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Review

Corporate Sustainability Assessment: A Historical Review

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Abstract: The main aim of the review is to build a general understanding about how corporate sustainability researchers propose evaluating corporate sustainability and how the proposed models and frameworks changed over time. The review is done from the perspective of several aspects, focusing on the methods, tools and models proposed for corporate sustainability assessment, noting the business level of evaluation (the company level, a broader industry of value chain level, or a narrower product or process level). Other two aspects of the research were the definition of sustainability in the proposed models with regards to sustainability dimensions, and different empirical studies executed using the theoretical models proposed. The review includes 30 papers, focusing on corporate sustainability evaluation, assessments and measurement, published from 1997 to 2010.

Keywords: Corporate sustainability, sustainability assessment, sustainable development, business sustainability, sustainability evaluation, sustainability measurement.

1. Introduction

As sustainability assessment at the national level is becoming more and more common, because of the government policies, appointing certain institutions to evaluate countries' sustainable development and spreading of countries' sustainable development strategies, similarly, the sustainability assessment of the business sector has also several attempts already. Corporations are seen as an important participant in the pursuit of sustainable development, thus researchers build corporate sustainability

assessment frameworks and models, that would be used to evaluate business contributions to sustainability.

The research problem of this paper can be defined as creation of various new business sustainability evaluation models, reflecting different approached to define sustainable development and sustainability, and employing different mathematical procedures to draw conclusions. Most of the business sustainability researchers try to build a unique and the best sustainability evaluation model without much deep research of what colleague researchers have created already and how his or her own model differs or is similar to the ones already used. This brings a problem of doing the same thing many times by different people, while it could be beneficial to build on the models already created and try to improve on them.

Thus, the aim of this review is to build a general understanding about how corporate sustainability researchers suggest to evaluate corporate sustainability: what tools are used, what models are suggested, what mathematical or logical procedures are suggested to execute this process. The review with a historical perspective should also bring some insights on how did the proposed sustainability evaluation models change over time. Another benefit of such research would be for the reviewer and the other readers to build a general understanding of what models have already been created and used in empirical studies, so the author in his or her own research could use one or several of the models proposed, or create his or her own corporate sustainability assessment model knowing various perspectives of other researchers.

2. Process of the historical study

This review focused on the corporate sustainability evaluation models, presented in the scientific articles. Only the articles, that had some kind of business perspective, were selected to be included in the research. The "business perspective" is quite a broad approach, as the review encompasses several studies of a broader and narrower scope of sustainability assessment of a product (a part of a business), of sustainability assessment of a supply chain (several integrated businesses), or certain industry perspective (several businesses working in one field). The most of the articles selected for this review had a focus on a company level, which was the main aim of the study.

The retrieved articles were then red by the reviewer with several specific questions in mind. One of the questions to be answered during the review was "how" does the article propose to evaluate sustainability. Before the review, several potential answers were listed, as the evaluation could be potentially be done by using indicators, benchmarks, indexes, standards or some other ways. The second question was "what" business level is evaluated, from the perspective of the firm (company, enterprise) level, and a broader level of several firms (certain industry or supply chain), or a narrower level, than a firm (a product or a process). The third concern in the review was the definition of sustainability, which would be the background of the model proposed, to be more precise, whether the author includes all three dimensions of sustainability (ecological, social and economic), that are so popular nowadays, or other sustainability conceptual frameworks are used with different components. The fourth concern was the type of empirical application of the models, thus the articles were read and reviewed not only looking at what theoretical models are proposed, but how the models were applied evaluating sustainability of real businesses. These were the main concerns during the execution of the

review, that would build a general understanding of the various propositions of researchers on the evaluation of corporate sustainability.

