world. The GRI guidelines are most often used for this purpose. In the current version of GRI G4, the environmental aspect of sustainability reporting refers to the organisation's impacts on animate and inanimate nature, including ecosystems, land, atmosphere, and water. Environmental indicators include results associated with the use of production factors (e.g. materials, energy, and water) and effects of the production (e.g. emissions, spills, and waste). Moreover, they include results relating to the impact on biodiversity, compliance with environmental principles and other relevant information, such as expenditure on environmental protection or impacts of products and services on the environment. The GRI report contains thirty-four indicators divided into several categories: raw materials/consumables, energy, water, biodiversity, emissions, effluents and waste, products and services, compliance, transport, and general issues.

Companies provide concise information on the issues mentioned above. Firms should also inform about their objectives with respect to results important from the point of view of the environment. In order to demonstrate the degree of fulfilment of the set objectives, they also present, apart from the GRI indicators, indicators specific to a given company. They must also provide a brief description of the policy defining their overall commitment to the environmental aspects listed above and a statement by the top management on operational responsibility for the environment. Table 13.3 presents reporting areas and indicators used in these areas to illustrate the company's impact on the environment.

	·
	ASPECT: MATERIALS
G4-EN1	Materials used by weight or volume
G4-EN2	Percentage of materials used that are recycled input materials
	ASPECT: ENERGY
G4-EN3	Energy consumption within the organisation
G4-EN4	Energy consumption outside of the organisation
G4-EN5	Energy intensity
G4-EN6	Reduction of energy consumption (achieved as a result of improvement in energy efficiency, as well as maintenance and repairs)
G4-EN7	Reductions in energy requirements of products and services

Table 13.3. Structure of the GRI 4 re	eport in the environmental area
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ASPECT: WATER				
G4-EN8	Total water withdrawal by source			
G4-EN9	Water sources significantly affected by withdrawal of water			
G4-EN10	Percentage and total volume of water recycled and reused			
	ASPECT: BIODIVERSITY			
G4-EN11	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas			
G4-EN12	Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas			
G4-EN13	Habitats protected or restored			
G4-EN14	Total number of the IUCN (International Union for Conservation of Nature) Red List species and national conservation list species with habitats in areas affected by operations of the organisation, by level of extinction risk			
	ASPECT: EMISSIONS			
G4-EN15	Direct greenhouse gas (GHG) emissions (by weight) (Scope 1)			
G4-EN16	Energy indirect greenhouse gas (GHG) emissions (by weight) (Scope 2)			
G4-EN17	Other indirect greenhouse gas (GHG) emissions (by weight) (Scope 3)			
G4-EN18	Greenhouse gas (GHG) emissions intensity (emissions intensity ratio)			
G4-EN19	Initiatives undertaken to reduce greenhouse gas emissions and achieved results			
G4-EN20	Emissions of ozone-depleting substances (ODS)			
G4-EN21	NO_{x} , SO_{x} , and other significant air emissions			
ASPECT: EFFLUENTS AND WASTE				
G4-EN22	Total water discharge by quality and destination			
G4-EN23	Total weight of waste by type and disposal method			
G4-EN24	Total number and volume of significant spills			
G4-EN25	Weight of transported, imported, exported, or treated waste deemed hazardous (within the meaning of Annexes I, II, III, and VIII to the Basel Convention), and percentage of transported waste shipped internationally			
G4-EN26	Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organisation's discharges of water and runoff			
ASPECT: PRODUCTS AND SERVICES				
G4-EN27	Extent of impact mitigation of environmental impacts of products and services			

G4-EN28	Percentage of products sold and their packaging materials that are reclaimed by category			
	ASPECT: COMPLIANCE			
G4-EN29	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations			
	ASPECT: TRANSPORT			
G4-EN30	Significant environmental impacts of transporting products and other goods and materials for the organisation's operations, and transporting members of the workforce			
ASPECT: OVERALL				
G4-EN31	Total environmental protection expenditures and investments by type			
ASPECT: SUPPLIER ENVIRONMENTAL ASSESSMENT				
G4-EN32	Percentage of new suppliers that were screened using environmental criteria			
G4-EN33	Significant actual and potential negative environmental impacts in the supply chain and actions taken $% \left({{{\mathbf{x}}_{i}}} \right)$			
ASPECT: ENVIRONMENTAL GRIEVANCE MECHANISMS				
G4-EN34	Number of grievances about environmental impacts filed, addressed, and resolved through formal grievance mechanisms			

Source: author's study based on [G4..., 2014, pp. 52-63].

Table 13.4 presents a comparison of individual elements of the GRI Guidelines, ISO 26000 and the principles of the Global Compact, which can be used for environmental reporting in the form of an extended management report on activities of the entity or a separate report containing non-financial data.

It should be emphasised that the GRI and the Global Compact complement each other in promoting universal principles of corporate responsibility and form a unified platform of values for organisations wishing to implement the policy of sustainable development into their activities.

It gives companies a possibility to prepare a single report providing information about progress in the implementation of the GC Principles, and presenting the GRI indicators. It is assumed that the ten principles of the GC will be integrated in the next generation of the GRI.

GRI G4	ISO 26000	UN Global Compact
 Materials (G4-EN1–G4-EN2) Energy (G4-EN3-G4-EN7) Water (G4-EN8–G4-EN10) Biodiversity (G4-EN11–G4-EN14) Emissions (G4-EN15-G4- EN21) Effluents and Waste (G4-EN22-G4-EN26) Products and Services (G4EN27–G4-EN28) Compliance (G4-EN29) Transport (G4-EN30) Overall (G4-EN31) Supplier Environmental Assessment (G4-EN32-G4-EN33) Environmental Grievance Mechanisms (G4-EN34) 	 Prevention of pollution (6.5.3) Sustainable resource use (6.5.4) Climate change mitigation and adaptation (6.5.5) Protection of the environment, biodiversity and restoration of natural habitats (6.5.6) 	 Businesses should support a prudent approach to environmental challenges. Businesses should undertake initiatives to promote greater environmental responsibility. Businesses should encourage the development and diffusion of environmentally-friendly technologies.

	Table	13.4.	Content	of envi	ronmental	data in	individual	reporting	standards
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Source: [Grzymisławski 2014, p. 20].

13.7. The Scope of Reporting in Poland

Reporting in the social and environmental areas already has a long history. In France, since 1977, companies employing more than three hundred people have been required to report on the so-called social balance. In July 2010, a statute imposed an obligation on all major companies operating in the country to report on CSR and contributions to sustainable development. In 2006, Great Britain obliged all public and private companies (except small ones) to publish reports on business activity as part of the annual management report, which is to include environmental, labour and social issues. In 2009, Denmark and Sweden introduced the obligation of CSR reporting according to the GRI, applicable to major companies. In 2012, also Spain obliged state-owned companies to prepare sustainability reports⁴.

⁴ See Raportowanie ESG w Unii Europejskiej – Regulacje w poszczególnych krajach Unii Europejskiej (http://seg.org.pl/pl/node/2130, 20.01.2016).

In Poland, the disclosing of social, environmental and economic information has been practiced only for a few years, but an upward trend can be observed in this area. In 2014, the Polish Association of Listed Companies conducted the third edition of research on sustainable development. The study covered 897 companies, 459 of which were listed on the Warsaw Stock Exchange. Data on prices, as well as financial data was taken from the database of the company Splentum Sp. z o.o. In accordance with the adopted methodology, each of the companies received an individual assessment on a scale from 0 to 3. To qualify a company to a particular group (assessment scale) there was used the Risk Rating model and a dialogue was held with the companies via a platform where they could view their analysis and comment on the obtained results.

Number of	Assessment	Assessment description	Environmental management (E)		
points scale			2012	2013	2014
2.7–3 or 1.8-2	а	Mechanism of external verification	0%	0%	0%
2.25 or 1.5	а-	Progress assessment	0%	0%	0%
1.8 or 1.2	b+	Policy + programme + management system	0.1%	0.2%	0.2%
1.2 or 0.8	b	Policy + programme or policy + management system	1.9%	1.7%	2.4%
0.75 or 0.5	b-	Extensive company policy	2.4%	3.2%	3.0%
0.3 or 0.2	c+	Instructions concerning the existence of the company's strategy	13.3%	12.7%	13.5%
0	С	Absence of information or complete failure of the assessment	83.3%	82.2%	81.2%

Table 13.5. Comparison of reporting results in the area of the environment
in 2012–2014

Source: author's study based on [Kostrzewa 2014, p. 9, p. 13].

In 2014, in the area of environmental management, 0.2% of the total sample received rate b+ and that was the highest rating. None of the companies received a higher result. Rate b was obtained by 2.4% and b- by 3% of the surveyed companies. Rate c+ was received by 13.5% and rate c by 81.2% of the companies. It means that over 80% of the surveyed companies do not publish

any information relating to the environment. Therefore, on the basis of the data included in Table 13.5, there can be observed the continued low level of disclosures of information relating to environmental protection. In 2014, as compared to 2012, a slight upward trend can also be noticed. In 2012, more than 83% of the companies did not disclose information about management in the environmental area; in 2014, this number was a little higher than 81%. The main factor that will mobilise companies in the coming years to increase the level of reporting on non-financial data will be legal measures adopted by the European Union in this area. "When reporting information, a company will be able to rely on national, European or international frameworks. Companies will be able to use the world's most popular non-financial reporting guidelines of the Global Reporting Initiative, the Global Compact, ISO 26000 or other international or national standards" [Sroka 2014, p. 5]). It should be emphasised that in the coming years the quality and usefulness of information contained in entities' reports addressed to a wide group of stakeholders will be of increasing importance. They will form the basis for making business decisions.

13.8. Final Remarks

To sum up the deliberations contained in this chapter, the increasing demand for information about operations of business entities should be emphasised. Financial information contained in financial statements has become far from sufficient for different groups of stakeholders to make rational decisions. Therefore, information relating to the impact of the company's activities on the environment is becoming increasingly important. This information is contained in internal environmental reports and is used by managers to make rational decisions in the area of business activity and finance. The scope and accuracy of internal reports determine the quality of external reports. At present, basic tools for reporting environmental data to external stakeholders are guidelines of the Global Reporting Initiative (GRI), the UN Global Compact and ISO 26000. Reports prepared in accordance with a selected model of guidelines include information on environmental, social and labour aspects. The most important area of these reports seems to be the environmental area. Pursuant to the EU directive mentioned in this chapter, in the environmental area, companies must report information on the current and expected impact of the entity on the environment and, in some cases, human health and safety, the use of renewable or non-renewable energy, greenhouse gas emissions, water consumption, and air pollution. Within the framework of integrated reporting, covering the financial area and the above-mentioned areas of the company's operations, companies may disclose the information in a report on activities or in a separate report. Such a report must contain information which is important for the company's operations and relates to implemented policies, achieved results and risk management in relation to the environmental, social and labour issues. An important area of these reports will be issues relating to respecting human rights and preventing corruption and bribery.

14 Possibilities and Directions of Improvement of Eco-Efficiency in the Operational Domain

14.1. Introductory Remarks

The purpose of the chapter is to present some conditions of improvement of ecoefficiency in the operational area of enterprise management and to indicate selected areas of improvement of eco-efficiency of an enterprise, in particular as regards cost management, in connection with the attainment of objectives by companies from the perspective of the application of sustainability principles.

14.2. Presentation of the Concept of Eco-efficiency in the Operational Domain

14.2.1. Operational Management

According to one of the definitions of operational management, proposed by D. Waters [Waters 2001, p. 32], it is a function of management responsible for all actions directly related to the generation of products, gathering raw materials and processing them into the planned finished products. Operational activity is defined in the Accounting Act – Article 48b section 3 item 1, and is understood as "the basic type of entity's activity and other types of activity, not included in investment activity or financial activity". Both definitions relate to the same area of economic activity, i.e. the operational domain.

The definitions presented above focus on operational management on the level of an enterprise, without taking into account the interactions of the environment on the company. There are no direct references to the area of environmental or social conditions in which an enterprise functions and their impact on a company. As regards the area that takes into consideration the impact of both these fields on a reciprocal basis, we deal with eco-efficiency within the meaning of the application of the principles of sustainable development. Definitions of sustainable development are widely presented in the literature [Bartkowiak 2008; Adamczyk and Nitkiewicz 2007] and will not be discussed in this chapter.

14.2.2. Operational Eco-efficiency

The concept of eco-efficiency is defined in many ways, including as proposed by M. Camarero as "the ability of enterprises, regions, economies to produce a greater quantity of goods and services with lower consumption of natural resources" [Camarero et al. 2013, p. 89].

In accordance with the definition of operational activity adopted above, only broadly understood costs rather than revenue are the area in which operational performance may be accomplished since the operational level of production or service provision does not generate revenue directly. For the purpose of the chapter, a review of operational costs has to be carried out as regards the aspect of eco-efficiency of the operational area in enterprise management, so that the operational costs responsible for eco-efficiency may be selected.

According to the classification presented in Annex No. 1 to the Accounting Act (the Act of 29 September 1994), the costs of operational activity include depreciation, consumption of materials and energy, third party services, taxes and charges, salaries and wages, social insurance and other benefits as well as other costs. However, according to the definition of operational management which specifies it as "all actions that directly relate to the production of product..." [Waters 2001, p. 32], depreciation should be eliminated from the collection of costs by type, since this cost is not directly connected with operational activity but it is only a derivative of the performance of an investment in production property. Since this chapter only deals with eco-efficiency on the operational level, all activities connected with the performance and financing of investments, including social responsible investment (SRI) will be only analysed in the chapter as examples or supplementation within the context of operational activities.

The concept of eco-efficiency in the operational domain was put forward for the heavy industry by S. Falson, who defined it in an indirect manner as follows: "Operational objectives of the processes of the heavy industry include permanent improvement of productivity, reduction in costs of energy, reduction in stock and capital saving, and all these things should be attained by means of sustainability" [Falson 2009, p. 1]. If this definition is extended with corporate social performance, in particular in such sensitive areas as human resources and direct corporate environment, one may define eco-efficiency as follows: eco-efficiency in the operational domain is understood as the application of the principles of sustainable development in management, consisting of permanent improvement of the effectiveness of operations with simultaneous limitation of an adverse impact on the environment and an increase in the satisfaction level of employees and the corporate environment.

The problem with environmental performance measurement lies not in the costs in accounting terms but rather in costs that are not directly connected with the process of management of the operations of an enterprise. Examples of such costs include costs of potential degradation of the natural habitat in the scope of the impact exerted by an enterprise, which are not incurred directly by an enterprise, and social costs connected with the availability of human resources on the labour market and corporate social responsibility.

Due to the nature of operational activity, the applied management tools have to be measurable and simple in order to accomplish the set objectives. If it is assumed, according to the definition presented above, that eco-efficiency covers, apart from the purely productive domain, also the area of corporate social responsibility and broadly understood human resources, all aspects of the operational activity in these areas should be analysed.

Many organisations deal with the issue of sustainable development, including, for example, international organisations, e.g. the UN or the OECD. However, apart from the political aspects dealt with by these organisations, another issue that is of certain significance is the transfer of the principles of sustainable development to the economic domain. Some organisations that promote values connected with sustainability also define more detailed principles of management for the improvement of eco-efficiency. According to the three principal objectives of eco-efficiency defined by the World Business Council for Sustainable Development, which include: ▶ reduction in the consumption of raw materials, including energy, materials, water, soil and increase in the pressure on recycling,

▶ reduction in the impact on the environment, including reduction in emission of air and water pollutants, reduction in storage of solid waste and responsible use of renewable resources,

▶ increase in the product value, understood as providing clients with more benefits by means of increasing the functionality of products, flexibility and module-based production, provision of additional services and focus on the sale of goods currently needed by clients [WBCSD 2000],

management should contribute to increased competitiveness of enterprises that apply principles aimed to attain these objectives.

It is assumed that if the above principles are applied, competitiveness should increase by means of the improvement of the economic performance in connection with (inter alia) the improvement of environmental performance.

14.3. Environmental Performance vs. Economic Performance in the Operational Area

The relations of environmental and economic performance are of key significance as regards sustainable development. Economic performance is the basis of economic activity and, as such, has been present in the theory and practice of economic activity for many years. That is why it will not be presented here. Economic performance is discussed in the literature, for example, by J. Dahmus [Dahmus 2014]. Its measurement according to the author's assumptions is illustrated by the following formula:

Natural resources = Quantity
$$X \frac{1}{Performance}$$
, (13.1)

where Quantity means the consumption of natural resources, and Performance means environmental performance of an undertaking. Thus, the following relation is expected as regards measurements of changes in environmental performance of an undertaking:

$$\frac{\Delta E}{E} > \frac{\Delta Q}{Q} > 0, \tag{13.2}$$

where ΔE and ΔQ mean changes of performance and consumption of natural resources.

In accordance with the above formulas, the consumption of natural resources is directly proportional to their volume and reversely proportional to environmental performance, while the improvement of environmental performance results in reduced consumption of natural resources.

However, the proposal presented above focuses merely on the consumption of natural resources and does not refer to any other relations between business and the environment, such as, for example, environmental pollution resulting from the conducted economic activity. That is the reason why further associations for the reciprocal impact of these two areas should be searched for.

A theoretical relation between the generated economic value and the quality of the environment is indicated by G. Huppes [Huppes 2008] and it is presented in the graph below. The black points on the graph show actual values while the curve reflects the possible optimal situation for a single undertaking, expected by the public (consumers in this case).



