Current Trends of Corporate Performance Evaluation in the Building and Construction Sector

Jiří Hřebíček, Michal Hodinka, Ondřej Popelka, and Oldřich Trenz

***Abstract*—** Current trends of corporate performance evaluation (i.e. measurement of environmental, social and governance (ESG) and economic/financial performance) including corporate sustainable reporting are introduced and discussed in the paper, which is focused on the building and construction sector. Conclusions of United Nations Environment Programme of Sustainable Buildings and Climate Initiative are combined with recommendations of the Reference Document on Best Environmental Management Practice of the Building and Construction Sector developed by the Joint Research Centre of the European Union (EU) and the Regulation (EU) No 305/2011 laying down harmonized conditions for the marketing of construction products. The Construction and Real Estate Supplement (CRESS) of the Global Reporting Initiative Guidelines is also taken into account. The development of advanced methods which identify key performance indicators for ESG performance of building and construction sector is discussed here, along with the possibility of the utilization of information and communication technology and XBRL taxonomy for corporate sustainability reporting.

***Keywords*—** Performance evaluation, Corporate performance, ESG performance, Key performance indicators, Corporate reporting, GRI, CRESS, UN SBCI, Building and Construction Sector.

I. Introduction

The research team of the Faculty of Business and Management (FBM) of Brno University of Technology (BUT) and Faculty of Business and Economics (FBE) of Mendel University in Brno (MENDELU) has solved the research project No P403/11/2085 "*Construction of Methods for Multi-factorial Assessment of Company Complex Performance in Selected Sectors*" since January 2011. The project is solved in 2011-2014 and funded by the Czech Science Foundation. The main goals of the research in this project have been specified by Hřebíček et al. [1], [3] and Chvátalová, Kocmanová and Dočekalová [2].

Reporting on sustainability and *environmental, social and governance* (ESG) performance is a crucial step towards a market that rewards the creation of long-term wealth in a just and sustainable society. Sustainability key performance indicators can play a crucial role in supporting markets that create such long term wealth. They can form the backbone of a sustainability disclosure that tracks and allows for improvement on those issues most tied to a corporation's environmental and social impact and most important for a company's financial performance.

We have analyzed sustainability reporting and ESG performance in chosen companies of the building and construction sector in the Czech Republic which have implemented and certified international management standards [4], i.e. quality (ISO 9000), environmental (ISO 14000 and EMAS) and occupational health and safety (ISO 18000) management systems. Some of them have also implemented the social responsibility (ISO 26000) management system [5].

We have investigated how ESG and economic/financial data and information, generally sources of sustainability indicators, can be monitored, codified, registered and transformed to *Key Performance Indicators* (KPI), e.g. [1], [3], [6], [7]. This fact indirectly indicates that, in the case of such needs, these organizations were able to use this ESG and economic/financial data and incorporate them into their corporate sustainability reports, which issued from different reporting frameworks and approaches of the following international organizations: United Nations Environment Programme Finance Initiative (UNEP FI) [8], International Financial Reporting Standards (IFRS) [9], Corporate Social Responsibility (CSR) [10], European Federation of Financial Analysts Societies (EFFAS) [11], Society of Investment Professionals in Germany (DVFA) [12], [13], Socially Responsible Investment (SRI) [14], United Nations Principles of Responsible Investment (UN PRI) [15], Organization for Economic Co-operation and Development (OECD) [16], [17], Global Reporting Initiative (GRI) [5], [18], [19], International Federation of Accountants (IFAC) [20], United Nations Conference on Trade and Development (UNCTAD) [21], [22], International Integrated Reporting Council (IIRC) [23] and United Nations Global Compact (UN Global Compact) [24].

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Our approach has arisen from analyses of their framework, guidance, studies and reports in relation to the development of sustainability and ESG indicators.

They are summarized in Fig. 1, which was introduced in [25].