3. A review of corporate sustainability assessment models

One of the first attempts to measure corporate sustainability is [1], where the authors present a method to measure sustainability of a production system, and as the authors state: "Because it would be very complex and time consuming to elaborate the method for a complete production system, the case study considers a relatively simple part of a production system: a paper mill in the Netherlands" [1]. Thus [1] focus on a company level and present method implementation in a case study. To measure sustainability, the authors use indicators and EUS (Environmental Utility Space). In the theoretical considerations and sustainability definition, the authors acknowledge the three pillars of sustainability, but mainly focus on the ecological dimension, explaining, that "Ecological sustainability is a prerequisite for social and economic sustainability: the carrying capacity of the biosphere is limited and should not be exceeded by socioeconomic activities" [1]. Thus sustainability is seen as a level of impact of socioeconomic activities on the environment. The method to measure sustainability of a company is also developed accordingly, as the level of impact of a company, in this case a paper mill (or socioeconomic activity) on the environment. The authors calculate such indicators, as energy, resources, output of white paper, emissions to air and water among others, and compare them to the environmental utility space (EUS) to create a graphical representation of the paper mill's different impacts on the environment.

[2] in their paper present indicators calculation proposal, which would allow assessment of business sustainability. Explaining their approach, the authors explain, that: "A fundamental standpoint adopted is to view economic social and environmental efficiency as a necessary (but not sufficient) step towards sustainability. To work out indicators, we build on both the concepts of cost- benefit analysis and the principles of production efficiency" [2]. The authors propose their methods for the firm, or as they define "decision making unit (DMU)" level. To evaluate sustainability, the authors suggest utilizing indicators of three sustainability dimensions: ecological, social and economic. [2] disapprove the use of one aggregate sustainability indicator (nowadays "index" would be a more correct term), but suggest using and in their study propose calculating several partial indexes, stressing different sustainability aspects. Thus [2] propose calculations of: 1. an index based on the input-output framework and cost-benefit analysis, 2. a model, considering social and environmental factors, and 3. a model, focusing mainly on environmental factors.

[3] presents a study of sustainability evaluation of 48 U.S. fossil fuel-fired power plants. The author focuses the study on a firm level and proposes using indicators for sustainability evaluation. A firm is illustrated as a part of industrial subsystem, which is located in the economic system, which is located in the social system, which is located in the ecological system. Thus all three sustainability dimensions are included into the theoretical framework. [3] explains the interrelations of the systems and the firm place in this way:

"A firm, taken as an industrial subsystem of a more global economic system, uses resources from all three (ecological, social and economic) systems <…>. In this case we consider raw materials and energy from the ecological system, labor from the social system, and capital from the economic system. The firm uses these resources to produce outputs such as value added in the economic system,

a product and employment in the social system, and undesirable outputs, or waste, in the ecological system. This process has to work in a sustainable way. A first step in the determination of sustainability is to avoid inefficiencies in all three of the aforementioned systems" [3].

[3] proposes using productive efficiency (PE) method to evaluate sustainability and calculate several PEIs (Productive Efficiency Indicators) for power plant ranking. The methods proposed can be utilized for ranking of firms, which could indicate what firms perform better than others and what firms are the laggards, but due to the lack of global sufficient conditions for sustainability it is not possible to state whether a company is sustainable or not, it is possible to rank them among themselves.

[4] in their article focus on evaluating sustainability at the farm level, which can be called focusing on a business entity level in general, as the authors describe two farms in terms of energy transfer, finances and products produced in each farm. The sustainability evaluation calculations are done for two farms in Central Italy. The authors proposed to evaluate sustainability using indicators: agroecosystem performance indicators (APIs). Indicators proposed include energy and monetary values. Thus the focus in evaluating sustainability is not entirely on nowadays broadly accepted ecological, social and economic dimensions, but on economic and energy dimensions. The farming system is explained through an input/output methodology, which analyses various energy and monetary flows among different system parts (crops, livestock and soil), from the system to the outside and through the system in different time periods.