Total quality of the environment

Total environmental burden

Fig. 14.1. Interdependency between the economic value and the quality of the environment

Source: [Huppes 2008].

G. Huppes indicates the difficulties with the measurement of the value in simple situations, so one may assume that there will be more problems with an increase in the number of undertakings, and, consequently, the quantity of data. Problems connected with the relation of the economic value and the to-tal quality of the environment as well as waiting for finding optimal solutions are broadly described in literature. The same author also indicates a necessity to reduce costs as one of the main elements of the aggregated approach connected with ecological performance for gaining economic benefits. Andreas Ciroth [Ciroth 2009, p. 1583] also claims that "cost data is a central aspect of the measurements of eco-efficiency." That is the reason for the adoption of broadly understood management of enterprise's costs as a factor of a decisive impact on environmental performance, some questions appearing at the very beginning, posed by R.L. Burritt [Burritt and Saka 2005], are significant for the further considerations. The questions are as follows:

1. What are environmental costs?

2. Which types of environmental costs are of potential significance to business?

3. Are environmental costs considerable to a given organisation?

The answer to these questions is of key importance for the further procedure, since intended objectives may be either attained or not fulfilled when applying the selected comparison of costs, for example in the event of defective definition of a set of environmental costs significant for conducting business. Green controlling is a tool for cost management, which may also be used to avoid such mistakes. It takes into account the sustainability principles and is defined as "... a variety of controlling, separated with consideration given to the processes connected with environmental protection. The subject of its interest includes, in particular, the effectiveness of the actions taken in the scope of environmental protection and application of environmental standards, as well as an analysis of the interdependency between the actions taken for the benefit of environmental protection and the achieved results" [Kochalski 2015]. The proper allocation of environmental costs is also one of the problems visible here and referred to in literature [Ciroth 2009]. That is why the pedigree matrix is recommended for cost management aimed at the improvement of eco-efficiency. The matrix evaluates the quality of data related to costs. It considers such factors as reliability of the source of data, its completeness, time and geographical differences in obtaining data, as well as technological differences. This approach allows for

the comparability of data from different enterprises functioning under diverse conditions. There are also some other methods of efficiency evaluation, including Data Envelopment Analysis¹ with the CCR model developed by A. Charnes, W. Cooper and E. Rhodes and, as a consequence of FDH² (Free Disposal Hull) technique [Adamczyk 2007]. However, this method is not broadly applied in the management of business processes (including operational sphere), apart from the applications in relatively small areas. It is probably so because of its complex nature as regards the conditions of daily management.

Apart from the considerations of the environmental costs and their influence on enterprise's performance and eco-efficiency, a question should be asked whether the improvement of efficiency in the area of environmental costs is convergent with eco-efficiency understood as sustainable development. As it has been assumed earlier, care about the environment is one of the elements of sustainability; thus, a conclusion may be drawn that actions in the scope of environmental protection should be treated equally as the actions taken in other areas of the activity conducted by a company. It is the responsibility of the legislature to assure this type of relation.

14.4. Legislative and Social Conditions of the Functioning of Enterprises from the Perspective of Ecology

Problems connected with the protection of the environment are reflected in international relations, which, in turn, are a source of the national legislation in this scope. As a rule, legislation establishes the limits of permissible contamination of the environment or the limits of using the environment by means of referring to environmental objectives. However, the Polish law provides for no system that would motivate for particular care about the natural habitat beyond

¹ Data Envelopment Analysis is a non-parametric method of evaluating effectiveness and productivity, based on the use of data of the greatest measured effectiveness, i.e. occurring actually in the analysed group, and creation of models for the evaluation of (inter alia) ecological, economic and social performance.

² Free Disposal Hull is a non-parametric method of estimation of the production group with defined technically viable inputs and outputs. It is defined as the smallest possible group of information containing all observations in the analysed sample of the production unit [Park, Simar and Weiner 2000, p. 855].

the set standards permitted under legal provisions in force. Examples of such an approach to the relations between legislation and care about the environment include the Water Law (the Act of 18 July 2007), the Environmental Protection Law (the Act of 27 April 2001), the Act on Prevention of Damage to the Environment and its Remedy (the Act of 13 April 2007) or the Act on Ozone Depleting Substances (the Act of 20 April 2004). All these legal acts and legal acts issued on their basis, such as ordinances of competent ministers, apply the principle of penalisation for exceeding standards, without establishing a system of awards for reaching more beneficial parameters for the environment. It leads to certain minimalism as regards the behaviour of economic operators, who rationalise the incurred costs, including the costs in the scope of environmental protection³.

In the three main areas of the functioning of an enterprise, the legislation defines the functioning of companies and costs connected with it from the perspective of the application of the sustainability principles, in particular in:

1) the environmental area that defines, for example, taxes and charges for the use of the environment, including natural resources, for environmenal pollution, by establishing the maximum values of permissible standards of pollutant emissions, and taxes and charges connected directly or indirectly with waste recycling,

2) the area of the employment relations and the costs connected with them, both in the scope of minimum salaries and working conditions, as well as the area of occupational safety; this area also includes uncountable costs incurred by economic operators which affect the functioning of an enterprise on the market, such as flexibility of the labour market and knowledge management within the sense of education of future employees, as well as in the field of relations of an enterprise with its suppliers within the sense of working conditions of suppliers' employees,

3) the area connected with corporate social responsibility within the context of the possibility of creation of the corporate image and the level of fiscal obligations resulting from it, here understood as the possibilities of including such actions in tax deductible expenses.

Only the first of the three areas mentioned above refers directly to environmental conditions, and the two further ones supplement the catalogue and

³ It does not relate, though, to the area of sale of air pollutants, which is still an exception to standards applicable to other areas of environmental pollution, such as contamination of waters and soil as well as noise.

create a proper basis for management under the conditions of sustainable development. With this background, it is important to present an outline of the corporate environment of enterprises that apply the principles of sustainable development and, also within this aspect, to present the legislation that directly relates to the areas of law described above.

▶ The environmental domain is described in legal provisions in a way that depends on the level of the community development. The established standards define the limits of permissible contamination or the maximum level of using natural resources. A sub-area is here the legislation defining certain burdens (costs) for conducting economic activity with the use of the natural habitat. Examples include charges for waste management, water collection or discharge of sewage.

> The area of relations between the employee and the employer is subject to the provisions on reciprocal obligations. One of the elements of such obligations is the minimum level of salaries. The sub-area of these relations defines safety of working conditions and the relations between the employer and organisations representing employees, which considerably affects the costs of economic activity. Internal legal regulations of an enterprise related to the reciprocal obligations of the employer and the employee, such as collective agreements, usually indicate additional obligations on the part of the employer, which in turn results in further increase in costs incurred by the company. A separate, or rather, neighbouring sub-area is the one connected with the relations of an enterprise with its suppliers, including in particular working conditions of employees who work in companies being suppliers of goods and services. An example of this approach is presented in the further part of the chapter. As regards the area of the relations between the employer and its employees, the legislation is very broad and includes, in particular, such legal acts as the Labour Code (the Act of 26 June 1974), the Trade Union Act (the Act of 23 May 1991), the Act on Informing Employees and Consultations (the Act of 7 April 2006), the Act on Special Principles of Termination of Employment Relationships with Employees for Reasons Not Connected with Employees (the Act of 13 March 2003) or the Act on Settlement of Labour Disputes (the Act of 13 May 1991). The principle of minimisation of the fulfilment of legal provisions is no longer applicable in this area in employment relations. The fulfilment by the employer of higher benefits for employees than the ones stipulated in legal provisions in force is considered desirable from the perspective of the public, and thus legal provisions allow for including such costs as tax deductible expenses and, consequently, reducing the taxation basis.

▶ The area connected with corporate social responsibility is not directly regulated in legal provisions in force. The legal provisions in this field stimulate or destimulate the activity of enterprises in this direction by means of taxation of different types of activity connected with CSR, or exemption from such taxes. The corporate image is a factor that is so strongly conditioned, apart from legislative factors, that legislation only strengthens or weakens the activity of companies in the field of CSR, without eliminating or creating them in a direct manner. The Polish law does not provide for any special legal regulations in the scope of the relations between the CSR area and the state's fiscal policy. General regulations apply in this scope, such as the Personal Income Tax Act (the Act of 26 July 1991), the Corporate Income Tax Act (the Act of 15 February 1992) or the Tax Code Act (the Act of 29 August 1997).

The outline of the legislation in the scope of sustainable development presented above shows a very diversified approach of the legislator to each of the three principal areas of sustainable development. Thus, it would be difficult to prove a conscious policy of the state as regards the promotion of sustainability as a way of enterprise management. However, one may not neglect the fact that at present the Polish legislation is, to a large extent, the transposition of the law of the European Union. A conclusion may be drawn that the promotion of the principles of sustainable development in the economy is justified on the Community level. Against the background of the international legislation, "as it stems from a broad view (of authors of law), sustainable development is nowadays part of the international lexicon of law. The basic issue is not whether it is not part of law now, but how it is to be applied and developed in practice (...). These questions arise in the context of both the legislature and the judiciary" [Sands 2015, p. 341]. Despite the fact that legislation provides for the implementation of the state's policy and the international obligations accepted by the state, the awareness and knowledge of the society in this respect are equally significant for the fulfilment of the sustainability principles.

14.5. Ecological Awareness of Consumers vs. Natural Resource Management

Ecological awareness is an element that is shaped, on the one hand, by the social conditions of the environment in which the human lives and, on the other hand,

it may be formed consciously. An example is provided by R. Hansmann [Hansmann et al. 2005] on the basis of a simulation game related to the ecological attitudes, carried out on a group of students in Switzerland. The game involved comparing behaviours of one group that was provided with information on economic and ecological consequences of their choices as regards products with the behaviours of the other group, which was not provided with such information. The game proved legitimacy of providing the public, including potential clients, with information on the consequences of decisions within the context of the civilisation development. What was of key significance was the provision of feedback connected with the decisions made by participants.

The very ecological awareness of the society and its impact on the clientproduct relations are broadly presented in the literature. This may be also exemplified by Norazah Mohd Suki, who presented the results of the research on the attitudes of young consumers in Malaysia [Suki 2013]. As the research results indicate, there is considerable convergence of the awareness of young customers in the scope of health and environmental protection with the choices they make. At the same time, the research conducted upon the order of the European Commission [Pesonen, Lasko and Hamalainen 2013] demonstrates that 17% of Europeans purchased environmentally-friendly products, and the share is on the increase. According to another research [Pesonen, Lasko and Hamalainen 2013], there is dynamic growth of the market of ecological food (growth by 43% in 2007 on the global market). What should be pointed out here is that the share of such food in the European market constitutes merely 4%. The research on the level of knowledge of clients and employees of the swimming pool in AaltoAlvari, Finland, in turn, indicates a considerable lack of knowledge of the basic processes occurring in nature, including, for example, the water cycle. One of the conclusions drawn on the basis of the conducted research was the necessity to provide the public with knowledge in the scope of environmental protection for the purpose of the possibility of implementing the sustainability policy [Pesonen, Lasko and Hamalainen 2013]. The examples provided above are the evidence of unequal awareness and knowledge in the scope of environmental protection amongst consumers and employees.

The awareness of the public and, consequently, of customers is of key importance also as regards the areas of corporate social responsibility and employment relations. Social movements have a stronger and stronger influence on the perception of enterprises, not only in the area of CSR, but throughout the scope of the activity conducted by companies. Easier access to information and com-

munication enables the society to exert a stronger and stronger impact on companies, including the ones that function on international markets. Pressure on organisation managers with respect to responsible and sustainable activity becomes more and more common. As regards this area, one may observe actions taken by organisation managers aimed at the implementation of the principles of sustainable development, also in terms of broadly understood employee rights related to the working conditions in cooperating enterprises. The problem of working conditions of the employees of a sub-supplier of Nike, presented by L.S. Paine [Paine 2015], shows the ethical side of the activity conducted by the international corporation to avoid accusations of economic neo-colonialism. The manner of solving the presented problem, which consists in the appointment of a special committee devoted to corporate social responsibility issues, is evidence of greater and greater engagement of the authorities of enterprises in solving such problems as working conditions, not only as regards employees that are directly employed in a company, but also the working conditions of contracting parties. However, such activities, being on the verge of management and ethics of business, are still rare nowadays. At the same time, attention should be paid to the possibilities of information impact of enterprises, including in particular large international corporations, on the way they are perceived by the public, including the very legislative process in the areas mentioned above. No broadly conducted research in this scope is known nowadays. As it has been demonstrated above, an increase in the social awareness is not only limited to the seller-customer relations, but, at the same time, it has an influence on the perception of working conditions and the attitude of an enterprise itself to the natural environment. Such an increase in awareness has certain consequences as regards the approach of enterprises to the increase in eco-efficiency by means of management of, for example, environmental costs.

14.6. Eco-efficiency vs. Sustainable Development in the Area of Operational Management of an Enterprise. Direct and Indirect Environmental Costs

As it was presented earlier, environmental performance is one of the areas of eco-efficiency. That is why it should not be analysed separately, but as one of

the elements of eco-efficiency. Operational management from the perspective of sustainable development or eco-efficiency is a slightly different concept from operational management understood in a traditional way, since it also enters the areas that are not directly connected with production. In most production companies, organisational departments connected with production and the ones dealing with employee issues and CSR are separate. It poses another challenge faced by managers, which is connected with the necessity to define principles and objectives of operational management in order to improve ecoefficiency within the meaning of sustainable development. Examples of such dualism in management as regards cost efficiency include costs connected with the enterprise-environment relation. From the perspective of production process management and reduction of costs in this area, the most rational approach is to reach minimum standards required by law in the scope of environmental protection with the lowest possible costs. However, from the point of view of the public, such a level of costs does not have to mean the most optimal management, taking into account the benefit account of the whole corporate environment. In the future, indirect environmental costs, also in the social sense, may constitute significant conditions that limit development or even survival of a company. Examples of such indirect costs include the costs incurred on working conditions, which should be the lowest possible from the perspective of production management. However, from the perspective of the possibility of recruiting employees in the future, the same costs may constitute a barrier to employment of highly-qualified staff. In order to properly manage costs, taking into account the conditions presented above, one has to properly select the costs and the manner of managing them, in order to meet the principles of sustainable development.

14.7. Selected Areas of Cost Management in the Light of the Principles of Sustainable Development

As mentioned above, the cost area is the proper one for improvement of ecoefficiency in the operational domain. The literature focusing on sustainable development devotes a lot of attention to costs connected with an increase in enterprise's performance, taking into account broadly understood environmental protection. The new quality in this area is the approach to calculation and management of costs, presented by Ch. Jasch [Jasch 2006]. Costs connected with the environment have been separated from the account of costs and each cost has been allocated to a relevant environmental factor. Thus, costs have been grouped into the three categories:

1) treatment of waste and air, in distribution into depreciation of relevant equipment, maintenance and service, and costs of materials, remuneration of employees responsible for these processes and taxes and charges connected with this process,

2) environmental protection and environmental management in distribution into external services in the scope of environmental management, remuneration for people engaged in environmental protection, research and development, extraordinary expenses incurred for integrated protection technologies and other costs of environmental management,

3) materials that do not constitute value in the final product, in distribution into raw materials, packaging, auxiliary materials, operational materials, energy and water as well as revenue connected with the activity for the benefit of the environment, including subsidies.

Each of these cost categories has been allocated to the following environmental factors:

- 1. Air and climate
- 2. Sewage
- 3. Waste
- 4. Contamination of underground waters
- 5. General costs of environmental management

The author emphasises the proper identification and allocation of assets to individual processes connected with particular categories of costs in the three categories: 1/ the end of pipe equipment that does not constitute production elements and is aimed at environmental objectives, 2/ pure production equipment, being elements of production equipment, but of higher value due to the necessity to attain environmental objectives, and 3/ high loss equipment, which does not meet the "best available technology" at a given moment. Such an approach to environmental costs was implemented in three breweries in Austria [Jasch 2006]; it is presented as a quick method of cost calculation. However, what should be emphasised here is that the costs presented in this way refer only to the enterprise-environment relations. When analysing an enterprise within the context of sustainable development, it is also costs of the two other areas that are significant, i.e. in the areas of the employment relations and CSR.

What is important in the first of them is in particular the cost of recruiting employees as a result of fluctuation of human resources, caused by dissatisfaction of employees with working conditions. Apart from these costs, an evaluation of an increase in costs of newly-hired employees as compared with the costs of lost employees is a proper solution. Costs connected with sick-leaves of employees and an analysis of the causes of absence also seem to be significant. What should be also observed and analysed in this area is costs connected with accidents at work, regardless of their causes, since such costs are always borne by an enterprise, in the form of both direct costs and social costs. The other area as regards the improvement of eco-efficiency – corporate social responsibility and possibility of measuring the improvement of eco-efficiency – is also covered by literature. However, there is no agreement as regards the possibility of measuring it in pecuniary values. The concept of "sustainable value added", presented by J. Korhonen, is based on the acknowledgement as values complementary to the assumption of sustainable areas in the scope of human manufactured capital, natural capital understood as the capital of natural resources, and social sustaining functions (Korhonen 2003). This concept does not solve problems connected with the possibility of measurement and comparison of the achievements in the scope of CSR with other areas, but rather emphasising the problems and proposal to maintain the status quo of the non-measurability of effects in the scope of corporate social responsibility.