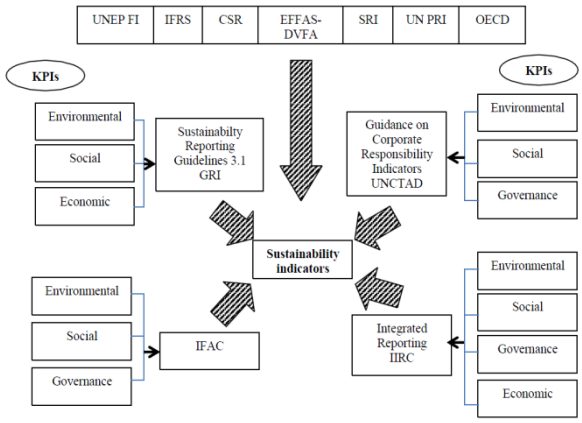

Fig. 1 Relationships of international organizations to sustainability and ESG indicators. Source [25]

We have focused on these crucial partial processes in our research areas: integration of economic/financial, environmental, social and governance performance indicators and their transformation into sustainability indicators of sustainability of corporate success.

Our proposals of possible corporate performance indicators measurements were tested in chosen organizations of the Building and Construction sector by means of developed KPIs. They issued from our previous findings [1], [2], [3], [26], [27], [28] and new proposals are discussed in the paper.

II. Corporate Performance Evaluation at Building and Construction Sector

A. Introduction

In socio-economic terms, the built environment has significant direct and indirect impacts on social well-being and the livelihoods and prosperity of communities and individuals. The building and construction sector, through its various activities as a major employer with a diverse and complex supply chain, can positively impact local economies by providing jobs, training and industry. This sector provides homes; education and recreational facilities for communities, but it can also be responsible for displacing many people.

In this chapter we introduce some results of our analysis of the state-of-the-art of economic/financial, environmental, social and governance aspects of ESG performance indicators of the *Building and Construction Sector*, where the construction sector is covered by *Section F* of the NACE Classification [29], divisions 41 to 43. According to NACE, the construction sector includes the *complete construction of buildings* (division 41), the *complete construction of civil engineering works* (division 42), as well as *specialized construction activities*, if carried out only as a *part of the construction process* (division 43).

We have considered the new approach of GRI 3.1 Guidelines [18] developed by GRI with other organizations on common approaches to corporate performance indicators and reporting in the Construction and Real Estate sector [30] and also the *United Nations Environment Programme of Sustainable Buildings and Climate Initiative* (UNEP-SBCI) [31].

On 25 November 2009, the Council and the European Parliament adopted the proposed revision of the *EcoManagement and Audit Scheme* (EMAS) regulation (EC) No 1221/2009 (EMAS III), which went into force on 11 January, 2010. We introduced the general environmental indicators from the Annex IV (Environmental reporting) of the EMAS III to standardized environmental KPIs of the Ministry of the Environment of the Czech Republic [26].

One of the new elements of the EMAS III was Article 46 stating that sector reference documents (SRD) on best environmental management practice (Article 46(1)) shall be developed. They shall contain best environmental management practices, sector-specific environmental performance indicators and, where appropriate, benchmarks of excellence and rating systems identifying environmental performance levels. Therefore, the SRD "*Documents on Best Environmental Management Practice of the Building and Construction Sector*" [32] for the building and construction sector was compiled by the Institute for Prospective Technological Studies (IPTS), part of the European Commission's Joint Research Centre (JRC) in 2011 and we will discuss this later.

The new role will begin to be played also by *Regulation (EU) No 305/2011* of the European Parliament and of the Council of 9 March 2011 (Construction Products Regulation – CPR) which will lay down harmonized conditions for the marketing of construction products – here its Annexes I, II, III (Declaration of performance) and V shall apply from 1 July 2013. We consider and discuss these later.

We have taken into account results of the EU project OPEN HOUSE[1], which has developed and implemented a common European transparent building assessment methodology, complementing the existing ones, for planning and constructing sustainable buildings by means of an open approach and technical platform[2].