[4] group the indicators into two groups: related to input and related to output, and after calculating the indicators for two farms, compare them to evaluate which farm's performance is better according to proposed indicators. The authors in the notes state that their study was not aimed at giving an absolute definition of the level of sustainability of the farm, but to supply indicators, capable of evidencing differences between farm systems.

[5] focus on farm sustainability evaluation. While focusing on the farm level, the authors discuss advantages and disadvantages of research implementation through case studies, that focus on one or a few entities, and survey or statistical data analysis from many entities. In their study, the authors rank 371 farms into four classes of performance with regard to sustainability. Farms were ranked according to their total score. Class I (total score from 16 to 20) included the best farms according to the value of the set of indicators, class II was the second best (score from 11 to 15), class III (score from 6 to 10) and class IV (total score from 0 to 5). To evaluate sustainability, [5] used indicators and indices, though they are not explicitly explained in their paper, so it is not possible to say what kind of indicators and indices were selected and whether all three pillars of sustainability (ecological, economic and social) were included among the indicators.

[6] analyze three case studies of integrated impact assessment. The three case studies highly differ, as the first case study deals with a large-scale scheme to finance the installation of a hydropower facility at the existing dam in Mali and power distribution to three countries: Mali, Senegal and Mauritania. The second case study deals with Area-Based Growth with Equity (ABGEP) Programme in Sri Lanka with a goal to integrate the activities of government agencies, nongovernmental organizations (NGOs) and private sector over a five- year period. The third case study dealt with Acid Waters Problem Study in Wales, UK. Thus the focus of the case studies is different, first with a hydropower facility with a multinational perspective, the second with regional growth stimulation in Sri Lanka and the third with studying water acidification in Wales, UK. The case studies illustrate

problems more at a national level, and creation and implementation of policies, and not specifically a "business" or "industry" cases, though business is also involved as a hydropower facility could be analysed as a business decision or business case, and regional development program was aimed at increasing investment and private sector economic activity among other goals.

As the case studies differ, so the authors found that the integrated impact assessment, encompassing economic, ecological and social impact assessments, in each case also differed. Impact assessments were done using differing methods, the integration of economic, ecological and social impact assessments also differed or even some of the three were not executed at all. Thus the authors conclude that "we do not propose a single standardized methodology for universal application. Rather we consider the choice on method should be sensitive to the nature of the proposed action, the stage in the planning and project cycle at which it is being appraised <…>"[6].

[7] estimated the cost of metal concentrates, that would be produced sustainably. The scope of study can be defined as estimating the sustainability of one of the business processes- metal extraction not taking into account further processes, such as how the metal is used in the manufacturing of goods or how much of the metal is recycled and reused when the life cycle of the metal product ends. In their study, [7] explain what would the sustainable metal extraction procedure look like and estimate the price of metal, produced in such a sustainable way. Thus the study focuses on a specific industry – mining – and study the possibilities of sustainable metal extraction comparing the sustainable metal extraction prices with the prices of metals in the market during the time of the research.

[8] propose to measure sustainability at the corporate and project levels. In their article, the authors propose using indicators for sustainability measurement and offers some guidance on the process of selecting indicator sets giving examples of two case studies- first at the corporate level and the second at the project level. From the sustainability dimensions perspective, for the corporate level sustainability evaluation, the authors do not explicitly state what dimensions should or should not be included. Nevertheless, the authors elaborate more on the importance of the indicator selection process in the company, emphasizing the importance of discussions in the company, and selecting the indicators, that would be both important for the organization and for the stakeholders.

In the second case study, [8] already acknowledge three sustainability dimensions for project management evaluation, and propose using the division into 4 pillars (economic, social, environmental quality and use of natural resources), further dividing them into 15 criteria, 37 sub-criteria and 69 indicators. Thus the proposed framework for project management sustainability evaluation encompasses all three sustainability dimensions.