Each of the three areas listed above is equally important from the perspective of the improvement of eco-efficiency. It is only possible to manage them if information from each area is reliable and up-to-date. The significance of information from the operational domain of an enterprise is of key importance for making proper management decisions.

14.8. Ecological Information from the Operational Area of Enterprise Management

The operational domain of business activity provides a lot of management information in different dimensions and areas, but it is mainly a provider of data and recipient of management directions. As regards sustainable development, operational activity is both a provider and recipient of data of certain significance for the improvement of eco-efficiency. This area is a source of management information, but it obtains data not only within an organisation itself, but also from beyond it. In accordance with the principles of sustainable development, management of an organisation should not only focus on long-term objectives of an increase of the organisation's value, but it should also take into account the interests of the broadly understood corporate environment.

Referring to the earlier findings in which sustainable development was presented as the activity in the three areas, i.e. the environmental, employment and CSR areas, the operational area of the activity conducted by an enterprise is also a source and a recipient of information in these areas. What is important is that some of these areas penetrate one another and may not be unequivocally separated.

The first group of information includes information from the pure production area. This type of information includes consumption of materials, energy, sick-leaves of employees, fluctuation of employees, costs of recruitment of new employees, consumption of raw materials, value of energy recovered in the production process and many other items of information related to the productioncorporate environment relations. The information should be analysed not only as regards particular values, but the analysis should also cover their tendencies for the introduction of improvements in the operational management process.

The second group of information is information connected with the environmental area, connected to a large extent with the information from the first group. The information related to the environmental condition should not only concern the closest surroundings of an enterprise, but also the areas that should be the most important to a company, for example the areas from where its raw materials are obtained. At the same time, the tests of the condition of the natural environment allow one to evaluate the impact of the condition of the environment on the health of employees, and, thus, their ability to work and their satisfaction with working conditions.

The third group includes information connected with CSR. Apart from the basic concept of CSR and data resulting from it, it is worth paying attention to the problem of working conditions in enterprises being suppliers and the perception of an enterprise as the one that cares about the local community. Within this context, building confidence is important from the perspective of the perception of an enterprise as a stable company with future, which gives a possibility to better recruit employees; but, on the other hand, good relations with the local community allow for increasing the reliability of the information provided by the enterprise. The information from this group is most difficult to measure and compare with the information from the first and second groups.

At the same time, it is relatively time-consuming and expensive to gain such information due to the necessity to conduct social research.

All the three groups of information are equally important and the management of these groups is of key importance for reaching sustainable development by a company, not only in the operational domain. Problems occurring at the time of gaining information, interpretation and possibility of measurement of information should be solved in each case on an individual basis, since each company needs a different set of information to improve its eco-efficiency as soon as practicable. A challenge to build an internally sustainable organisation may be met if the information is gained properly from the areas mentioned above and used for management purposes.

14.9. Sustainable Organisation

14.9.1. Applied Technologies and Other Factors that Affect Eco-efficiency

The applied technologies are of key significance for the incurred costs in the production or service provision process. They have an influence on the costs of energy needed in the production process, and on the volume of consumed materials. V. Smil [Smil 2015] points to the significance of the limitation of the consumption of materials. On the basis of the data presented by V. Smil, one may observe that despite the consumption of a smaller quantity of materials for the production of one product (for example PCs) (reduction by 70%), because of their affordable prices and the demand for them, the consumption of materials required for their production increased globally by more than 500% during the years 1981–2011. The same author presented data demonstrating an increase in the consumption of materials per capita in the years 1900-2010 by almost 400%, from 0.84 to 3.28 tonnes of consumed materials per capita. Taking into consideration the simultaneous population growth by 400% during this period, the result is an increase in the global consumption of materials by almost fifteen times [Smil 2015]). An increase in the availability of goods is a positive phenomenon from the social perspective, but an analysis should be carried out with regard to the durability of products whose short lifetime may also contribute to an increase in the global demand for products. Apart from such basic cost carriers as materials, from the perspective of sustainable development, attention should be also paid to costs connected with the cultural aspect and the level of education of staff as well as loyalty of employees towards the work establishment.

These factors affect the quality of the performed work and the potential costs of removing imperfections of products and, on the other hand, the costs of energy consumed by employees beyond the production process. The value of these costs is connected with the level of ecological awareness of employees and their identification with the company. Research on the value and tendencies of relevant indicators in this area may allow for developing programmes aimed to reduce costs and environmental burden.

14.9.2. Convergence of Operational Performance and Accomplishment of Sustainable Development Objectives

The improvement of eco-efficiency and the accomplishment of the set objectives should be analysed in the long term because of different susceptibility of particular areas of the enterprises' activity to stimuli. In the short time horizon, the economic performance of an enterprise may be improved without paying attention to other aspects than production and current costs of an enterprise, but the development will not be continuous if environmental problems are left unsolved. As it has been mentioned above, legislation provides for desirable relations between an enterprise and the environment to a large extent, and in a different scope between an enterprise and an employee. Such relations form convergence of the enhancement of economic performance and accomplishment of sustainability objectives. The responsibility of an enterprise, not only towards its owners, but also towards the public, is a carrier of its value in the long term. As regards the legislation, there have been observed certain tendencies aimed to assure greater transparency of enterprises and greater participation of the public in company management. Literature even deals with the issue of "democratisation of corporation" [White 2015].

14.9.3. Social Costs vs. the Application of the Principles of Sustainable Development

Social costs are some of the costs that are not directly incurred by companies but that are of great significance from the perspective of sustainable development. The consideration of these costs in investment undertakings was reflected in investment projects already in the 1990s. Examples of the application of an account of social costs for the selection of the technology of construction of water-pipe infrastructure in cities are provided by such authors as, for example, J. Matthews, E. Allouche and R. Sterling [Matthews, Allouche and Sterling 2015]. When estimating social costs in such categories as costs of extended travel, degradation of road surfaces, increased costs of using cars and reduced safety, they presented examples of justified application of trenchless methods of performance of linear infrastructure in Oakland, California (USA) and Kessel-Dorp, Belgium. The account of social costs was also used in Poland in the construction of network infrastructure, for example during the construction of a sanitary channel in Poznań in 2015, where the contractor was granted an award estimated on the basis of the account of social costs for shortening the time of investment performance *(own source)*.

Another element of social costs, connected with the activities based on CSR, is the proper provision of information on difficulties connected with the performance of an investment or repair of the urban infrastructure. A visual system connected with radar measurement of speed that informs drivers of the average speed in the vicinity of the investment and the average time of travel was used in Poznań, at the time of the construction of the "Right-Bank Collector." The possibility of using roads located along the infrastructure by cyclists may serve as another example *(own source)*. Such activities have a positive impact on the image of the investor and the contractor but, on the other hand, they contribute to a reduction in social costs and alternative costs incurred by the public administration.

A sustainable organisation provides grounds for management of an enterprise in compliance with the principles of sustainable development, but such tools as measures of eco-efficiency are necessary for the improvement of ecological performance.

14.10. Non-financial Measures of Eco-efficiency

Financial measures and indicators related to eco-efficiency are present in the practice of economic activity, although they are not always standardised. Their application differs and depends on the maturity of an organisation and its legislative environment. Most of them relate to the area of environmental protection and eco-efficiency in the sense of ecological performance. In a sense, eco-effi

ciency stems from ecological performance, which is why literature focuses on the measurements of economic and financial performance, taking into account the environmental performance reached by an organisation. That is why measures related to this area occur frequently nowadays, in particular in highly-developed countries. Some of these measures are a response to legal requirements, for example the carbon footprint indicator⁴ in some highly-developed countries while others are closely connected with the specificity of production of a given enterprise. Some of them may serve as a point of reference to eco-efficiency of a company in the sector while others illustrate tendencies of eco-efficiency within an enterprise. In practice, management of an organisation in the scope of sustainable development requires a lot of measures and indicators of management, including the ones from beyond the areas of finance and economy. These indicators and measures are used, to a large extent, for internal benchmarking as part of an organisation or external benchmarking, if such data is available.

Literature provides a lot of examples of eco-efficiency. Some of the examples are presented below in Table 14.1 as relations of the consumption of goods to their placement in the final product [Jasch 2003].

Table 14.1. Input and output values – measures				
Input (kg/kWh)	Output (kg/kWh)			
Raw materials	Product			
Auxiliary materials	Final product			
Packaging	Per unit of final product			
Production materials	Waste			
Sales	Municipal waste			
Energy	Recycled waste			
Gas	Hazardous waste			

Source: author's study based on [Jasch 2003].

The measures presented above do not close a catalogue of possible measures, but only serve as examples of their application in the paper factory SCA Laakirchen in which they were applied [Jasch 2003].

⁴ It is a measure that presents the volume of the emission of carbon dioxide per unit of the final product or service.

What should be highlighted here is that the measures presented above only relate to the area of ecological performance, which does not suffice for management purposes in the whole sustainable development area. The chapter is not aimed to elaborate on indicators related to the area of employment relations and the CSR area, so as to fill the whole area of sustainable development. However, the application of measures related to sustainable development seems justified also in these areas. Such measures are currently applied in human resource management, for example the employee fluctuation measure, which may be used as input for measurements reflecting employee satisfaction level. An equally valuable measure, this time in the area of corporate social responsibility, is the measure of involvement of an enterprise in the fulfilment of social objectives in the direct vicinity of the location of conducting business activity with regard to the selected production volumes. However, even if a catalogue of relevant measures is developed in all of the three areas referred to above, it will not solve the problem of the relation of weights and significance of particular measures or their aggregated values in all these areas and among them.

The application of measures of eco-efficiency requires meeting a wide range of conditions so that their measurements give positive effects as a result of management. Many of these conditions are difficult to fulfil in enterprises operating on the competitive market. Therefore, enterprises providing public services, in particular the ones operating on regulated markets, are particularly predisposed for the implementation of management in compliance with the principles of sustainable development.

14.11. Public Services in the Light of Sustainable Development

As publicly available services according to the adopted assumptions, public services require a specific approach to management in connection with the role they play both in the economy and the society. Many of them are subject to special regulations, including issuance of a licence for conducting activity. At the same time, their specific place in the economy predisposes them to the application of the sustainability principles because of the close relations of enterprises providing such services with the legislature on the regional or central level, depending on legal conditions. This condition, typical of these services, is re-

flected in the literature regarding sustainable development. It is reflected in the new approach to managing entities that provide public services, proposed by S. Osborne, called New Public Management [Osborne et al. 2014]. The author claims that the mere reduction in costs does not lead to the attainment of the objective, being sustainable development of public services, in the long or medium term. He proposes to simultaneously look at enterprises providing public services in the four dimensions:

• sustainability of an enterprise providing public services itself,

▶ sustainability of the system of provision of public services and the mechanism for their provision,

• sustainability of the local community,

• environmental sustainability.

On the basis of the conducted analyses, seven proposals have been formulated as regards the development of the bases of sustainable development for enterprises providing public services. Due to their significance, they are referred to below:

• public services are a system rather than merely organisations themselves and should be managed as such, including all elements of the system,

▶ enterprises providing public services should be involved in organisational internal sustainability under their own rules in the short term, which is necessary but does not suffice to reach sustainability of enterprises providing public services or public services in the long term,

▶ internal effectiveness is necessary for an individual enterprise providing public services but it does not create a sustainable system of public services; instead, enterprises providing public services should focus on external effectiveness for clients and development of sustainable public services for the local community,

▶ knowledge (both of professionals and service users) is a key resource for the effectiveness of enterprises providing public services whereas relations rather than single transactions are key tools for positive transformations of public services; this transformation is currently emphasised by information generated and disseminated by social media and digital technology,

• a sustainable enterprise providing public services depends more on building long-lasting relations than on values resulting from unit transactions,

• cooperation is in the centre of provision of public services and is, at the same time, a source of effectiveness and innovativeness in public services,

• public services should cover environmental sustainability if they are to be sustainable indeed.

These proposals seem to be key (but only initial) principles of development of sustainable organisations of the public service provision system. What is also highlighted is that enterprises providing public services do not develop a sustainable system of these services on their own, and a necessity arises for relevant administration to cooperate with such enterprises. What should be also analysed in the scope of public services is the problem of the scope and quality of such services, since ordering parties seldom measure the quality of services. The expectations of clients about the quality and costs of such services are also rarely measured. The establishment of the local law, such as regulations of the provision of services in the scope of supply of water and discharge of sewage may serve as a good example here. Hardly any control is exercised in Poland as regards the quality of services provided by enterprises involved in service provision. That is why the clients' expectations in this scope and the level of fulfilment of obligations of an enterprise connected with a permission issued to it are in most cases unknown. It may lead to divergence of expectations of clients of public services and the quality and costs of the provided services. At the same time, the established quality standards of the rendered services are maintained by companies, in particular by monopolies, since there is no stimulus to improve the quality of services. One of the good examples with regard to the abandonment of such an approach is interaction with clients of a water supply company in the Netherlands, related to making a decision to build a water softening plant and possibility of supplying it at a higher price than the current price (own source).

The improvement of the quality of services and the improvement of eco-efficiency are key elements of development of an enterprise as part of sustainable development. The enhancement of eco-efficiency in the operational domain takes place under slightly different conditions in enterprises providing public services and in enterprises operating on competitive markets. Below there are two examples of improvement of eco-efficiency in both enterprise types.

14.12. Examples of the Improvement of Eco-efficiency in the Operational Domain

Eco-efficiency is broadly presented in the literature in the scope of the investment process of enterprises and investments performed by the public administration whereas the improvement of eco-efficiency in the operational domain is

not covered so widely. An example of enhancement of eco-efficiency in a textile factory in Brazil, presented by Vanalle, Costa and Rucato [Vanalle, Costa and Rucato 2014], shows the method that has led to reduced demand for resources necessary in the production process. The analysis of the dying process and material washing process, conducted from the perspective of eco-efficiency, was focused on the limitation of the demand for raw materials, energy, water and fire wood. Prior to the commencement of the research in the enterprise, no analyses were carried out as regards the value of the enterprise from the environmental perspective. The measurements of eco-efficiency made prior to the introduction of changes in the scope of the chemicals and raw materials applied in the production process were compared with the measurements made after the implementation of changes. On the basis of the results of analyses, applied technologies and work organisation the best solutions in this scope were proposed. As a result of the implemented changes, the demand for raw materials was reduced by 42.8%, costs of electric energy fell by 45.7%, costs of fire wood fell by 43.9% and the demand for water was reduced by 10%. The proposed ecoefficiency measurement method, reached as a result of the application of the value analysis implementation method, demonstrated an increase in the value of eco-efficiency and, thus, an increase in the enterprise's value.

The example presented above is interesting from the perspective of the improvement of operational performance, but one has to remember that it relates to an increase in the economic performance mainly in connection with environmental performance. Literature contains studies on the improvement of efficiency in particular areas of eco-efficiency, but it is still difficult to find any examples that present the improvement of eco-efficiency in the whole area of sustainable development in the economic practice.

The second example of eco-efficiency improvement is Aquanet, an enterprise providing services in the scope of supply of water and collection of sewage in the Poznań agglomeration. The research carried out in 2011 and 2012 indicates a possibility of improvement of eco-efficiency, inter alia, in the scope of the supply of water. As a result of cost management, the company reduced the water pressure in the water-pipe network without limiting the conditions of supply of water to its clients. In this way, the enterprise managed to improve its performance, which consisted in reduction in the demand for electric energy by 5% per year, reduction in the level of leakage of water from the network from 14% to 11% and reduction in the number of water-pipe breakdowns by 20% [Chudziński 2014].

From the perspective of eco-efficiency understood within the context of sustainable development, both these examples are evidence of the possibility of improving eco-efficiency in the operational domain, but also here the improvement of eco-efficiency is presented only in one of the areas of sustainability.

14.13. Final Remarks

The conditions of the possibility of improving eco-efficiency by companies in the operational domain presented in this chapter point to many problems that have not yet been solved. The presented outline of legislation in the scope of sustainable development indicates that it is only a necessary element, but it does not suffice to assure improvement of eco-efficiency on the operational level in the whole area of sustainable development. What also seems necessary is the unification of legislation on the global level, so that the possibility of competition among enterprises from different countries is not disturbed.

The areas of improvement of eco-efficiency of an enterprise presented in the chapter show the whole range of possibilities, including environmental performance. What is important is that the improvement of eco-efficiency should not be associated only with this area, without taking into account the employment and CSR areas. One of the most important conclusions drawn on the basis of the information analysed in this chapter is that cost management is a necessary but insufficient element for companies to reach sustainable development. A key element of cost management is proper measurement and allocation of costs in enterprises, adapted to the possibilities of management for improvement of eco-efficiency, but because of considerable complexity of the parameters, they are still not broadly used in business, and in many cases they limit eco-efficiency to its ecological sense. There are no well-developed and commonly used tools for the application of eco-efficiency management in the full scope of sustainable development.

Literature also contains a lot of sceptical references to sustainable development, for example that improvement of efficiency leads to reduction in prices for products, among other things, and, consequently, to an increase in the demand and increase in consumption, including consumption of natural resources.

Nowadays the improvement of efficiency of enterprises on the operational level is more and more frequently perceived against the whole range of the activities conducted by companies. The enterprise's eco-efficiency level seems to have a more considerable impact on the way it is perceived and, consequently, on the company's value [Sinkin 2008]. Greater and greater progress is observed as regards the information provided by companies in the area of sustainable development. Environmental publications and corporate social responsibility start to be treated equally important as the presentation of economic results.