B. Questionnaire for the Investigation of Corporate Performance at the Building and Construction Sector

Our research project No P403/11/1103 consists of partial research targets [1], [2], [3]. These targets are connected with the particular project stages. In the first stage, the state-of-the-art analysis has been developed in collaboration with researchers of the FBM BUT together with the questionnaire covering all four general topics (reporting is included across all the topics) of our research [1], [2], [25], [26]. According to this, the questionnaire was divided into four independent modules focusing on partial aspects of business development,

[1] http://www.openhouse-fp7.eu/
[2] http://www.openhouse-fp7.eu/assets/files/D.1.2.1_120227.pdf

particularly in the environmental, social, economic, and corporate governance management subsystems.

The questionnaire was prepared for both (printed and online) versions with the identical texts. After collection of all data, both data sets were merged for further data processing. The online data collection was done by means of the *Research Laboratory* (ReLa) questionnaire system, which has been developed as a research project of the Institute of Marketing and Trade of the FBE MENDELU in Brno [46].

Based on the research results of the questionnaire, it was possible to evaluate the current state and potential corporate performance of the investigated organizations of the building and construction sector on environmental, social, economical and corporate governance levels.

Subsequently, we have continued in the verification of the correctness of our approaches and development of KPIs for corporate performance evaluation and corporate sustainability reporting, proposed for organizations of the investigated sector of the Czech Republic and the European Union.

C. GRI Construction and Real Estate Sector Supplement

The GRI is a very important network-based organization that produces a comprehensive sustainability reporting framework that is widely used around the world. It has developed the *Construction and Real Estate Supplement* (CRESS) [30] and provides organizations in this sector with a tailored version of GRI's Reporting Guidelines [18]. It includes the original Guidelines, which set out the *Reporting Principles, Disclosures on Management Approach* (DMA) and *Performance Indicators* (PI), which are organized into the following categories: *Economic, Environmental* and *Social*. The Social category is broken down further into *Labor, Human Rights, Society* and *Product Responsibility subcategories*. Each category includes a DMA and a corresponding set of *Core* and *Additional Performance Indicators*.

The CRESS is intended for companies that:

1) invest in, develop, construct, or manage buildings; and
2) invest in, develop or construct infrastructure.

For the purpose of the CRESS, infrastructure assets relate to *new construction*, and *demolition and redevelopment* of infrastructure only. *Management and occupation* of infrastructure is not included in the scope of the CRESS.

Infrastructure asset types include [30]:

1) *Transport infrastructure* (e.g., roads, tunnels, bridges, airports);
2) *Social infrastructure* (e.g., hospitals, schools, courts, correctional facilities);
3) *Environmental infrastructure* (e.g., water treatment, waste and recycling facilities, desalination plants);
4) *Energy infrastructure* (e.g., power generation, renewable installations, gas storage, transmission distribution, combined heat and power); and
5) *Other infrastructure* (e.g., fixed or mobile telecommunication networks, broadcast facilities).

The lifecycle diagram (Fig. 2) describes the activity areas covered within the CRESS.

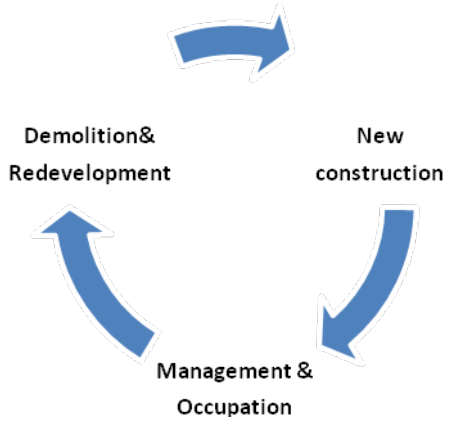

Fig. 2 Lifecycle diagram of activity areas covered within CRESS. Source [30]

The Construction and Real Estate sector has a significant impact on the economy, society, and environment, in ways that are both positive and negative. We consider appropriate indicators of CRESS in indicators for proposed metrics of ESG performance evaluation.