[9] in their paper propose a concept of sustainable value added, by which corporate contributions to sustainability could be measured. Thus the authors focus this approach on a company level. As a way to measure corporate contributions to sustainability, [9] propose a measure based on opportunity costs, which "shows how much more value is created because a company is more efficient than a benchmark and because the resources are allocated to the company and not to benchmark companies. Sustainable Value Added is a monetary measure of corporate contributions, which shows the extra value created when environmental and social impacts are kept constant. As this concept is monetary, is should be noted, that to calculate it, the environmental and social damage or, on the other hand, gain, should be monetized before the concept can be applied, which brings more ethical questions into debate, such as "what is the monetary value of a person injured or killed in a job?"

[10] further develop their [9] concept of sustainable value. The authors state, that "Conceptually, the methodology is suitable for the analysis of the sustainability performance of any form of economic activity or entity such as companies, regions, national economies, processes, or products" [10]. In the article the focus is on a company level and the presentation of a practical application of a concept calculates sustainable value of British Petroleum (BP) in 2001. All three sustainability dimensions are included in the analysis. The data to calculate BP's sustainable value, and thus contribution to sustainable development, consists of 2 economic, 6 ecological and 1 social indicator. In the calculation, the performance data of BP is benchmarked to the data of United Kingdom to find out which of them uses these forms of capital more effectively. The authors calculate, that in 2001, BP created a sustainable value of – (minus) 72 billion £ [10], and that economic capital and work accidents had a positive sustainable value, but all the environmental indicators had a negative sustainable value.

[11] after reviewing 12 case studies of sustainable tourism development, proposes a procedure to assess tourism sustainability. In the paper [11] uses two terms to describe the object of interest: "tourism sustainability" and "tourism destination sustainability". As the author describes: "A tourist destination means a tourist attraction (human-made or natural), including the human system and the ecosystem, influenced by tourism activities" [11]. Thus, the object is quite broad, and could encompass many different things, like a city (e.g. Paris) as a destination, an event (e.g. Oktoberfest in Germany), or a nature's object (e.g. Mount Everest).

As the object of this review is a business sustainability, from this point of view, tourism consists of companies working in tourism sector, thus one could distinguish a tourism company and a tourism industry. But [11] does not state such a distinction and adapts a broader term of "tourist destination".

To assess the sustainability, [11] proposes an eight step process, in which systems are identified, dimensions are identified, indicators are identified, data gathered and analysed through several steps. Thus to evaluated sustainability, [11] proposes gathering data as indicators and using various methods to analyse and present the data: tourism sustainability assessment maps (TAMs), AMOEBA of tourism sustainability indicators (ATSI), sustainability gradation and barometer of tourism sustainability. From the perspective of sustainability dimensions, [11] distinguishes two systems: the human system and the ecosystem, and granulate them into dimensions: human system dimensions: political, economic, socio-cultural, production structure, and ecosystem dimensions: general environmental impacts, ecosystem quality, biodiversity, environmental policy and management. Thus all three nowadays broadly accepted dimensions (ecological, social and economic) are included and even further expanded in the proposed tourism sustainability assessment procedure.

[12] propose a model of assessing sustainable development at a company level, by obtaining a composite sustainable development index (ICSD) in order to track information on economic, environmental and social company's performance in time. [12] suggest utilizing indicators to evaluate sustainable development of a company, and define a 7-step evaluation process. First [12] propose to select indicators, then group them, decide on indicator's impact, normalize indicators, weight indicators, calculate economic, social and environmental sub-indices and out of them calculate a composite sustainable development index. In their paper, [12] also employ this model in a case study of a company Henkel, evaluating its sustainable development through the years 1998-2003. The information, necessary for the case study, was obtained from the company's annual sustainability reports.

[13] in their paper adapt a broad approach in defining the object of sustainability evaluation: it is named “business sustainability”, “sustainability of operations in the manufacturing sector”, “the assessment of the sustainability performances of technological developments during project management” [13], “industry sustainability” (p. 374), “sustainability performances of a company and its operational activities”, “projects that are undertaken in the process industry” (p. 384). Thus the authors in their paper craft a framework that would be universally applicable in quite a wide range of sustainability assessments.