The conclusions from the review of literature and legislation related to ecoefficiency may be presented in the three areas. Firstly, legislation does not suffice and is not a sufficient element to dynamise the changes aimed to implement the principles of sustainable development in enterprise management. Secondly, tools for enterprise management for the purpose of improvement of eco-efficiency in all areas of sustainable development are currently rare in the economic practice. Thirdly, there is a need to carry out research on enterprises in the operational domain, for the purpose of developing uniform principles of management that take into account all areas of sustainability at the same time.

15 Evaluation of Investment Projects with Environmental and Social Insight

15.1. Introductory Remarks

The objective of this chapter is to develop a model approach to the assessment of feasibility of investment projects subject to environmental and social aspects.

The structure of the chapter is to support the objective taking not only financial prospects into account but also other aspects, like environmental and social ones. First, a definition is provided of the notion and the need for a comprehensive assessment of investment projects is justified. Additionally, the core rules applicable to developing financial models of investment projects are presented as well as the rules and methods to structure cash flows. Subsequently, the major methods of investment project financial evaluation are specified briefly; they are to determine if a project is profitable for the owners. Since the financial assessment of profitability does not incorporate non-internalised external effects, a need arises to apply non-financial assessment methods that are presented further below. The presentation is summed up and generalised with a discussion of the implicit assumptions determining the assessment perspectives adopted by the presented groups of investment project evaluation methods.

Due to the volume of the issues at hand and the restricted size of this paper, not all methods of the analysis have been presented in detail with only brief characteristics provided and sources given where they are specified in detail.
15.2. About the Need for Comprehensive Assessment of Investment Projects

The nature of investing may be defined as postponement of current consumption in favour of future consumption with the assumption that the future consumption will be larger than now [K. Jajuga and T. Jajuga 2000, p. 7]¹. Thus, the definition assumes that the investor will make a sacrifice. For the purposes of this discussion an assumption is made that an investment project is a "comprehensive physical scope of investment to be performed with a specific objective, at a specific place and time" [Rogowski 2008a, p. 21], thus limiting the coverage to material investments². Additionally, the terms "investment venture" and "investment project" will be used alternatively³.

The profitability analysis of investment projects is a major element of the pre-investment phase in their life cycle [Behrens and Hawranek 1993, pp. 9–21]. Appropriate decisions may only be taken as a result of a comprehensive assessment. With reference to investment projects, this means the need to incorporate all material aspects that affect projects, including environmental and social aspects as well as the use of appropriate assessment methods. Profitability assessment of investment projects may be carried out from various perspectives. Financial assessment of investment projects assumes that the objective is to increase the value of the enterprise that has carried out the project. This assessment is from the owner's viewpoint. However, when the viewpoints of other stakeholders are used, it is necessary to apply other evaluation methods. Further below those will be referred to as non-financial methods.

In this context, note should be taken of the classification of investments that has become increasingly important in economic practice. Investments are divided into commercial, social and hybrid ones – commercial with social elements and social with commercial elements [Rogowski 2008a, p. 30]. With respect to hybrid and social projects, including environmentally-friendly ones, financial evaluation alone is insufficient. Thus, a need arises to resort to other methods

¹ This is not the only definition of the nature of investing. A comprehensive review made by Rogowski [2008a, p. 14] shows that outlays, benefits, time and risk constitute material elements of investments.

² Various classifications of investments made on the basis of various criteria are discussed e.g. by Rogowski [2008a, pp. 22–32].

³ A similar review is also made by e.g. Manikowski [2013, p. 23]. In literature there are also instances when the notions are treated separately [Rogowski 2008a, p. 21].

used e.g. as part of cost-benefit analysis. This is given special attention in particular with respect to socially demanded projects which, however, do not generate sufficient surplus to guarantee profitability that would encourage private capital to finance such projects. Therefore, such methodology is used in the case of projects financed with public funds, e.g. by the European Union. It is worth stressing that with respect to social and hybrid projects, financial profitability assessment is often omitted [Epstein 2008, p. 104], which is a mistake. The fact that it is usually insufficient does not necessarily mean that it may be omitted since even then it is a good point of reference for a cost-benefit analysis.

A comprehensive assessment of investment projects is materially supported with analysis models of all key aspects of projects, including strategic analysis or the UNIDO model⁴. The use of the first approach would require a model approach to strategic analysis⁵ of investment projects, including an analysis of factors coming from the macro-environment, micro-environment and from inside the project itself. The other model assumes an in-depth analysis of all functional areas of investment projects, such as the market and marketing concepts, materials and other outlays, location and the environment, technical aspects of the project, organisation and general overheads, human resources, planning of the implementation and finance of the project [Behrens and Hawranek 1993, pp. 76–404].

Irrespective of the approach applied, an in-depth analysis of all material aspects of investment projects should provide the required data to develop a financial model that will be used as an indispensable tool to evaluate investment projects.

15.3. Rules and Methods of Constructing Cash Flows of Investment Projects

The application of financial evaluation methods should be preceded by the development of a financial model for the investment project. Within the framework of the pro forma financial statements, the financial model will describe

⁴ This notion is understood as the methodology of developing feasibility studies created by the United Nations Industrial Development Organisation (UNIDO) [Behrens and Hawranek 1993, p. 1].

⁵ A model approach to strategic analysis including environmental and social aspects is presented in chapter six.

the operations of the enterprise which is to carry out the project in the future. The length of the detailed projection will depend on the anticipated life of the project; if a justified assumption is made that the project will be continued, the period of the detailed projection should cover the period of competitive advantage of the project. This can be determined in reliance on the suggestions of the capital market by developing scenarios. The period of the detailed projection should additionally correspond to the strategy, cover all project life cycle phases, at least until the maturity phase and the entire economic cycle of the sector [Mills 2005, pp. 68–73; Rappaport 1999, p. 48; Frąckowiak 1998, p. 201; Copeland, Koller and Murrin 1997, p. 267]. The decision on the length of the detailed projection is related to the decision on the valuation method of the residual value that is to be incorporated in the analysis.

The financial model for the investment project that as a minimum should comprise a profit and loss account, a cash flow statement, a balance sheet and an equalised balance sheet (equal assets and liabilities) constitutes a test of whether the model has been constructed correctly. First a decision should be made if the financial model is to present the values of each variable in nominal or real values. Afterwards, on the basis of the assumptions developed subject to all major aspects, the profit and loss account should contain projections of the individual items, in particular operating revenues and costs. Furthermore, demand for working capital is to be assessed, providing for inventories, trade, public and employee-related receivables and payables, appropriate for the anticipated size of operations. Changes of working capital should be incorporated in the cash flow statement and cash flows from operating activities should be cohesive with the assumptions underlying the profit and loss account. Cash flow from investing activities is to be projected on the basis of the anticipated investment scheme and the investment time schedule. Additionally, it is necessary to project replacement investments to modernise the assets. Financing cash flows must be cohesive with the assumptions related to project financing and the costs of external financing should be incorporated in the profit and loss account. The cash balance at the end of each period should be positive throughout the detailed projection period. The individual balance sheet items must be projected in line with the existing assumptions - in particular the values of fixed assets and intangible assets must be compliant with the assumptions underlying the investment outlays and depreciation/amortisation, the value of working assets and non-interest liabilities shall result from assumptions underlying the demand for net working capital, the value of capital must result from the assumptions related to contributions by owners and the dividend policy while the value of interest-related third party capital must be compliant with the assumptions related to the structure and conditions of external financing. In the proposed procedure, cash funds act as the parameter balancing the model⁶.

A number of rules have to be complied with in the preparation and use of the data from the financial model in the assessment of investment project. The most important ones include:⁷

▶ to ignore the sunk costs which means that the costs (outlays) incurred by the moment the decisions are taken and that may not be recovered should not affect the decision on performing the project;

➤ consistent incorporation of inflation in the analysis which means that if cash flows are expressed in nominal values, they should be discounted with the nominal discount rate and if the cash flows are expressed in real terms, they should be discounted with the real discount rate;

▶ decisions should be made on the basis of (differential) incremental cash flows to provide for side effects ⁸; such differential cash flows are calculated as follows:

 $\begin{array}{c} company \ CF_t & company \ CF_t \\ Project \ CF_t = when \ the \ project \ is - when \ the \ project \ is . \\ carried \ out & abandoned \end{array}$ (15.1)

An appropriately developed financial model constitutes a basis to determine project cash flows to be discounted. The two most commonly used methods to define cash flows are as follows [Benninga and Sarig 2000, p. 92]:

- ▶ FCFF method or free cash flow to firm⁹;
- ▶ FCFE method or free cash flow to equity¹⁰.

⁶ That type of financial modelling is discussed e.g. in: [Machała 2001, chapter 6.2]. Detailed issues relating to the integration of environmental and social aspects in financial planning are discussed in chapter 8.

⁷ Only the most important ones are listed. The rules are discussed in a majority of literature items relating to capital budgeting and corporate finance, e.g. in: [Ross, Westerfield and Jordan 1999, p. 312; Sierpińska and Jachna 2007, p. 451; Machała 2001, p. 155].

⁸ An example of a side effect may be the impact of the analysed investment project on the existing projects of the enterprise, e.g. reduced demand for existing models due to the marketing of a new finished product model.

⁹ It can be also found under other names: sequential valuation, FCF (free cash flow), free cash flow for the entire company or for all parties contributing capital, cost of capital approach [Benninga and Sarig 2000, p. 94; Nita 2007, p. 79; Szczepankowski 2007, pp. 65, 74; Dudycz 2005, pp. 41, 42, 57; Damodaran 2002, p. 382; Zarzecki 1999, p. 125].

¹⁰ In literature it is also called indirect valuation, ECF (equity cash flow), free cash flow for owners or equity, FCE [Benninga and Sarig 2000, p. 94; Nita 2007, p. 67; Mills 2005, p. 102; Szczepankowski 2007, pp. 65–66; Dudycz 2005, pp. 41, 45, 58].

The FCFF method defines cash flows to be discounted as follows:

+ operating revenues	
– operating costs (including depreciation/amortisation)	
= operating profit	
-tax	
= net operating profit	
+ depreciation / amortisation	
-/+ net working capital change	
+/– net investment cash flows	
cash flows to be discounted	(15.2)

Since the cash flows are addressed to all capital providers, the weighted average cost of capital shall be the appropriate discount rate¹¹.

The FCFE method defines cash flows to be discounted as follows:

+ operating revenues - operating costs (including depreciation/amortisation) = operating profit - interest = gross profit - tax = net profit + depreciation / amortisation -/+ net working capital change +/- net investment cash flows +/- contracting/repayment of debt = cash flows to be discounted (15.3)

Since the cash flows are addressed to the owners, the cost of equity shall be the appropriate discount rate¹².

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¹¹ Defined as in chapter 16.

¹² Defined as in chapter 16.

15.4. Methods of Investment Project Financial Evaluation

The major financial evaluation methods of investment projects include the following [Rogowski 2008a, pp. 147–224; Machała 2001, pp. 107–139]:

- NPV net present value;
- ▶ IRR internal rate of return;
- PI profitability index;
- DPP discounted payback period;
- MIRR modified IRR;
- ▶ MNPV modified NPV.

Those methods may be extended with the incorporation of the real options approach.

The net present value (NPV) is an assessment criterion of investment projects related to the operating objective of the enterprise being an increase of its value [Brigham and Gapenski 2000, vol. 1, p. 302]. For a typical project¹³, it is the difference between the sum of discounted future positive cash flows and the value of initial investment required to commission the project [Machała 2001, p. 112]:

$$NPV = \sum_{i=1}^{n} \frac{CF_i}{(1+k)^i} - CF_0.$$
(15.4)

In a general approach, it is the sum of discounted cash flows (positive and negative) generated by the project:

$$NPV = \sum_{i=0}^{n} \frac{CF_i}{(1+k)^i},$$
(15.5)

where:

n – the number of project functioning periods;

 CF_{i} – cash flows generated by the project in the i-th period;

*CF*⁰ – initial investment;

k – discount rate (cost of capital)¹⁴.

¹³ A typical project is characterised by negative cash flows at the beginning of project performance (at the zero moment) and by positive flows subsequently. If negative cash flows occur during project duration, such a project is called non-typical [Brigham and Houston 2005, p. 71; Rogowski 2008a, p. 29]

¹⁴ The formulas used in this chapter provide for a constant discount rate k throughout the analysis period that can be easily transformed into a form incorporating a variable discount rate in subsequent periods. [Rogowski 2008a, p. 170; Machała 2001, p. 118].

The rules of applying the NPV criterion are such that if NPV is positive, the project should be accepted while when NPV is less than or equal to zero, the project should be rejected; if projects are mutually exclusive, the project with the highest positive NPV is to be selected. If a project with the highest NPV is selected, this should result in the highest growth of the enterprise value. Due to compliance with the core objective of enterprise which is to increase its value, the net present value is the most important and superior criterion to other capital budgeting criteria.

NPV is an absolute measure informing by how much the enterprise value grows if the project in the form resulting from the assumed analysis is carried out. The absolute criterion is complemented by the internal rate of return (IRR) which is a relative criterion.

IRR is the discount rate which equalises the sum of the present value of positive cash flows with the sum of the present value of negative cash flows generated by the project [Ross, Westerfield and Jordan 1999, p. 288; Brigham and Gapenski 2000, vol. 1, p. 303]. For typical projects, it is the solution to the equation (15.6) in relation to *IRR* [Machała 2001, p. 125]:

$$\sum_{i=1}^{n} \frac{CF_i}{(1+IRR)^i} = CF_0.$$
 (15.6)

In a general approach, the internal rate of return is the solution to the equation (14.7) in relation to IRR:

$$\sum_{i=0}^{n} \frac{CF_i}{(1+IRR)^i} = 0,$$
(15.7)

where:

IRR – internal rate of return;

other designations – like in the equations (15.4) and (15.5).

IRR is then equal to the discount rate at which NPV is equal to zero. Since IRR is a percentage rate, it should be compared to the discount rate (k). The principles of applying the IRR are such that if IRR is lower than or equal to the discount rate, the project is not viable while if IRR is higher than the discount rate, the project is viable in line with the internal rate of return criterion¹⁵. For

¹⁵ This does not mean, however, that a project characterised by an *IRR* higher than the discount rate should be carried out since the further analysis should verify if this is not the case where *IRR* is not the appropriate criterion to assess the viability of an investment project. Such instances (e.g. IRR in the assessment of projects that are not typical, the possibility of the occurrence of multiple *IRRs* or no *IRR*, a potential conflict of NPV indications in the assessment of mutually exclusive projects) are well described in literature [Ross, Westerfield and Jordan 1999, pp. 292–297; Brigham and Gapenski 2000, vol. 1, pp. 305–319].

a majority of investment projects, the internal rate of return is not determined analytically but with the method of consecutive iterations.

Profitability index (PI) is another relative criterion. The structure of PI is related to NPV [Ross, Westerfield and Jordan 1999, p. 298]; however, if NPV is an absolute criterion being the difference between the present value of the positive cash flows and the present value of the negative cash flows, PI is the quotient of the two values¹⁶. For a typical project, it is a relation of the present value of the future positive cash flows to the initial investment:

$$PI = \frac{\sum_{i=1}^{n} \frac{CF_i}{(1+k)^i}}{CF_0}.$$
(15.8)

In a general approach, PI is determined with the following formula:

$$PI = \frac{\sum_{i=0}^{n} \frac{CF_{i}^{(+)}}{(1+k)^{i}}}{\sum_{i=0}^{n} \frac{CF_{i}^{(-)}}{(1+k)^{i}}},$$
(15.9)

where:

PI – profitability index;

 $CF_i^{(+)}$ – positive cash flows in the *i*-th period;

 $CF_i^{(-)}$ – negative cash flows in the *i*-th period;

other designations – like in the equations (15.4) and (15.5).

If PI is above one, the project is viable while if PI is less than or equal to one, the project should be rejected. Among mutually exclusive projects, the PI criterion identifies the most viable project in relative terms¹⁷.

In its structure, the discounted payback period (DPP) refers to an ordinary payback period¹⁸; however, the cash flows need to be discounted before the payback periods are calculated [Ross, Westerfield and Jordan 1999, p. 283]. The

¹⁶ In place of PI also the NPVR (net present value ratio) is applied which is a ratio of NPV to the present value of investment outlays [Sierpińska and Jachna 2007, p. 481; Rogowski 2008a, p. 169]. Thus, the following equation is true for a typical project: *PI*=NPVR+1.

¹⁷ But also in this case there may be a conflict of indications on the basis of the NPV criterion [Brigham and Gapenski 2000, vol. 1, p. 322].

¹⁸ An ordinary payback period belongs to static project evaluation methods which are not presented due to the restricted size of this paper and their basic deficiency being the failure to incorporate the time value of money. A relevant discussion may be found e.g. in: [Rogowski 2008a, p. 129].

discounted payback period determines the time¹⁹ over which – subject to the time value of money – the positive cash flows generated by the project will cover the initial investment. The definition shows that with no methodological complication DPP may be calculated solely for typical projects. To calculate DPP, when the positive cash flows are discounted it is necessary to calculate the cumulated present values of cash flows from each year (cumulatively) and afterwards a period (year) is to be found for which the sign of the cumulated present value of the cash flows is changed from negative to positive (the year when the payback ends) and the following formula needs to be applied:

Methodical objections are raised relating to the application of the formula (15.10) [Nowicki 2013] that may be mitigated by calculating the discounted payback period with the accuracy to one year and not a part thereof or by performing an analysis in periods shorter than one year.