D. UNEP Sustainable Buildings and Climate Initiative

In 2006, the UNEP launched the *Sustainable Buildings and Climate Initiative* (UNEP-SBCI) [31] to respond to the challenges and needs of stakeholders in the building sector. The UNEP SBCI is a partnership of major public and private sector stakeholders in the building sector, working to promote sustainable building policies and practices worldwide. Partners include: industry representatives, businesses, governments, local authorities, research and academic institutions, non-governmental organizations (NGOs), and representatives from civil society.

Since its inception UNEP's SBCI has played a unique and critical role in presenting a common voice for the building sector stakeholders and in promoting a worldwide adoption of sustainable buildings and construction practices. It is clear that UNEP-SBCI continues to lead the global dialogue on sustainable buildings while helping to shape policies which will result in more sustainable development patterns and reduce the impact of buildings on climate change.

The UNEP-SBCI [31] informs that buildings are responsible for more than 40 % of global energy use and one third of global greenhouse gas emissions. It also estimates that buildings are responsible for up to 80 % of greenhouse gas emissions in our cities and towns. Reducing global greenhouse gas emissions in the built environment is also widely recognized as the least expensive abatement opportunity. The UNEP-SBCI estimates that the built environment is globally responsible for 30 % of natural material use and 20 % of water use. The creation and maintenance of the built environment also significantly affects natural ecosystems and transforms or eradicates long-standing habitats. The Construction sector also produces large quantities of waste and UNEP-SBCI estimates that the built environment contributes to 30 % of total solid waste generation.

In order to establish globally recognized baselines based on a life cycle approach and frame a common language for the performance assessment of energy efficient & low carbon buildings, UNEP-SBCI created the *Sustainable Buildings Steering Committee* (SB-SC) in 2010 to oversee the development of the *Sustainable Buildings Protocol* (SB Protocol). The SB Protocol provides a common understanding of the core issues, measuring tools, and verification process for sustainable buildings and will address the following aspects of a building's impact:

1) *Energy Efficiency & Greenhouse Gas Emissions* (EE/GHG);
2) *Water use*;
3) *Soil, water and air pollution*, and
4) *Building and construction materials* (consumption, scarcity, life-cycle and waste generation).

In 2011, the first draft of the SB Protocol was completed and reviewed by UNEP-SBCI's *Advisory Board*[3]. In response to feedback the SB Protocol was separated into two documents; the first, focused on government/local authority organizations that possess juridical and/or regulatory control over the built environment; and the second, targeting private and public sector organizations with financial and/or operational control over large building portfolios. The SB Protocol will continue to be refined in 2012 and will be submitted for external review before it is finalized.

A number of international and national initiatives (GRI [30], Cities Alliance/World Bank/UN Habitat[4], OECD/IEA[5], ISO TC59/SC17 [33], CEN 350 [34], [35], Sustainable Buildings Alliance[6], UK Green Property Alliance[7]) provide common metrics and reporting frameworks for common indicators in the built-environment, including GHG emissions, some of which have already contributed actively to the current development of the SB Protocol in general and the common carbon metric work in particular.

E. EU Construction Product Regulation

The construction sector has not only a significant role in the EU economy, but it is also a major contributor to the EU energy consumption and greenhouse gas emissions. Construction activities and buildings are related to various impacts on the environment. The key aspects are land use, the consumption of raw materials, energy and water, the production of waste, as well as noise and air emissions, e.g., 42 % of the total EU final energy consumption, 35 % of the greenhouse emissions, about 50 wt. % of extracted materials and 22 wt. % of waste generation is related to buildings.

The Regulation (EU) No 305/2011 (Construction Products Regulation - CPR) which repeals the Directive No 89/106/EEC (Construction Products Directive – CPD), is to ensure reliable information on construction products in relation to their performances. This is achieved by providing a "*common technical language*", offering uniform assessment methods of the performance of construction products. These methods have been compiled in *harmonized European standards* (HEN) and *European Assessment Documents* (EAD). This common technical language is to be applied by:

1) the *manufacturers* when declaring the performance of their products, but also by
2) the *authorities* of Member States of EU when specifying requirements for them, and by
3) their *users* (architects, engineers, constructors…) when choosing the products most suitable for their intended use in construction works.