The way to evaluate sustainability, according to [13], is by using indicators, and the authors use three sustainability dimensions (economic, social and environmental) as a basis to structure the framework. [13] present results of a survey, done in a large petrochemical company in South Africa “which rated the relevance of proposed framework’s different criteria for operational (project) sustainability assessment. The authors conclude, that sustainability evaluation “<…> overall procedure (and sustainability indicators) would, most probably, be company-specific”, and that ”the criteria addressed in the proposed framework are particularly applicable to assess projects that are undertaken in the process industry. <…> the proposed framework can thus be used to establish the sustainability of the products as well” [13]. According to the authors, in assessing sustainability, “although individual indicators may be similar, the overall set of indicators to assess company, project and technology sustainability, would typically be dissimilar” [13].

[14] focuses not on a company, or product, or industry perspective, but on a specific issue, that is connected to sustainable development. The author proposes a method to compare corporate commitment and stakeholders’ expectations, as well as corporate commitment and corporate performance. Using this method, one can evaluate whether company’s actions fit the expectations of the stakeholders, are they perceived as committing too little or exceed their expectations. In the article [14] presents four case studies from the Life Sciences industry in Gasel, Switzerland, focusing on evaluation of pharmaceuticals in the water, historical landfills, GMO’s and access to treatment. The method of evaluation does not use indicators or indexes, or calculations, but studies and compares opinions of the corporations and their stakeholders, thus uses interviews and other information sources, such as reports, websites, press releases, newspaper articles etc. From the perspective of this reviews aim and focus of business sustainability evaluation, this study does not directly evaluate corporate sustainability, but rather evaluates the perceptions of corporate sustainability among the stakeholders.

[15] focused attention on sustainability evaluation of universities. From the perspective of business sustainability evaluation [15] paper is of interest, as universities happen to be both public and private, thus especially if a university operates as a private university, it could be considered a business entity, supplying educational services to the society for a payment.

Thus in the paper, [15] focuses on a university (company) level in sustainability evaluation. In the paper, [15] after reviewing both business-specific and university-specific sustainability tools, proposed to use modified Global Reporting Initiative (GRI) guidelines adding an educational dimension. Based on the modified GRI guidelines, Lozano (2006) developed a tool called Graphical Assessment of Sustainability in Universities (GASU), which can be used to compare sustainability performance of a university over time, as well as to benchmark different institutions against each other. Both, Modified GRI guidelines, and GASU utilizes indicators for sustainability assessment.

[16] after discussing various aspects of cost-benefit analysis and full cost and sustainability accounting, for business sustainability assessment propose using Sustainability Assessment Modelling

(SAM), used in UK and New Zeland in oil, energy generation, forestry, housing and other industries. SAM is applied at the project level and offers a way to understand impacts of all three dimensions of sustainability. According to the model, the impacts are categorized into four categories: the financial flows, usage of resources, environmental impacts and social impacts.

[17] propose a framework for sustainability assessment called Sustainability Assessment of Farming and Environment (SAFE). It should be noted here that acronym SAFE has already two explanations of sustainability assessment models: one of [17] and the second one of [18] Sustainability Assessment by Fuzzy Evaluation (SAFE). [17] state that "the framework is designed for three spatial levels: the parcel level, the farm level and a higher spatial level that can be a landscape, the region or the state"[17]. The SAFE framework utilizes indicators and reference values for sustainability evaluation, though the complete hierarchical framework consists of goals, principles, criterion, indicators and reference values.