The classical internal rate of return assumes that positive cash flows will be re-invested at a rate equal to *IRR*²⁰. When such assumption is not reasonable, it is recommended to apply a modified internal rate of return (*MIRR*) [Sierpińska and Jachna 2007, p. 486]. It is calculated as follows:

$$MIRR = \int_{1}^{n} \frac{\sum_{i=0}^{n} CF_{i}^{(+)} (1 + rei)^{n-i}}{\sum_{i=0}^{n} \frac{CF_{i}^{(-)}}{(1+k)^{i}}} - 1, \qquad (15.11)$$

where:

transformed to $IRR = \eta \frac{\sum_{i=1}^{n} CF_i (1 + IRR)^{n-i}}{CF_0} - 1$, which shows that IRR provides for re-investment of pos-

itive cash flows generated by the project at a rate of return equal to *IRR*. The replacement of the rate with another re-investment rate (*rei*) creates a modified *IRR*.

¹⁹ In literature most often it is expressed in years; however, it is obvious that the unit of time in which the payback period is expressed is compliant with the period (stage) of analysis (half-year, quarter, month).

²⁰ In order to prove this, it is sufficient to transform the *IRR* formula, e.g. equation (15.6) may be

MIRR – modified internal rate of return; rei – re-investment rate; other designations – like in the equation (15.9).

The criteria of applying MIRR are the same as applicable to IRR. It is a common belief that MIRR mitigates the material defect of IRR and therefore it is recommended to apply MIRR always when it is possible to estimate the re-investment rate in a reliable manner [Brigham and Gapenski 2000, vol. 1, p. 320; Machała 2001, p. 139].

The classical NPV also makes certain implicit assumptions as to the re-investment rate. The measure assumes that it is equal to the discount rate $(k)^{21}$. If such assumption is unjustified, the net present value is to be modified to the form [Sierpińska and Jachna 2007, p. 487; Rogowski 2008a, p. 209; Machała 2001, p. 117]:

$$MNPV = \frac{\sum_{i=1}^{n} CF_i (1 + rei)^{n-i}}{(1+k)^n} - CF_0, \qquad (15.12)$$

where:

MPNV – modified NPV; other designations – like in the equations (15.11) and (15.5).

If the re-investment rate is lower than the project discount rate, MPNV will be lower than the classical NPV. In case the re-investment rate is lower than IRR, MIRR will be lower than the classical IRR.

Sometimes certain limitations of the NPV method are indicated [Damodaran 2002, p. 772, 796; Rogowski 2008a, pp. 168, 172; Rogowski 2008b, p. 12; Mizerka 2005, pp. 39-44], specifying that NPV is a "static" method, which means that it does not account for the possibility of response to future changes of the conditions (an assumption of a manager passively following the assumed scenario of events). There are opinions that variability and unpredictability should not be treated solely as a threat (thus requiring that higher discount rates are

transformed to $NPV = \frac{i-1}{k} CF_i (1+k)^{n-i}$ tive cash flows generated by the project at a rate of return equal to k. The replacement of the rate with another re-investment rate (rei) creates a modified NPV.

²¹ In order to prove this, it is sufficient to transform the NPV formula, e.g. equation (15.4) may be

applied, thus decreasing the value of the investment) but also as an opportunity. It is also stressed that NPV is not a good tool to determine the value of projects in sectors and areas of operation that are characterised by high uncertainty and volatility (such as e.g. research and development). Such deficiencies of the NPV method may be resolved with real options [Copeland, Weston and Shastri 2014, p. 305]. They are defined as the value resulting from strategic opportunities held by the enterprise whose predictability is limited and therefore they are not subject to assessment with the classical NPV method. Real options are conditional, they depend on unpredictable circumstances and are similar to financial options. The most frequently identified real options include growth options, exit options, timing options, staging options, flexibility options [Mizerka 2005, p. 62; Michalski 2001, pp. 38-41; Rogowski 2008b, pp. 27-34]. Investment projects are often characterised by a number of inter-related (compound) options and that makes the identification, analysis and valuation very difficult [Copeland, Weston and Shastri 2014, pp. 323-334]. The sum of real options and "static" NPV is called expanded NPV [Trigeorgis 1996, p. 258, as cited in: Mizerka 2005, p. 75] and interpreted in the same way as the net present value.

15.5. Methods of Investment Project Non-financial Evaluation

In order to incorporate environmental and social aspects in project evaluation, it is necessary to incorporate the effects that are not covered by financial profitability assessment in the calculations. Cost-benefit analysis (CBA) covers such methods of economic analysis as²² [European Commission 2014, p. 55]:

▶ economic net present value (*ENPV*)²³ or the difference between the discounted value of social benefits and costs;

▶ economic rate of return (*ERR*) or the discount rate for which *ENPV* is equal to zero;

²² The applied nomenclature may cause confusion. It is worth stressing that financial analysis is a part of economic analysis of the enterprise [Waśniewski and Skoczylas 2002, p. 5]. In the assessment of investment projects in which environmental and social aspects are material, evaluation relying on financial assessment methods is called financial analysis while an analysis incorporating external effects is called economic analysis [European Commission 2014, p. 19].

²³ The economic net present value may not be confused with *ENPV* (expanded net present value) which for a specific investment project is equal to the sum of "static" NPV and the values of real options related to the project [Trigeorgis 1996, p. 258, quoted in: Mizerka 2005, p. 75].

▶ B/C ratio (benefits to costs ratio) or the ratio of discounted social benefits to discounted social costs.

The structure of those criteria refers to financial evaluation methods – *ENPV* to net present value, *ERR* to internal rate of return and B/C ratio to PI^{24} and, therefore, for positively assessed projects *ENPV* should be positive, *ERR* should exceed the social discount rate and the B/C ratio should be above 1. The main difference between the financial profitability measures and the methods presented here is that the latter rely on shadow prices (dual prices) or alternative costs of goods and services in lieu of imperfect market prices and the analysis covers all identifiable environmental and social external effects and the fact that the social discount rate is used for discounting²⁵. For instance, if NPV refers to an analysis from the owner's perspective, *ENPV* assumes the society's viewpoint. That is due to the overall assumptions of the cost-benefit analysis whose aim is to determine if the project is worth performing from the public or social viewpoint. The economic analysis adjusts the cash flows estimated in the financial analysis with fiscal effects, external effects and shadow prices [Szot-Gabryś 2013, p. 157].

Such fiscal adjustments are made so that the outlays and results are presented net of indirect taxes unless VAT is not refundable. Additionally, the prices of outlays should cover direct taxes and any subsidies granted should not be treated as a revenue item in the economic analysis since they are purely transfer payments. However, if indirect taxes or subsidies are to be used as adjustment for external factors (e.g. fees for gas and dust emissions to the air), it may prove reasonable to treat those taxes or subsidies as project costs or benefits as long as they are not duplicated [European Commission 2014, p. 45].

Market prices become equalised with shadow prices when market prices fail to resemble the alternative costs of the outlays due to market imperfections, monopolies, trade barriers, etc. The adjustments have the objective that such shadow prices reflect willingness to pay (WTP)²⁶ with reference to project re-

²⁴ Therefore, those measures are characterised by the same advantages and deficiencies like NPV, *IRR* and *PI*.

²⁵ More on the social discount rate in chapter 16.

²⁶ Along with WTA (willingness to accept), willingness to pay (WTP) belongs to methods to express the value of goods and services which, according to Epstein [2008, pp. 145–148], may be presented as the sum of the use value, option value and intrinsic (existence, conservation) value resulting from the existence of the goods. WTP means the maximum amount that consumers would be willing to pay for implementing a positive change or omitting the implementation of a negative change. WTA means the minimum amount that a consumer would be willing to accept for implementing a negative change or omitting the implementation of positive change [Żylicz 2009, p. 9].

sults and alternative costs in relation to outlays [Szot-Gabryś 2013, p. 157]. Specific solutions provide for the application of border prices, conversion factors, long-term marginal costs or shadow wages with reference to labour costs [European Commission 2014, pp. 45–50].

Such adjustment for external factors is aimed at determining the negative and positive values of non-market effects that are important for the society and that have not been incorporated in the financial analysis²⁷. As far as possible, they should be quantified, expressed in monetary terms and incorporated in the analysis. If such external effects cannot be expressed in monetary terms, quality assessment should be carried out [European Commission 2014, pp. 50–53]²⁸. Project effects may also be presented with output, result and impact indicators [Szot-Gabryś 2013, p. 181].

The problem related to the incorporation of environmental and social aspects in the analysis is that they are perceived as intangible effects and therefore they are difficult to measure [Epstein 2008, p. 143]. The difficulties in expressing the impact of environmental and social aspects on projects are augmented by the mandatory nature of many projects, forced by public authorities in the area of sustainable development that require the willingness to comply with the regulations with as little effort as possible and by postponing the environmental and social costs [Epstein and Rejc Buhovac 2014, p. 97]. In order to overcome the difficulties, various detailed methods are applied to express the external effects in monetary terms. A selection of the methods with brief characteristics is presented in table 15.1²⁹.

The use of the methods specified in table 15.1 is aimed at presenting external effects generated by the project in monetary terms to be used in a cost-benefit analysis and to be used to determine such measures as ENPV, ERR or the B/C ratio. With respect to certain methods (travel-cost method and contingent val-

²⁷ An example of such external effects may include an increase or decrease of noise, air pollution and emissions of greenhouse gases, pollution of soil or water or reduction thereof, degradation of the ecosystem or landscape or reduction thereof, increased or decreased vibrations (shocks) generated by the project (e.g. related to transport).

²⁸ A similar approach always requiring an attempt at presenting the effects of investment projects or other operations of the organisation in monetary terms – and when this is impossible – to make non-monetary quantification and a quality assessment is also presented by other assessment schemes of impact on the environment and the society, e.g. social return on investment [Maas and Boons 2010, p. 166].

²⁹ Among the methods presented in the table, the cost of control method, damage costing method, market price method, hedonic pricing method and the travel cost method, represent indirect methods, also referred to as revealed preference methodology (RPM), while the contingent valuation method – direct methods, also referred to as stated preference methodology (SPM).

uation), it is necessary to obtain original data on the basis of questionnaires [Epstein 2008, pp. 190–196].

Table 15.1. Monetisation methods of external effects						
Methods	Description	Advantages	Drawbacks			
Cost of control and shadow pricing	 Costs of avoidance or mitigation of (environmental or social) damage before it occurs 	 Avoidance of difficult- to-determine actual costs of damage Simplicity of calculations 	 Shadow pricing assumes legislators accurately value costs of environmental or social damage 			
Damage costing	 Actual costs of damage 	 Recognises external damages 	 Monetary effects are difficult to assess 			
Market price and appraisal	 Price or appraisal on the basis of resources traded in existing markets 	 Uses life cycle assessment (LCA) 	 Requires the existence of a competitive market 			
Hedonic pricing	 Property value or wages as proxy of costs 	 Values an entire range of impacts simultaneously 	 Precision is often challenged 			
Travel-cost method	• Cost of travel to recreation sites	▶ The data is available	 Difficult to measure hypothetical alternatives 			
Contingent valuation	 A questionnaire with questions relating to a hypothetical scenario 	 Assesses passive use values Helps identify impacts 	 Lacks precision 			

Source: author's study based on [Epstein and Rejc Buhovac 2014, p. 149; R.M. Fernandez 2014, p. 128].

It should be noted that the algorithm approved by the European Commission of applying cost-benefit analysis in the assessment of large projects³⁰ requires to use it only when the result of financial evaluation is negative (NPV < 0) [European Commission 2014, p. 10]. This is due to the project financing rules in the

 $^{^{30}\,}$ Large projects are such where eligible expenses exceed EUR 50 million; in case of projects relating to the promotion of sustainable transport and removal of capacity deficiencies in the operation of the most important network infrastructure – EUR 75 million [Regulation No. 1303/2013, Article 100].

European Union; however, this may lead to a situation when the impact assessment of environmental and social aspects is not performed due to the positive net present value and the project will generate negative ENPV due to external social costs in excess of social benefits. In a situation when the financial project assessment is positive, it is recommended to perform the cost-benefit analysis to verify if the project does not generate negative external effects that are not internalised.

It is worth noting that financial project assessment in commercial projects must be dominant. Cost-benefit analysis may be perceived in the case of feasibility study of commercial projects as an analysis to be carried out to obtain preferential funding. From the viewpoint of the state or the society, the cost-benefit analysis shows justification for investments that would not be feasible for private business. If for a project characterised by negative financial assessment the enterprise decided to go ahead with the project on the basis of the cost-benefit analysis and the project was not financed subject to preferential terms, such a decision would pose a hazard to the enterprise to continue as a going concern. This shows the importance of the owner's perspective in the assessment of commercial projects. However, complete disregard of environmental and social aspects in the analysis may result in disregarding material types of social and political risks which in turn may lead to underestimation of the overall product cost which in the long run may result in the project not being profitable [Epstein 2008, p. 157].

The problems are related to market analysis which should be carried out both with reference to financial assessment of investment projects and to the conclusions resulting from the analysis providing for external environmental and social effects. This is covered in the next chapter.

15.6. Adopted Assessment Perspective and its Impact on the Applied Project Evaluation Method

With reference to the definition of the nature of investing quoted at the beginning, it is worth noting that sacrificing current consumption in favour of higher future consumption is the essence of investments both from the viewpoint of financial profitability assessment and in the cost-benefit analysis. However, a change occurs of the investor from whose perspective the analysis is performed. In the first case, this is the owner while in the other case – the whole society. Referring to the objective of enterprise³¹, it should be noted that the methodology of financial profitability assessment (in particular the net present value method with the use of a discount rate equivalent to cost of capital or the rate of return expected by the providers of capital) is fully compliant with the objective of enterprise which is to increase its value. The model-based approach presented in this chapter to incorporate environmental and social aspects combined with the cost-benefit analysis departs from the supreme position of the owner's interests among objectives expected to be accomplished by the stakeholders of the enterprise. Applying the society's viewpoint means a shift towards the concept of balancing claims by all stakeholders. Therefore, the social discount rate is determined taking into account postponement of consumption in favour of higher future consumption from the viewpoint of the entire society³².

The application of methods providing for environmental and social aspects in investment project assessment supports the valuation of the impact of those aspects³³; however, this does not remove the problem of taking decisions in the face of various contradictory functions of the objective³⁴. Due to the imprecise definition of the stakeholder group from whose perspective the assessment is made and relying just on the general identification of the whole society, the problem results in the determination to the discount rate at a highly general level. For that reason, considering the deficiencies and advantages of the presented methods, efforts should be made to internalise as large a number of external effects as possible. As a result, the internalised external effects will be incorporated within the financial profitability assessment of the investment project, i.e. incorporated in the methodology performing the evaluation from the viewpoint of a precisely defined stakeholder group of owners.

15.7. Final Remarks

The objective of this chapter is to develop a model approach to the assessment of feasibility of investment projects subject to environmental and social aspects.

³¹ Included in chapter 4.

³² This is discussed in chapter 16.

 $^{^{\}rm 33}\,$ The precision of measurement is a separate issue, considering the subjective nature of certain methods.

³⁴ The problem is mentioned in chapter 4.

The objective has been achieved. Each sub-chapter defines the core notions and justification is provided for the need for a comprehensive review of the profitability of investment projects – taking not only financial matters into account but also other aspects, like environmental and social ones. Additionally, the core rules applicable to developing financial models of investment projects as well as the rules and methods to structure cash flows are presented. Subsequently, the major methods of investment project financial evaluation are characterised to determine if a project is profitable for the owners. Since – as presented in the chapter – the financial evaluation does not incorporate non-internalised external effects, a need arises to apply non-financial assessment methods that are presented in the next sub-chapter. The discussion of the implicit assumptions determining the assessment perspectives adopted by the presented groups of project evaluation methods sums up the discussion in the chapter.

16 Risk Analysis and Cost of Capital Estimation in Sustainable Business

16.1. Introductory Remarks

An analysis of risk and factors that affect the cost of capital is a major issue for enterprises intending to increase their value, managed in line with controlling principles providing for environmental and social aspects. The impact of those aspects constitutes the risk of business pursued and thus the cost of capital as a value driver which cannot be overestimated.

The objective of this chapter is to develop a model approach to an analysis of risk and factors affecting the cost of capital as well as a methodology of the cost of capital estimation that may be used in an enterprise managed according to green controlling principles.

To achieve the objective, the chapter has been appropriately structured where first various types of risk related to business operations are defined. Subsequently, various available ways to incorporate the risk in the analysis are presented as well as there is a brief presentation of basic risk analysis methods that may be applied in the enterprise and in the assessment of investment projects. The most important methods of estimating the cost of capital are presented. Afterwards, when searching for various factors affecting the cost of capital, reference is made to contemporary theories of optimal capital structure. On the basis of prevailing theories, factors affecting the cost of capital are identified and a model approach to the problem is developed. With reference to environmental and social aspects, a synthetic presentation is made of the results of empirical research related to the impact of corporate governance and environmental and social aspects on the cost of capital in the enterprise.

16.2. Risk Definition and Types

Risk is an inherent element of business and investments. This is a very broad and abstract notion and therefore multiple definitions and approaches have been developed.