A different approach, not directly evaluating or measuring sustainability of a company, but researching what means do the companies implement to move toward sustainability, is employed by [19] and [20]. These authors survey companies with an intention to find out what strategies do companies employ. [20] surveyed US commercial carpet industry companies with the purpose to study what competitive advantages do companies get (decrease in manufacturing cost, improved product quality, improved company image etc.) when implementing different pollution prevention and product stewardship practices (reduce energy use, raw material use, solid waste, emissions etc.). Thus [20] in the study focused on a company level, surveying companies in one industry (commercial carpet) in one country (US) and concentrating mostly on one dimension of sustainability, namely ecological dimension (with some aspects of economic benefits in the competitive advantages gained). The social dimension is lacking in the study.

[19] surveyed polluting companies in Portugal, inquiring what environmental strategies (out of 10 listed in the questionnaire) the companies use. Thus the focus of the study was also on a company level and one country (Portugal), but not one industry and also one sustainability dimension - environmental dimension (leaving out social and economic dimensions). These kinds of surveys cannot be directly used for sustainability assessment of a company, firstly because they concentrate mostly on one aspect – ecological – and a second reason is that a survey, that is mostly based on the opinion of a company representative cannot really be used to "measure" sustainability, only to give some insight into what kind of strategies companies are implementing inside to move towards sustainability.

[21] present results of a study, aimed at assessing farm sustainability of 41 dairy farms during 7 years. The authors propose evaluating sustainability at a firm level and concentrate their study on farming sector. To evaluate farm sustainability, the authors use sustainable value and sustainable efficiency concepts, introduced by [9][10]. In their study of 41 farms, the authors took into account these forms of capital: 1. labour, 2. farm capital, 3. utilized land, 4. energy use, 5. nitrogen surplus, but, as the authors state: "Information on other important capital forms (e.g. social aspects and other environmental aspects) was not available in our data set and could not be taken info account"[21]. The authors use indicators from the data set and calculate out of them the values of sustainable value and sustainable efficiency. It should be noted, that in the empirical study, the authors themselves admit, that they did not include a social dimension (out of three environmental, social and economic dimensions) due to the lack of data availability.

[22] explores the possibilities of measuring sustainability at the company (corporation) level and the possibilities to expand this process to the supply chain. As the authors state: "A supply chain is made up of a number of companies, and the sustainability of the chain is dependent on the sustainability of the individual companies" [22]. Thus they consider two scopes: individual company and the companies of the supply chain (which is different from the perspective of companies in the industry, which would combine competitors). It should be noted, that the authors concentrate only on one dimension of sustainability - social dimension - and do not discuss the other two (environmental and economic), but these are not left out completely - the theoretical sustainability model they use consists of all three - only the scope of the paper is on social dimension. [22] use indicators for company and supply chain sustainability measurement, and out of indicators calculate an index of social sustainability measurement. The authors also demonstrate how a "supply chain sustainability index" can be calculated from indexes of companies in the supply chain.

[23] in their study concentrate on evaluating the impact of a product on the environment. They base their study on two products: namely high density polyethylene (HDPE) shopping bags and beds, and calculate impact of each product impact on the environment through the life cycle. Thus the activities in the supply chain are analyzed from the raw materials extraction to the landfill or recycling phase. Thus the scope of the study is not on a company, but on a single product but through all the life cycle.

To evaluate the impacts of a product on the environment, [23] used Life Cycle Assessment (LCA) as a tool. Moreover, they developed different scenarios to be able to estimate whether local production, recycling and local raw material extraction could change the products' impact on the environment. As the authors do not consider other aspects (social and economic) of sustainability, the study cannot be called sustainability assessment study, as there is only environmental aspect studied.

[24] analyze the "sustainability approach" of a sample of 52 Spanish listed companies. In their study, they draw the conclusions about the company and the sector performance at the same time, as the analyzed companies belong to several sectors (eg. Petrol and power sector: 8 companies, consumer goods: 4 companies, financial services and real estate: 16 companies etc.). [24] try to distinguish whether companies, that are more strategically committed to stakeholders, show better social and financial performance. To draw such a finding, the authors use fuzzy logic approach using different indexes. It is studied whether the company publishes sustainability information to the public, and the information is evaluated whether it can be called a sustainability report and whether it is compatible to generally accepted guidelines. From this information, an index is created and with other indexes, they are compared to financial information. It should be noted, that the environmental information is not used in the study, only the financial and social aspects, thus not completely studying all three sustainability dimensions.

[25] focus their sustainability evaluation study on a company level, a company, that has four production facilities in two countries: Taiwan and Philipines. Thus the authors carry out the study on a company group level and on a factory level. For the evaluation of sustainability, the authors use SPI's (Sustainable Production Indicators). The performance of indicators is evaluated using both fuzzy measures and ANP (Analytical Network Process). The indicators selected include all three sustainability dimensions, and are grouped into 5 groups: 1. Energy and material for natural environment, 2. Economic performance, 3. Community development or social justice, 4. Workers and 5. Products, and 22 criteria inside them.

[26] and [27] present a model, called GAMEDE: a global activity model for evaluating the sustainability of the diary enterprises. The model is created at the farm, or company, level and can be used to model the consequences of management decisions for farm sustainability.

GAMEDE model utilizes indicators, but not as a framework, which would suggest that certain indicators should be selected instead of others to evaluate farm sustainability, but as a software program, which can forecast the outcome indicators of a farm when certain decisions are made about fertilizers, working hours, economic output, pollution to air or soil. The authors worked with six farmers in 2004-2006 to test how precise the GAMEDE model is in modeling farm performance. [26] state: "Our studies have shown that the model performs well for diary farms of La Reunion, although these farms have contrasting characteristics in terms of climatic conditions, forage, crop varieties, herd size, buildings, agricultural land area, and above all, management action plans" [26].

The created model takes info account all three pillars of sustainability, naming them as: "technico-economic viability, respect for environment, and social livability"[27]. Depending on the input variables, representing management decisions, GAMEDE models the indicators of nitrogen efficiency, nitrogen surplus, total labor requirement, repetitive labor requirement, milk productivity, silage grassland productivity and gross margin.

[18] propose to assess corporate sustainability using fuzzy logic. The authors present a model, which can be used to assess sustainability at a company level. To assess sustainability, the authors use indicators, and calculate an overall sustainability (OSUS) value out of them using fuzzy logic. The indicators are grouped according to two components: human and ecological. The human component consists of economic, political, knowledge and welfare inputs; the ecological component has air, water, land and biodiversity inputs. Each of the inputs can have one or more indicators, e.g. air has indicators of greenhouse gas emissions and toxic releases. Thus the indicators encompass all three pillars of sustainability: environmental, social and economic. In their paper, the authors present model application to assessing sustainability of three large international corporations, operating in the beverage sector.

[28] in their study propose using composite indicators for evaluation of sustainability of farms. As the theoretical framework for agricultural sustainability analysis the authors use SAFE (Sustainability Assessment of Farming and the Environment Framework) proposed by [17]. In the paper, the authors present results of a research, comprising of 349 questionnaire responses (data on 336 rain-fed farms and 243 irrigated farms). The indicators selected for the study include all three sustainability dimensions: economic, social and environmental and uses 16 indicators. CIAS (composite indicators of agricultural sustainability) were calculated for all the farms in the study, thus enabling the authors to evaluate each farm's sustainability.

[29] in their study focus on sustainability evaluation of one sector, namely, transport. A transport sector, from a business perspective, can be seen as a group of companies, working in one industry, in this case, transport. Thus the authors focus on the industry, not a company, level. In the article, [29] seek to evaluate transport sustainability of 10 countries (Bulgaria, the Czech Republic, Latvia, Lithuania, Hungary, Poland, Romania, Slovakia, Croatia and Turkey).