One of the first definitions was presented by A.H. Willett [1901, pp. 9, 10] who stated that risk was "objectified uncertainty as to the occurrence of an undesired event." He further noted [Willett 1901, p. 6] that one can "define risk with reference to the degree of uncertainty about the occurrence of a loss, and not with reference to the degree of probability that it will occur." It seems that this definition does not remain in the mainstream of capital market theories due to the non-existence of clear differentiation between risk and uncertainty and due to the questioning of the significance of probability.

A more contemporary definition of risk was presented by F.H. Knight [1921, p. 233] who made differentiation between unmeasurable uncertainty (uncertainty *sensu stricto*) and measurable uncertainty understood as risk. F.H. Knight [1921, p. 233] stated that risk was a situation wherein "the distribution of the outcome in a group of instances is known (either through calculation *a priori* or from statistics of past experience), while in the case of uncertainty this is not true, the reason being in general that it is impossible to form a group of instances, because the situation dealt with is in a high degree unique."

From the viewpoint of effects, risk may be perceived as [Błaszczuk 2006, p. 98; Jajuga K. and Jajuga T. 2004, p. 99]:

possibility of loss generation (hazard),

• possibility of generating effects that are incompliant with the expectations, loss or profit (both a hazard and an opportunity).

The first approach is typical of, for example, the theory of insurance, while the other one – of the theory of capital markets. It is worth stressing that risk may be manifested not only in the uncertainty as to the effects but also as to the occurrence of a certain event (it may occur or not), the time and place where the event may be materialised [Błaszczuk 2006, p. 97].

Also the investor's subjective approach to risk is important for risk perception. In that respect, three types of investors may be identified characterised as follows [Jajuga K. and Jajuga T. 2004, pp. 111–120]:

- risk-averse investors,
- risk-neutral investors,
- risk-seeking investors.

In view of the fact that risk is a very broad notion, there are many risk classifications¹. In the context of determining the cost of capital and the theory of capital markets, the split of risk into the following becomes especially important [Brealey, Myers and Allen 2008, p. 188]²:

• market risk, i.e. systematic risk, undiversifiable risk,

• unique risk, i.e. unsystematic risk, residual risk, company specific risk, diversifiable risk.

Systematic risk is related to macroeconomic factors and capital market as such. The risk may not be mitigated by developing a diversified portfolio since it is related to the general national situation (political and economic situation, including changes to interest rates, inflation, FX rates, etc.) or the overall trends prevailing in the capital market (bull market, bear market). In the social and environmental area, it is necessary to stress the impact of such events on the business of enterprises and their cost of capital like e.g.:

• occurrence of extreme weather conditions (flood, draught, tornado, earthquake, fire, etc.),

• disturbances in access to natural resources as a result of exhaustion, excessive demand, legislation,

• development of new pro-ecological and pro-social trends, increased social and environmental awareness of consumers and local communities,

• modifications to laws and state policy to ensure sustainable development.

With respect to unique risk, it is related to microeconomic, sectoral factors, primarily with the unique features of each entity (capital structure, operating activities, internal factors, external dependencies, etc.). Investors may mitigate the risk

¹ One of the broadest risk classifications by various criteria is presented by Dziawgo [2010, pp. 41–51]. Other classifications may be found e.g. in: Jajuga K. and Jajuga T. [2004, pp. 99–101], Jurek [2004, pp. 22–24] and Tarczyński [1997, pp. 35–38].

 $^{^{2}}$ Apart from the above mentioned risk types, Pratt and Grabowski [2010, pp. 55–57] also identify:

maturity risk, i.e. horizon risk, interest rate risk which are risks related to changing investment value over time as a result of changing interest rates, inflation (the longer the investment, the higher the maturity risk),

liquidity and marketability risk related to the ease, time, volume and spread on sales of listed assets and general lack of possibility to sell at the stock exchange due to the fact that such assets are not traded in a stock exchange or there are certain restrictions to sale.

It seems that the first of the listed risks refers in its nature to systematic risk while the other has certain common features with specific risk since it is subject to unique features of the assets (possibilities and restrictions to sale), although it may be fully treated as systematic risk as indicated by Pratt and Grabowski [2010, p. 57] since the risk for a specific investment follows the overall valuation of liquidity and marketability.

(or even eliminate it) by developing a security portfolio composed of securities of business with various unique features and coming from various sectors³. Regarding green controlling and sustainable development, the risk may be viewed in the context of environmental, social and governance issues (ESG issues).

Business operations by enterprises may have an adverse effect on the natural environment and may generate risk for local communities. The impact is dependent on the sector in which the enterprise operates and the effects may be reversible or irreversible. Sectors with specific environmental and social hazard include, for example, mining industry, infrastructural and construction industry, manufacturing, agriculture and fishery.

Unique risk related to the business of enterprises with respect to the environment may be split into risks related to [Firstforsustainability.org 2015]:

▶ air pollution (use and storage of resources and raw materials) generated in an organised way as a result of typical manufacturing processes (e.g. combustion) as well as resulting from leaks and failures⁴,

• land contamination (both the topsoils and subsurface soils), resulting from the business of enterprises, improper storage and use of materials, disposal thereof or failures,

▶ energy consumption in manufacturing and supporting processes, i.e. processes of heating, cooling and air compression, with the use of renewable resources (e.g. wind, solar energy, biomass and geothermal energy) and non-renewable resources (e.g. minerals: hard coal, brown coal, oil, natural gas),

• use of hazardous substances in processes, such as explosives, compressed, toxic or flammable gases and liquids, strongly oxidising substances, toxic and radioactive materials or corrosive substances,

• water consumption and sewage, i.e. water consumption in production, sanitary processes and the resultant sewage or contaminated water from precipitation,

▶ generation of waste – liquid, solid and gaseous (in the form of final products as well as materials, semi-finished products used for production) that require disposal by dumping, recycling or combustion,

³ Certain authors suggest that the risk premium included in the cost of capital should not cover specific risks as it may be mitigated, eliminated by diversifying the portfolio.

⁴ Typical pollution refers e.g. to the emissions of volatile organic compounds (VOCs), particulate matter (PM), ozone depleting substances (ODS), greenhouse gases (GHGs – e.g. carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbon (HFC), perfluorocarbon (PFC) or sulphur hexafluoride (SF₆), sulphur dioxide (SO₂) or toxic, poisonous factors (e.g. mercury (Hg)).

• biodiversity and reduction of natural resources – degradation of soil, air and water, depletion of natural resources used for production, reduction of the diversity and number of species living in the natural environment.

Unique risk related to the business of enterprises with respect to the society may be split into risks related to [Firstforsustainability.org 2015]:

▶ employees and working conditions, e.g. retaining and motivating employees, methods of hiring, laying off and remunerating, trade union organisations, strike hazards, appropriate and safe working conditions⁵, equal opportunities for men and women, discrimination, mobbing or use of child labour or forced labour,

▶ security and health of local communities, i.e. the impact of products and business of enterprises (including failures and accidents) on local communities as a result of release of hazardous, poisonous or toxic substances but also increased traffic, noise, unpleasant odours, deteriorated working or health conditions,

▶ land acquisition and resettlement, resulting from business expansion or investment projects,

▶ social movements and protection of national heritage – the impact of specific conditions for business operations related to culture, religion, social movements and trends, national or ethnic minorities or indigenous inhabitants, protection of historic monuments and cultural, natural and intangible heritage.

Unique risk in the area of corporate governance relates, for example, to:

▶ the scope, quality and timing of the disclosure of the required information by the enterprise,

• ensuring correct organisation of general meetings, operation and stability of the management board and supervisory board (board of directors), audit reliability,

• effective monitoring and motivating of managers, existence of anti-takeover mechanisms and the related agency costs,

▶ the need to ensure adequate rights to shareholders, appropriate relations between dominant, institutional investors and individual, minority investors⁶,

• breach by enterprises of market transactional rules with external entities.

⁵ It refers, for example, to ensuring a secure and ergonomic working environment, appropriate space, lighting, temperature and air access, first aid, protection against noise, vibrations, fire, electricity, hazardous substances, provision of sanitary and social facilities.

⁶ It refers e.g. to the risk related to transferring values outside the company through fees, licences, transfer pricing, taking actions aimed at preventing or impeding minority shareholders in performing their rights by postponing, delaying dates of general meetings, questioning voting rights, attempts at diluting shareholdings, etc.

All of the risk types listed above – when mismanaged or not managed at all – may result in disturbances in operations of the enterprise, court proceedings, penalties, lost licences, permits and thus deteriorated reputation of the enterprise, lost market shares, increased operating and financial expenses, loss of potential benefits and finally loss of the enterprise value. Thus, the investor should take all the above risks into account in its analysis, e.g. in the applied discount rate.

16.3. Ways of Including Risk in the Analysis. Methods of Risk Analysis

In view of the risk definitions and types quoted in the previous sub-chapter, risk analysis becomes of special importance in most business operations. Such an analysis should be performed in majority of decision-related situations in the enterprise, in particular on the occasion of strategic decisions, such as a feasibility analysis of investment projects, business valuation or financial modelling of business processes. In the model approach, the risk analysis may be split into two stages. First, a decision needs to be made about the way to incorporate risk in the analysis. Next, it is necessary to apply appropriate risk analysis methods.

The core issue is to incorporate risk in the analysis that may be done in two ways – with the use of⁷:

- 1) certainty equivalent;
- 2) risk-adjusted discount rate.

In the first method, the risk is placed in the numerator of the present value formula within DCF analysis (e.g. NPV formula), while in the other method – in the denominator.

The certainty equivalent (CE) method stems from the utility theory [Brigham and Gapenski 2000, vol. 1, p. 418]. Certainty equivalent may be best defined as the amount of income that is certain and thus gives the decision-maker such utility as risk-weighted expected income. Due to risk aversion, it is considered

⁷ In literature, the methods of incorporating risk in the analysis are called direct risk analysis methods, effectiveness adjustment methods (of investment projects) [Rogowski 2008a, p. 292; Brigham and Gapenski 2000, vol. 1, p. 417; Ostrowska 2002, p. 103]. Within the scope of direct risk analysis methods there is also a method of threshold payback period [Rogowski 2008a, p. 293] or methods which combine certainty equivalent method and the risk-adjusted discount rate method [Manikowski 2013, p. 40].

that the certainty equivalent is lower than expected income for a majority of decision-makers.

The application of the CE method in the DCF analysis consists in assessing the certainty equivalent to each cash flow in the analysed period on the basis of expected cash flows and the relevant risk assessment followed by discounting each certainty equivalent with a risk-free rate in order to obtain the value of a decision criterion (e.g. NPV for the investment project).

The major problem related to the application of the method is its subjective nature since there is no objective practical method to determine the certainty equivalent for risk-weighted cash flows. Each decision-maker may evaluate it individually applying their own risk aversion and their own utility function⁸. It is combined with a practical problem incorporated in the assessment of investment projects by enterprises with separation of ownership and control where certainty equivalents of cash flows determined by decision-makers – managers would provide for their utility functions while they should reflect the priorities of the owners [Brigham and Gapenski 2000, vol. 1, p. 419].

In the risk-adjusted discount rate (RADR) method, cash flows to be discounted are expected cash flows and risk is incorporated in the discount rate. The risk-adjusted discount rate method covers a base rate (usually a risk-free rate or the average cost of capital for the company if a discount rate is estimated for an investment project that is different in terms of risk from the existing assets) and risk premium [Rogowski 2008a, p. 297]. It is worth noting that apart from subjective methods, the risk premium may also be estimated with objectified methods that are used to estimate the cost of capital.

The use of the risk-adjusted discount rate method is supported by the fact that the discount rate for projects with an average risk may be estimated on the basis of observable market data while no data is available to estimate the certainty equivalent for cash flows of an average project. Projects with an average risk are discounted at the company's cost of capital, projects with risk above average – at a higher cost of capital and projects with risk below average – at a lower cost of capital [Brigham and Gapenski 2000, vol. 1, p. 420].

Practical problems in applying the certainty equivalent method cause that usually risk is incorporated in the analysis with the use of the risk-adjusted dis-

⁸ The problem is not resolved with the proposal to apply the certainty equivalent ratio that may be determined with one of three methods; however, each of them is subjective and one explicitly refers to the risk-adjusted discount rate method [Rogowski 2008a, p. 304].

count rate method⁹. However, it is worth noting that risk incorporation in the analysis with the risk-adjusted discount rate method is a theoretical justification to use the cost of capital as the discount rate in DCF analysis.

The basic risk analysis methods include¹⁰:

- sensitivity analysis;
- threshold value analysis;
- scenario analysis;
- Monte-Carlo simulation.

Sensitivity analysis is a method showing the changes of the dependent variable (e.g. NPV of the investment project) as a result of changes to a single independent variable with the other factors unchanged [Ross, Westerfield and Jordan 1999, p. 358]. The sensitivity of the dependent variable is determined with reference to the level of the variables used in the base variant (expected values). On the basis of the calculations, it is possible to determine curves presenting the relationship of the dependent variable to changes to the level of the independent variables. The inclination of the curves presents the sensitivity of the dependent variable to changes to the sensitivity ratio can be calculated, being the quotient of the relative change of the dependent variable and the relative change of the independent variable [Machała 2001, p. 180; Nahotko 1997, p. 182].

An analysis of threshold values is based on the same assumptions as sensitivity analysis – it investigates the change of the dependent variable caused by a change of the independent variable *ceteris paribus* [Rogowski 2008a, p. 260; Ostrowska 2002, p. 120]. However, the purpose of the analysis is different as it aims at determining such value of the independent variable for which the dependent variable assumes a threshold value (e.g. NPV for the investment pro-

⁹ It is confirmed in literature [Kasiewicz and Rogowski 2007; Wiśniewski 2007; Brigham and Gapenski 2000, vol. 1, p. 420; Manikowski 2013, pp. 40, 205]. However, this does not mean that the certainty equivalent method is fully discarded as it has interesting advantages. An interesting attempt at rehabilitating the method was made by Manikowski [2013, chapter 4].

¹⁰ In literature, the risk analysis methods are also called indirect risk analysis methods [Rogowski 2008a, p. 253], risk management methods [Nahotko 1997, p. 120], specific risk assessment methods (of the investment project) [Brigham and Gapenski 2000, vol. 1, p. 395]; jointly with methods to incorporate risk in the analysis they are generally classified as risk assessment methods [Ostrowska 2002, p. 95]. Among indirect risk analysis methods there are also probabilistic-statistical methods (including decision tree analysis), methods of operations research (including game strategy) [Ostrowska 2002, p. 96; Rogowski 2008a, p. 253; Nahotko 1997, pp. 120–125].

ject is equal to zero) [Machała 2001, p. 189]¹¹. On that basis, it is possible to calculate a safety margin which informs by what percentage the independent variable may be changed to assume a threshold value for which the dependent variable assumes the required threshold value [Nahotko 1997, p. 189].

The defect of the two quoted risk analysis methods is that they assume a change solely to one independent variable with all other factors remaining unchanged [Rogowski 2008a, p. 263]. Scenario analysis mitigates the defect by developing variants which provide for simultaneous changes of several independent variables to investigate the impact of the changes on the dependent variable. Thus, it considers not only the sensitivity of the dependent variable to changes of multiple independent variables at the same time which mitigates the defect of the sensitivity analysis and also covers a range of probable values of the independent variables. A material element of the scenario method is an estimate of the probability of each reviewed variant since in the scenario method it is the value of the dependent variable weighted with the probability of each variant that operates as the decision criterion. However, scenario analysis has certain limitations. Its defect is that it takes into account only variants selected from the entire range of possibilities without reflecting the entire probability distribution of the independent variables and thus of the dependent variables. Scenario analysis is limited with the practical assumption that the independent variables are positively correlated, which means that they reach only optimistic or only pessimistic values¹². In reality, the probability that all variables reach at the same time only optimistic or only pessimistic values is usually low and as a result usually scenario analysis overestimates maximum and minimum values [Brigham and Gapenski 2000, vol. 1, p. 401; Rogowski 2008a, p. 270].

The Monte Carlo simulation is a simulation analysis method combining sensitivity analysis and probability distributions of independent variables. Usually, it must be preceded by the development of a financial model of the analysed

¹¹ One example of a threshold value analysis is a break-even point analysis which is a threshold value equal to zero for the dependent variable that subject to certain assumptions is equal to profit on sales depending on the levels of such independent variables like sales in terms of quantity, unit prices, fixed costs or unit variable costs.

¹² This statement may be confirmed by the fact that when this method is presented in literature it is often stated that there is a need to develop three scenarios: optimistic (the best one), pessimistic (the worst one) and realistic (the most likely one) [Brigham and Gapenski 2000, vol. 1, p. 398; Pluta 1999, p. 39; Gawron 1997, p. 155]. In order to overcome the limitation, it is necessary to develop multiple various scenarios that provide, at the same time, for optimistic and pessimistic changes in relation to the base variant within various independent variables, e.g. variants assuming higher revenues (optimistic) and higher costs (pessimistic) than in the base variant.

issue (e.g. an investment project) identifying certain and random variables, and it also determines the relationship combining all the variables [Brigham and Gapenski 2000, vol. 1, p. 401; Rogowski 2008a, p. 284]. Afterwards, when the probability distribution is determined for each random independent variable, a multiple iteration has to be performed which consists in random selection of each independent variable on the basis of its probability distribution and calculation of the dependent variable (e.g. NPV of the investment project). The number of iterations has to be material and the drawing has to be carried out in a way that the sequence of the drawn values for each model parameter creates the same distribution as the pre-determined hypothetical distribution of the independent variables. The values of the dependent variable calculated in each iteration are used to determine the probability distribution of the variable which estimates the parameters of the distribution like the expected value, standard deviation, etc. With the procedure, the Monte Carlo simulation accounts for the entire volatility range of independent variables incorporating their probability distributions and thus mitigating the limitations to scenario analysis mentioned earlier that accounts solely for selected levels of independent variables. The limitations to the Monte Carlo simulation refer to the need to estimate hypothetical probability distributions of the independent variables and distribution correlations [Brigham and Gapenski 2000, vol. 1, p. 404], which requires a lot of data to be collected and this may not always be possible.