To evaluate sustainability of countries' transport industry, [29] use indicators, grouped according to three sustainability dimensions: economic, social and environmental. Using different methods of calculation, the authors conclude, that in one case, the most sustainable transport sector is in Slovakia, Turkey and Czech Republic, and in the other case, the most sustainable transport sector is in Slovakia,

Turkey, Czech Republic and Latvia. To draw such a conclusion, the authors use ELECTRE I method (Elimination Et Choix Traduisant la Realite; Elimination And Choice Corresponding to Reality) and authors' modification of the ELECTRE method.

[30] in their review of sustainability assessment models mention, that some of the models discussed in their paper, can be used to assess corporate sustainability. [30] list a number of existing models, used to assess environmental performance of a business (Eco-compass, Eco-indicator, COMPLEMENT) as well as couple of guidelines to assess corporate sustainability (CERES, GRI) and proposes SAFE (Sustainability Assessment by Fuzzy Evaluation) model and a number of indicators to assess business sustainability. Thus the authors propose to measure sustainability of a business by using indicators or the model SAFE (Sustainability Assessment by Fuzzy Evaluation). As this article is a review article, these is little further information about the SAFE (Sustainability Assessment by Fuzzy Evaluation) model structure or implementation.

4. Conclusions

The corporate sustainability research review has shown, that almost all the articles reviewed propose using indicators for corporate sustainability assessment. Most of the indicators represent various impacts on the environment and the society. In order to evaluate businesses, one needs certain data, that afterwards could be evaluated. Thus measuring and evaluating sustainability of a corporation needs calculating indicators, and then evaluating whether the values of the indicators are good or bad, satisfactory or unsatisfactory.

The differences among the models proposed come when the decisions are made about how the indicators should be used: should they be grouped, normalized, divided, recalculated etc. Thus after gathering the necessary data through indicators, various techniques are employed to get certain outcomes: calculating one or several indices, using fuzzy logic, ELECTRE method, ANP (Analytical Network Process), normalizing data, calculating scores and grouping them into groups from the worst performance to the best performance, using benchmark data for comparison with company data. Also various techniques are used to present the results of the calculations in graphical forms: graphs, diagrams, tables, lists of different forms and shapes.

As the focus of the review was on the sustainability evaluation at the company level, most of the reviewed papers researched exactly this level of businesses. Nevertheless, there are different approaches and attempts to evaluate sustainability of a broader level of a group of companies, companies in an industry or in a value chain, or narrower approaches of evaluating products or process sustainability.

In most of the reviewed studies, all three sustainability dimensions (ecologic, social and economic) have been analyzed or at least acknowledged, as in most studies, the sustainability dimensions are used as a theoretical framework, but the empirical studies sometimes have a narrower scope researching only one dimension. There were studies, that had a different approach, defining two systems: the nature system, and the human system, and these were further divided. Nevertheless, these frameworks also encompass all the three dimensions, as the economic aspect is often included inside the social dimension.

The empirical studies could be divided into two groups: one group would consist of the studies, evaluating sustainability of one or several companies, and gathering necessary information from the

companies' sustainability reports and annual statements. These studies are mostly case studies. Another group of studies could be defined as ranking a large number of companies (from tens to hundreds of companies), and the data for sustainability evaluation in such studies is often gathered by surveys. In such studies, the aim is often ranking the companies according to certain criteria and classifying the companies into groups, with the intention to be able to state which companies are the best performing ones in the group, and which ones are the laggards not specifically concentrating on the deep analysis of one of them.

From the historic perspective, the proposals to evaluate sustainability did not change much, as already the first studies reviewed were built on the concept of three sustainability dimensions. The first reviewed study [1] already used three sustainability dimensions, though defining them as the impact of socioeconomic activities on the environment. The latter studies of corporate sustainability more and more often included in the frameworks the positive and the negative impacts of all the three dimensions, building a general understanding, that the company had both positive and negative impacts in all three dimensions. Thus both positive and negative economic impacts, positive and negative social impacts, and positive and negative impacts on the environment are later included in the corporate sustainability assessment frameworks.

Conflict of Interest

The author declares no conflict of interest.

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