The presented risk analysis methods may be successfully applied both in financial analysis (of enterprises, investment projects) and in the assessment of non-financial factors. Additionally, risk quality analysis is important for the impact analysis of environmental and social aspects apart from the fact that it is recommended to apply the risk assessment methods described here, including scenario and simulation methods [Epstein and Rejc Buhovac 2014, pp. 158–162]. The recommended social and political risk management methods include e.g. development of a risk profile integrated with a risk management system. The process is composed of three stages [Epstein 2008, pp. 116–122]:

• identification of the background risk sources;

differentiation between real and perceived risk;

• identification of company- or project-relevant political, environmental and social risks.

The incorporation of environmental and social effects of business operations is supported by initiatives of financing institutions like the Equator Principles [Epstein 2008, pp. 122–123] that are applied to all new investment projects by

institutions which are members of the initiative and they require potential borrowers to prove that they comply with the environmental and social requirements of the World Bank and of IFC¹³ and to justify deviations from those standards.

In order to calculate the potential risks once identified, it is necessary to [Epstein and Rejc Buhovac 2014, pp. 185–192]:

• calculate the benefits related to each issue that may generate risk;

• calculate the potential costs related to each risk type, including reputation costs;

• estimate the probability that each risk will materialise;

• multiply the potential cost by the probability of materialising to calculate the expected value of each risk;

• estimate when the risk may emerge and calculate the NPV of the risk;

- aggregate NPVs for all risks and insert them in ROI calculations;
- calculate the expected value of the ROI.

The application of various risk analysis methods stemming from environmental and social aspects of the enterprise's business seems by all means necessary in view of the fact that it is compliant with recommendations of corporate social responsibility which, as a rule, is a philosophy of conducting business resulting in effective management of those risk types over a long term [O'Faircheallaigh 2010, p. 411].

16.4. Methods of the Cost of Capital Estimation

In order to incorporate risk in the analysis, it is necessary to assess the cost of capital. There are numerous estimation methods of the cost of capital; this subchapter presents only some of them¹⁴. Generally, the cost of capital is defined as weighted average cost of capital (WACC) used to finance the assets of the enterprise, calculated as follows:

¹³ The standards are included, for example, in IFC Performance Standards on Environmental and Social Sustainability or World Bank Group Environmental, Health and Safety Guidelines [IFC Performance Standards on Environmental and Social Sustainability 2012].

¹⁴ Due to the limited size of this paper, it does not support a detailed presentation of all available methods; however, an interested reader will easily find descriptions and examples of using other methods of the cost of capital estimation.

$$WACC = \sum_{i=1}^{n} w_i k_i = w_1 k_1 + w_2 k_2 + \dots + w_n k_n$$
(16.1)

where:

 w_i – weight or share of the *i*-th capital component in the invested capital,

 k_i – cost of the *i*-th capital component,

n – number of components in the invested capital.

The estimation of the cost of debt should present no difficulty because the expected financial burden to the enterprise for debt funding is largely determined by the contractual terms and conditions¹⁵. The cost of debt before tax is equal to the internal rate of return from cash flows generated by a selected source of debt¹⁶.

The estimation of the cost of equity is more complex. The basic methods of equity cost estimation include the Gordon model, the build-up method, the capital assets pricing model (CAPM) and varieties thereof.

The Gordon model may be used to estimate the cost of both privileged and ordinary share capital [Ross, Westerfield and Jordan 1999, p. 464; Damodaran 2002, p. 323; Duliniec 1998, p. 88]¹⁷:

$$k_{KW} = \frac{D_1}{P} + g,$$
 (16.2)

where:

 k_{KW} – cost of equity;

P- share price;

 D_1 – dividend per share distributed after one year from the time of the analysis;

g – fixed rate of dividend growth with $D_i = D_0(1+g)^i$.

¹⁵ It refers, in particular, to fixed interest rate loans or bonds. In case of variable interest rate loans or bonds, the future payments at the time of analysis are not known and the amount thereof will be subject to future fluctuations of the base interest rate applicable to debt.

¹⁶ WACC most often includes the cost of debt after tax which is obtained by multiplying the cost of debt before tax by (1–T) where T is the effective income tax rate.

¹⁷ When the cost of capital acquired as a result of new share issues is estimated, the share price (P) in the denominator of the fraction is to be reduced by the floatation costs.

When the dividend method presented with the Gordon model cannot be used¹⁸, it is necessary to apply other methods of the cost of equity estimation. The build-up method is one of the intuitive methods [Pratt and Grabowski 2010, p. 87; Risius 2007, p. 89]. It is based on an assumption that the cost of equity of an enterprise is composed of a number of identifiable risk factors that when summed up will reflect the rate of return that may be expected from the invested capital by a rational investor. Thus, the cost of equity may be calculated with the following formula:

$$k_{KW} = r_f + x_1 + x_2 + \dots + x_n \tag{16.3}$$

where:

 r_{f} – risk-free rate of return,

 $x_{1\dots n}$ – risk factor premiums.

Most often the formula used in this build-up method is as follows:

$$k_{KW} = r_f + (r_m - r_f) + RP_s$$
(16.4)

where:

 $(r_m - r_f)$ – market risk premium,

 RP_s – premium for risk specific of each enterprise.

The incorporation of the last component of the sum in the formula (16.4) consists of increasing or decreasing the cost of equity related to the specific risk factors referring to the specific enterprise, resulting e.g. from:

- ▶ size of the company,
- nature of the sector,
- financial risk,
- diversification extent of the business,

▶ other features like the competences of the management, employee qualifications, organisational structure¹⁹.

¹⁸ It takes place in case of enterprises with an unstable dividend policy since market conditions make it impossible to determine growth potential on the basis of fundamentals [Szczepankowski 2007, pp. 221, 227] and when the implicit assumptions of the method are not complied with [Damodaran 2002, p. 356; Damodaran 2007, p. 1062].

¹⁹ A proposal to incorporate the impact of specific risk on the cost of equity includes such factors as historic operational profit, volatility of revenues and profit (+3.5%); no experience and effective management (+1.0%); no access to funding sources (+0.5%); excessive dependence on a few key persons (+1.0%); no diversification in terms of volume and geographic location (+0.5%); no marketing resources vs. the competitors (+0.5%); no possibility for product and market development (+0.5%); restrictions of the financial reporting system and control (+0,5%); patents, copyright, licences for authorised distribution, holding proprietary rights for specific products (-1.0%). It should be remembered that the proposed adjustments are subjective [Hitchner 2003, p. 146, as cited in: Byrka-Kita 2006, p. 268]. Other examples of applying this method are also quoted by Pratt and Grabowski [2010, pp. 98–99].

The build-up method is a universal method; however, its deficiency lies in its subjective nature. The method which aspires for greater objectivity is the capital assets pricing model (CAPM). In that model, the cost of equity is calculated with the following formula:

$$k_{KW} = r_f + \beta_i (r_m - r_f)$$
(16.5)

where:

 k_{KW} – cost of equity,

 r_f -risk-free rate of return, e.g. rate of return on long-term government bonds, r_m -rate of return on a market portfolio,

 $(r_m - r_f)$ – market risk premium,

 β_i – beta coefficient for stocks of the company with:

$$\beta_i = \frac{\operatorname{cov}\left(r_i, r_m\right)}{\operatorname{var}\left(r_m\right)},\tag{16.6}$$

 $cov(r_i, r_m)$ – co-variance of rates of return on the stocks of the analysed enterprise and a market portfolio,

 $var(r_m)$ – variance of rates of return on a market portfolio.

Thus, the capital assets pricing model defines the cost of equity as the sum of the risk-free rate of return increased by risk premium related to investments in the stocks of a specific company; the risk premium is expressed with the beta coefficient with reference to the market risk premium²⁰.

When it is impossible to estimate CAPM parameters on the basis of historic data, it is possible to use the Hamada equation²¹. In that approach, the beta coefficient is calculated on the basis of the reference beta known for the reference group, using the following formula²²:

$$\beta_L = \beta_U \left[1 + \left(1 - T \right) \frac{D}{E} \right], \tag{16.7}$$

²² When introducing the equation, Hamada [1972] assumed that the cost of debt was equal to the risk-free rate of return. If debt is subject to market risk or the beta of debt (β_D) is higher than zero, the levered beta (equity beta) is calculated as follows: $\beta_L = \beta_U \left[1 + (1-T) \frac{D}{E} \right] - \beta_D (1-T) \frac{D}{E}$ [Damodaran 2007, p. 339].

²⁰ The issues of estimating the risk-free rate of return, market risk premium and the beta coefficient are discussed e.g. in: [Brigham and Gapenski 2000, vol. 1, pp. 246-251; Damodaran 2007, pp. 318–326; A. Cwynar and W. Cwynar 2007, pp. 64–108; Porras 2011, pp. 165–192].

²¹ The approach is one of possibilities to apply the pure play method and this is treated as a variety of CAPM as pure play CAPM [W. Cwynar 2010, pp. 159–168; Brigham and Gapenski 2000, vol. 1, pp. 414]. The possibility to apply the pure play method according to various theoretical approaches is compared by P. Fernandez [2006].

where:

 β_{U} – unlevered beta, reflecting operational risk for the reference group; it is also called the asset beta, operational beta and sectoral beta;

 β_L – levered beta, also called equity beta; beta coefficient of the company, reflecting both operational and financial risk, being thus related to its capital structure and tax rate;

D/E – debt to equity ratio (capital structure ratio) of the analysed enterprise; *T* – income tax rate.

In economic practice and in scientific research, multiple varieties of the capital assets pricing model are used that differ from the classical model with different incorporation of risk premium, assumptions relating to market integration, incorporation of country risk premium or calculation of the beta factor²³:

- ▶ local CAPM [Porras 2011, p. 182];
- ▶ international CAPM [Sabal 2003, p. 12; Porras 2011, p. 183];
- modified international CAPM [Sabal 2003, p. 13; Porras 2011, p. 184];
- ▶ Godfrey-Espinosa model (1996);
- downside-CAPM [Estrada 2002].

The methods referred to above do not exhaust all options to estimate the cost of equity – they are just examples of the issue.

As shown above, the methods of the cost of equity estimation do not separately cover environmental and social aspects. The methods referring to CAPM are usually single-factor methods (if other factors are incorporated, they relate, for instance, to the risk of a local market), which means that environmental and social aspects are incorporated therein among other aspects as factors affecting risk premium. Obviously, it is also possible to incorporate those aspects in the APT method (arbitrage pricing theory); however, that would require the development of a special model and the method is not used frequently [Porras 2011, p. 188]. Among the presented methods, only the build-up method may separately incorporate premium for environmental and social risk (within the premium for specific risk); however, it would be subjective in itself.

²³ The list does not exhaust all estimation methods of the cost of equity – it only contains the ones that are most often applied and encountered in literature [Porras 2011, p. 192]. More estimation methods of the cost of equity, including those that do not refer to CAPM in their structure (such as the model of Erb, Harvey and Viskant [1996]) and multi-factor methods (such as the model by Fama and French or the model by Carhart) are discussed e.g. in: [Sabal 2003; Cruces, Buscaglia and Alonso 2002, pp. 2–5; W. Cwynar 2010].

The social discount rate (SDR) is the discount rate used in economic analysis as part of cost-benefit analysis. It should reflect the social viewpoint on the valuation of future benefits and costs in relation to today's costs and benefits [European Commission 2014, p. 289]. The European Commission recommends a certain level of the social discount rate in the assessment of projects in a given financial perspective²⁴. Member States may determine the social discount rate at a level different than recommended by the European Commission provided that it is justified by projected economic growth and other parameters incorporated in the methodology to calculate the rate and that it is consistently applied for similar projects in the state, region or sector [European Commission 2014, p. 44]. SDR may be estimated relying on the social rate of return on private investments (SRRI). In accordance with the method, public investments should generate the same return as private investments since public projects may displace private ones. This means that SDR may be calculated with methods of the cost of capital estimation presented earlier in the chapter which would generate quite high estimates of the SDR due to external effects and market imperfections [European Commission 2014, p. 289]. The other method is to estimate SDR on the basis of social rate of time preference (SRTP). SRTP is the rate at which the society would be willing to postpone consumption in favour of increased future consumption [Florio and Sirtori 2013, p. 5]. Thus, this is the expected rate of return estimated from the society's viewpoint. In practice, the rate of return that the society can achieve in exchange for postponed consumption is the rate of return on savings. Therefore, SRTP is estimated on the basis of rates of return on government bonds or other low-risk securities. The other method relies on the projected long-term economic growth and is based on Ramsey's economic growth model [European Commission 2014, p. 290]²⁵. An example of estimating the social rate of time preference with the method for various countries is presented in table 16.1.

²⁴ In the 2014–2020 financial perspective it is 5% for countries receiving support from the Cohesion Fund and 3% for the other Member States [European Commission 2014, p. 44].

²⁵ Other methods like a weighted average approach or dual capital price are rarely applied in practice [European Commission 2014, p. 290].

Table 10.1. Shir estination for 20 EU countries							
Parameter	p (%)	e	g (%)	SRTP (%)			
Estimation period	2011	2011	2000–2018				
Italy	0.98	1.50	0.10	1.13			
Portugal	0.97	1.86	0.38	1.67			
France	0.84	1.27	0.71	1.74			
Denmark	0.94	1.28	0.63	1.75			
Belgium	0.96	1.53	0.71	2.05			
Spain	0.84	1.45	0.86	2.09			
Luxembourg	0.74	1.84	0.77	2.17			
The Netherlands	0.81	1.55	0.96	2.30			
Greece	0.98	1.47	0.96	2.39			
United Kingdom	0.88	1.53	1.13	2.61			
Austria	0.91	1.45	1.20	2.65			
Germany	1.04	1.33	1.36	2.84			
Slovenia	0.91	1.38	1.69	3.25			
Finland	0.94	1.70	1.46	3.42			
Hungary	1.29	1.25	1.90	3.67			
Sweden	0.95	1.65	1.73	3.80			
Ireland	0.63	2.31	1.55	4.21			
Poland	0.97	1.09	3.16	4.43			
Czech Republic	1.02	1.44	2.58	4.75			
Estonia	1.14	1.19	4.53	6.52			
Total average	0.94	1.50	1.42	2.97			
Non-Cohesion Fund Countries	0.91	1.51	0.98	2.41			
Cohesion Fund Countries	0.97	1.49	1.96	3.66			

Table 16.1. SRTP estimation for 20 EU countries

Source: [Florio and Sirtori 2013, p. 12].

Table 16.1 shows the different SRTP levels not only among individual countries but also among countries eligible for Cohesion Fund and those that are not eligible for the Fund.

16.5. Factors Affecting the Cost of Capital – Theoretical Approach

Observations and conclusions stemming from the theories of optimal capital structure are a natural starting point for a search of factors that affect the cost of capital since the theories present a close relation between the capital structure and the cost thereof and the relation is bi-directional. It means that the cost of capital affects the capital structure and that the capital structure affects the cost of capital. The other of the listed impact directions does not apply to the fact that WACC is a weighted average where shares of individual components in the invested capital act as weights. The debt level also affects the cost of equity and the cost of debt which results from the factors described in the theories of optimal capital structure. This is the reason why it is necessary to turn to those theories to identify and better understand the factors affecting the cost of capital. Nowadays, the following two theories are most important among the theories of optimal capital structure: trade-off theory and pecking order theory.

The trade-off theory abandons certain assumptions to the models by Modigliani and Miller [1958; 1963] in search for an optimal capital structure being such at which the weighted average cost of capital is minimum while the enterprise value reaches its maximum. The theory assumes that each change of the debt to equity ratio generates benefits and costs. An increased debt level, on the one hand, will reduce the cost of capital due to interest tax shields and an increased share of a less expensive funding source while, on the other hand, it will increase WACC due to an increased cost of equity as a result of an increased financial risk as well as an increased cost of debt and reduced free cash flows due to an increased probability of financial distress [A. Cwynar and W. Cwynar 2007, p. 140]. Thus, the trade-off theory incorporates both direct and indirect costs of financial distress²⁶ and a double relation between the debt level and agency costs – the disciplining impact of debt on managers and potential intensification of agency problem along with growing debt level as well as potential

²⁶ Direct costs of financial distress include reduced proceeds on the disposal of assets, administrative expenses, costs of court proceedings, lost tax breaks. Indirect costs of financial distress include the costs of lost development opportunities resulting from the need to service debt, incorporation of bankruptcy risk by counterparties of the analysed entity, increased borrowing costs or no interest by owners to re-invest profit which may result in failure to perform potentially profitable investment projects [Ross, Westerfield and Jordan 1999, p. 552; Brigham and Gapenski 2000, vol. 1, p. 511]. Damodaran [2007, p. 844] lists the types of companies specially exposed to indirect bankruptcy costs.

costs of conflicts of interest between creditors and owners [Jensen and Meckling 1976; Brigham and Gapenski 2000, vol. 1, p. 513; A. Cwynar and W. Cwynar 2007, p. 141].

Contrary to the trade-off theory, the pecking order theory has no static nature²⁷, identifying the hierarchy in which the enterprise uses internal and external funds. In compliance with the theory, the target capital structure does not exist; however, there are two types of equity - internal and external. In each enterprise, the mix of debt and equity is a result of cumulated demand for external funding [Porras 2011, p. 198]. Companies first use their retained profit, afterwards they resort to debt and in the end to external equity²⁸. The pecking order theory describes the observed practice relating to the creation of capital structure; however, it would not clarify the reasons directly. In this context, various groups of arguments clarifying the behaviour of companies in that respect may be helpful. A clarification of priority of internal funding may be found in the agency theory [Jensen and Meckling 1976, p. 53] according to which the capital structure is a compromise between the benefits of external funding and the resultant agency costs [Porras 2011, p. 199]. There is an interesting clarification to the pecking order theory relying on asymmetric information hypothesis and signalling theory [Myers and Majluf, 1984]. Information asymmetry created in a natural manner by the agency problem makes the decisions related to the capital structure becoming signals that affect the investors and other stakeholders. In accordance with the theory, managers decide to issue new shares when they find that the outstanding shares are overvalued and refrain from new issues when they are convinced that the stock is under-valued [Duliniec 1998, p. 129]. Thus, companies avoid new share issues as they are usually perceived negatively by investors²⁹. Another reason why the retained profit is used in the first place may be the willingness to preserve financial flexibility understood as a reserve possibility to incur debt that may be used to finance an attractive investment project when it occurs, without the need to issue new shares [Porras 2011, p. 201; A. Cwynar and W. Cwynar 2007, p. 143].

²⁷ The static nature of the trade-off theory shall be understood in this way since it does not provide for changes to the volume of assets and only for a change to debt to equity ratio [Ross, Westerfield and Jordan 1999, p. 553].

²⁸ The sequence is to apply to developed economies [Porras 2011, p. 198]. The hierarchy of funding sources in Polish conditions is discussed e.g. by Kubiak [2013].

²⁹ A review of studies testing various hypotheses resulting from the pecking order theory can be found e.g. in: [Copeland, Weston and Shastri 2014, p. 568].
The most important findings from the optimal capital structure theories support the identification of the following groups of factors affecting the cost of capital³⁰:

interest tax shields;

• differentiated (lower with respect to debt than in the case of owners) requirements of capital providers with respect to the rate of return related to the level of financial risk;

- the level of bankruptcy risk related to the costs of financial distress;
- flexibility with respect to financial and investment decisions;

▶ the agency problem manifested, on the one hand, in growing agency costs along with growing debt and, on the other hand, in a disciplining effect of debt on managers.

It is worth noting that the factors affect not only the cost of capital but also other value drivers of the enterprise. The factors listed above may be called direct or closer ones (first level factors³¹). For each of them, a set of factors may be identified (further or indirect or of other levels) that affect them. This way, an entire pyramid of factors may be obtained coming from the macro-, microenvironment and from the inside of the enterprise. For example, interest tax shields are subject to the income tax rates, which is a condition of the tax system affected by the political and legal environment factors. It is also affected by interest rates applicable to debt which are subject to the level of basic interest rates which are an element of the economic environment. Interest tax shields are also a general resultant value of the entity's overall profitability level which is affected by factors coming both from the inside and outside of the enterprise. Furthermore, the risk of bankruptcy is related to the level of direct bankruptcy costs which are largely affected by factors from the political and legal environment as well as indirect costs of financial distress subject primarily to factors coming from the inside and micro-environment of the enterprise. A similar analysis may also be performed for other factors identified by theories of op-

³⁰ The mutual impact of the capital structure and cost of capital mentioned here constitutes a difficulty in identifying the factors which affect the cost of capital since sometimes it is impossible to differentiate between causes and effects, which augments the complexity of the problems.

³¹ Those are first-level factors in the context of relationships with optimal capital structure theories. Each first-level factor is affected by other factors that may come from inside the enterprise, from the micro- or macro-environment.

timal capital structure. The multitude of factors directly or indirectly affecting the cost of capital cause that they may be grouped by various criteria³².

Referring to environmental and social aspects it should be noted that they may affect practically each closer (first level) factor identified on the basis of the theories of optimal capital structure. For instance, interest tax shields may be affected by environmental conditions that have an influence on the overall tax system and the entity's profitability. The level of direct and indirect bankruptcy costs may be affected by the scope of the enterprise's business which is harmful to the environment as well as the entity's relations with the social environment.

Detailed impact potential of environmental and social aspects on the cost of capital, resulting from empirical studies, is presented in the next sub-chapter.

16.6. Impact of Environmental, Social and Governance Issues (ESG) on the Cost of Capital of Enterprise – Empirical Studies

As specified in sub-chapter 4.5, the fact that the enterprise incorporates environmental, social and governance issues (ESG issues) in its operations has a positive impact on its effectiveness and increase of its value. This is due, for example, to the observable (cf. studies Table 16.2)³³ reduction of risk and the accompanying lower cost of equity and debt of the enterprise (measured, respectively, e.g. with returns, standard deviation of returns, beta coefficient, effective interest costs or credit spreads).

For example, the positive impact of compliance with corporate governance or more precisely the shareholders' rights and transparent reporting on the cost of equity (reduction thereof) was manifested in the study by C.S.A. Cheng, D. Collins and H.H. Huang [2006]. The favourable aspects of the broad disclosures in the context of the cost of equity are also confirmed in the study by Ch.A. Boto-

 $^{^{32}\,}$ It does not exhaust the list of factors affecting the cost of capital and capital structure. A broad review can be found in [Copeland, Weston and Shastri 2014, pp. 570–577; Jerzemowska 1999, pp. 51–60; 170–175]. The abundance of theoretical approaches used in empirical studies is presented in the next sub-chapter.

³³ The data sources and the terminology used in the studies on the cost of capital are usually similar to those described in sub-chapter 4.5.

san [1997]³⁴. It showed the existence of a negative correlation between the cost of equity and the disclosure level for firms with a low analyst following³⁵.

It is worth noting that the observed reduction of the cost of capital is not limited only to the cost of equity. The study conducted by P. Sengupta [1998] proved the existence of a negative correlation between the disclosure quality and the effective cost of debt as well as yield to maturity. The relation becomes especially important in periods of major volatility and uncertainty of the market environment.

However, contrary opinions can be found in literature as well. Certain authors are of the opinion that the reduced cost of capital should not occur [Botosan 2006, pp. 35 and 38]. They believe that the market should demand a premium only for systematic risk and insufficient disclosure constitute an element of diversifiable risk for which no premium is due (risk may be mitigated). Thus, such risk should not be taken into account when the cost of capital is determined. Additionally, they suggest that frequent disclosures may result in increased volatility of share prices due to short-term reaction.

With respect to an analysis of impact of social and environmental issues on the cost of capital, the conclusions drawn from the studies are substantially the same with reference to corporate governance. S.E. Ghoul et al. [2011]) showed that companies with better CSR scores are characterised by a lower cost of equity and the reduction is substantially due to investments in responsible employee relations, environmental policies and product strategies³⁶. Additionally, the participation in controversial (sin) industries³⁷ (in this case, tobacco and nuclear power) increases cost of equity. It is in those industries that a specifically favourable impact of CSR on the cost of capital can be observed. The study by H. Jo and H. Na [2012] shows that the CSR level in enterprises in those industries is negatively correlated with the cost of equity and the dependence is stronger than in enterprises from non-controversial industries.

Studies also confirm a positive impact when the ESG issues are incorporated in the business of enterprises on the cost of their debt. I. Oikonomou, C. Brooks and S. Pavelin [2011] manifested that the high effectiveness of enterprises in

³⁴ Many other studies on the impact of a greater disclosure on decreasing costs of capital can be found in the article by Botosan [2006].

³⁵ In the case of the other group, i.e. companies with a high analyst following, the relation has not proven statistically significant.

³⁶ The study showed little or insignificant impact of the activities related to the community relations, diversity and human rights on the lowering cost of equity.

³⁷ Those include e.g. gambling, alcohol, tobacco, mining, oil, biotech, cement, military, firearms or the nuclear energy industries.

that respect is translated into a lower risk premium, higher bond rating and lower corporate bond yield spreads. It is worth stressing that the effect becomes more intense with time – the longer the term to maturity of bonds, the stronger the effect. Also the study by A. Goss and G.S. Roberts [2011] shows that the average spread for companies characterised by an assessment of ESG issues below average is by about 7 to 18 basis points higher. However, they failed to find evidence that lenders reward CSR leaders. Thus, in the opinion of the scientists, this suggests that banks perceive CSR as a second-order determinant of spreads. The conclusions drawn from the studies also indicate that the impact of CSR on the cost of debt is subject to the borrower quality. In case of low-quality borrowers, voluntary investments in CSR are perceived by banks through the costs of agency and overinvestment, which results in higher spreads (the relationship does not occur in case of high-quality borrowers).

A mixed impact of environmental risk management (ERM) on the cost of capital is presented in the study by M.P. Sharfman and C.S. Fernando [2008]. The study confirmed a negative correlation between the cost of equity (beta coefficient) and the ERM quality; however, in case of the cost of debt, the relationship proved positive. The studies additionally suggest that environmentally strong enterprises are able to incur more debt than their weaker counterparts and thus generate a higher tax shield. The authors of the study additionally managed to confirm the positive impact of ERM on the weighted average cost of capital (WACC).

A summary of a broader scope of studies presenting the impact of ESG issues on the firm's cost of capital is presented in Table 16.2^{38} .

Table 16.2. Impact of ESG issues on the firm's cost of capital				
Authors of the study	Period	ESG issue	ESG factor	Impact
1	2	3	4	5
Albuquerque, Durnev and Koskinen (2013)	2003–2012	Composite CSR index	ESG	Decrease

³⁸ In the case of certain studies, the conclusions were not clear; the result of the study as decrease, mixed or none was determined on the basis of the weight of each indication, the number thereof and the authors' opinions. Some of the studies quoted after [Clark, Feiner and Viehs 2014] are provided with additional comments with details or clarifying the classification. The comments and a full bibliography could not have been presented due to the size of the paper; however, they are available in the above publication.

1	2	3	4	5
Ashbaugh-Skaife, Collins and LaFond (2004)	1996–2002	Several individual CG attributes and a composite G index	G	Decrease
Ashbaugh-Skaife, Collins and LaFond (2006)	2003	G index and individual G attributes	G	Decrease
Attig, El Ghoul, Guedhami and Suh (2013)	1991–2010	Composite CSR index (excluding G)	ES	Decrease
Barth, Konchitchki and Landsman (2013)	1974–2000	Earnings transparency	G	Decrease
Bauer and Hann (2010)	1995–2006	Environmental performance	E	Decrease
Bauer, Derwall and Hann (2009)	1995–2006	Employee relations	s	Decrease
Bhojraj and Sengupta (2003)	1991–1996	G attributes	G	Decrease
Botosan (1997)	1990	Disclosure quality	G	Decrease
Bradley, Chen, Dallas and Snyderwine (2008)	2001–2007	Several G indices	G	Decrease
Cajias, Fuerst and Bienert (2012)	2003–2010	CSE strengths and concerns	ESG	Mixed
Chava (2011)	2000–2007	Environmental performance	Е	Decrease
Chava, Livdan and Purnanandam (2009)	1990–2004	Reversed G index	G	Decrease
Chen, Chen and Wei (2009))	2001–2002	Composite G index	G	Decrease
Chen, Chen and Wei (2011)	1990–2004	G index	G	Decrease
Cheng, Collins and Huang (2006)	2001–2002	Shareholders' rights and financial disclosures	G	Decrease
Cremers, Nair and Wei (2007)	1990–1997	Anti-takeover index and ownership structure	G	Decrease
Derwall and Verwijmeren (2007)	2003–2005	CG quality	G	Decrease
Dhaliwal, Li, Tsang and Yang (2011)	1993–2007	CSR disclosing quality	ESG	Decrease
El Ghoul, Guedhami, Kim and Park (2014)	2002–2011	Corporate environmental responsibility	E	Decrease
El Ghoul, Guedhami, Kwok and Mishra (2011)	1992–2007	Overall CSR score (excluding G)	ES	Decrease
Goss and Roberts (2011)	1991–2006	CSR strengths and concerns	ESG	Decrease

1	2	3	4	5
Jiraporn, Jiraporn, Boesprasert and Chang (2014)	1995–2007	Composite CSR score	ESG	Decrease
Jo and Na (2012)	1991–2010	CSR index (excluding G)	ESG	Decrease
Klock, Mansi and Maxwell (2005)	1990–2000	G index	G	Decrease
Lima and Sanvicente (2013)	1998–2008	Composite G index	G	Decrease
Menz (2010)	2004–2007	Binary indicator variables for social responsibility	ESG	None
Oikonomou, Brooks and Pavelin (2011)	1994–2008	Aggregate CSP score	ESG	Decrease
Reverte (2012)	2003–2008	CSR reporting quality	ESG	Decrease
Schauten and van Dijk (2011)	2001–2009	Disclosure quality	G	Decrease
Schneider (2011)	1994–2004	Environmental performance: pounds of toxic emissions	E	Decrease
Sengupta (1998)	1987–1991	Disclosure quality	G	Decrease
Sharfman and Fernando (2008)	2001–2002	Environmental risk management	E	Mixed
Verwijmeren and Derwall (2010)	2001–2005	Employee wellbeing	S	Decrease

Source: author's study based on [Botosan 1997; Cheng, Collins and Huang 2006; Clark, Feiner and Viehs 2014; Ghoul et al. 2011; Goss and Roberts 2011; Jo and Na 2012; Oikonomou, Brooks and Pavelin 2011; Sengupta 1998; Sharfman and Fernando 2008].

As is visible in the data presented in table 16.2, about 91% of 34 presented studies indicate the existence of a positive relationship between the extent, quality of incorporating ESG issues in the company's business and lower cost of capital. Only 3% of the studies show no relationship and 6% have mixed results.

16.7. Final Remarks

The objective of this chapter was to develop a model approach to the analysis of risk and factors affecting the cost of capital as well as the methodology of the

cost of capital estimation that may be used in an enterprise managed according to green controlling principles.

The objective of the chapter has been accomplished. In individual sub-chapters, various types of risks have been identified related to business activity. Subsequently, various available ways to incorporate the risk in the analysis are presented as well as there is a presentation of basic risk analysis methods that may be applied in the enterprise and in the assessment of investment projects. The most important methods of estimating the cost of capital are shown. Afterwards, when searching for various factors affecting the cost of capital reference is made to contemporary theories of optimal capital structure. On the basis of prevailing theories, factors affecting the cost of capital are identified and a model approach to the problem has been developed. With reference to environmental and social aspects, a synthetic presentation is made of the results of empirical research related to the impact of corporate governance and environmental and social aspects on the cost of capital in the enterprise.

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THE LIST OF IMPORTANT WEBSITES (REFERS TO CHAPTER 12)

AccountAbility http://www.accountability.org/

BellagioSTAMP https://www.iisd.org/measure/principles/progress/bellagiostamp/

Caux Round Table http://www.cauxroundtable.org/

Dow Jones Sustainability Indices http://www.sustainability-indices.com/

EMAS standard http://ec.europa.eu/environment/emas/news/index_en.htm

Fédération des Experts Comtables Européens (FEE) http://www.fee.be/

Global Reporting Initiative (GRI) https://www.globalreporting.org

Greenwashing Index http://www.greenwashingindex.com/

International Auditing and Assurance Standards Board https://www.iaasb.org/

International Federation of Accountants (IFAC) http://www.ifac.org/

International Finance Corporation (IFC) Sustainability Framework http://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/IFC+Sustainability/

International Integrated Reporting Council (IIRC) http://integratedreporting.org/

International Labour Organisation (ILO) http://www.ilo.org/global/lang--en/index.htm

International Institute for Sustainable Development https://www.iisd.org/

IRIS http://iris.thegiin.org/metrics

ISAE 3000 standard http://www.isae3000.com/

ISO 26000 standard http://www.iso.org/iso/home/standards/iso26000.htm

ISO 14000 standard http://www.iso.org/iso/home/standards/management-standards/iso14000.htm Tripartite declaration of principles concerning multinational enterprises and social policy (MNE Dec-

laration) http://www.ilo.org/empent/Publications/WCMS_094386/lang--en/index.htm Organisation for Economic Co-operation and Development (OECD) http://www.oecd.org/index.htm OECD Guidelines for Multinational Enterprises http://mneguidelines.oecd.org/

RobecoSAM http://www.robecosam.com/

Social Accountability International (SAI): http://sa-intl.org/

Sustainability Accounting Standards Board (SASB) http://www.sasb.org/

Sustainability Disclosure Database http://database.globalreporting.org/

United Nations Global Compact https://www.unglobalcompact.org/

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Modern management for the fulfilment of sustainable development goals requires support provided by controlling, especially 'green controlling', whose core focus is on environmental and social issues. This book presents controlling within the concept of sustainable development as an element contributing to the increase of enterprise value. The authors of this monograph have explored topics in connection with environmental and social determinants, at the same time presenting their financial consequences for company business. As a result, the publication demonstrates, in the theoretical dimension, that activities undertaken in an organized and coordinated fashion with a view of sustainable development goals may and should be regarded in connection with finance.

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