The CPR has already entered into force. However, the main parts of its substantial Articles shall be valid from 1 July 2013. Until then, the CPD therefore remains in application. The already applicable parts of the CPR focus on the notification and designation processes of the *Notified Bodies* (NB) and the *Technical Assessment Bodies* (TAB).

The *Declaration of Performance* (DoP) is the key concept in the CPR, which is layed out in Annex III of the CPR. The DoP gives the manufacturer the opportunity to deliver the information about the essential characteristics of the product they wants to deliver to the market.

The CPR emphasizes an aspect of sustainable development in the area of construction products in following the requirements of its Annex III:

1) *Requirement No 3* (hygiene, health and the environment) affects the wider environment and newly applies to the entire building life cycle including construction, use and demolition.
2) *Requirement No 6* (energy saving and heat retention) is supplemented by new energy efficiency requirements of individual buildings to minimize energy consumption during construction and demolition.
3) *Requirement No 7* concerning the sustainable use of natural resources, particularly the possibility of reuse or recyclability of the materials and parts after demolition of building structures to ensure that the lifelong? Use of raw materials (including secondary materials) is environmentally friendly.

All the information supplied by the DoP is obtained by strictly applying the methods and criteria provided by the relevant harmonized standard or, in the absence of an applicable harmonized standard, by the relevant EAD. The *European Technical Assessment* (ETA) shall be issued by a TAB on the basis of an EAD adopted by the *European Organisation for Technical Approvals*[8] (EOTA).

A request for a ETA by a manufacturer for any construction product not covered or not fully covered by a harmonized standard of the *European Committee for Standardization*[9] (CEN) and for which the performance in relation to its essential characteristics cannot be entirely assessed according to an existing CEN harmonized standard can be addressed to a TAB designated in the product area in question (see TABs in

[3] http://www.unep.org/sbci/AboutSBCI/structure.asp
[4] www.unep.org/urban_environment
[5] www.iea.org/subjectqueries/buildings.asp
[6] www.sballiance.org
[7] www.ipf.org.uk
[8] http://www.eota.be/pages/home/
[9] http://www.cen.eu/

New Approach Notified and Designated Organisations (NANDO) Information System).

The *CEN Environmental Helpdesk*[10] (CEN/EHD) provides information and support to CEN Technical Committees (TCs) and Working Groups when addressing environmental issues in European Standards. The role of the CEN/EHD is to:

1) Develop environmental awareness among CEN technical bodies and encourage a systematic approach to integrate environmental aspects into standards.
2) Structure environmental information and provide supporting tools available for TCs.
3) Provide guidance to specific environmental projects within standardization.

In order to help deliver these objectives, the CEN/EHD has produced an Environmental Framework of tools and support services that are freely available to all CEN committee members. The Environmental Framework includes for instance the following useful items:

- Guidance and examples by sectors (Construction, Consumer products, Energy and utilities, Environment, Healthcare, Heating, Ventilation and Air Conditioning (HVAC), Materials, Pressure equipment, Services, Transport and packaging);
- Guide to EU environmental policy and directives (Sustainable Consumption and Production and Sustainable Industrial Policy (SCP/SIP) Action Plan, LCA database, Ecolabel, Environmental Footprint, etc);
- Useful links (The CEN Environmental approach, EC Communication on the integration of environmental aspects in standards, Environmental standards from ISO and other standardization organizations).

The DoP constitutes then the key element in the functioning of the Internal Market for construction products by providing it with the necessary transparency and by establishing a clear system of allocation of the responsibilities between actors and enables to specify more precisely corporate sustainable performance in the construction and building sector.

F. EMAS III Reference Document for Building and Construction Sector

Buildings present sustainability challenges in many forms, including energy efficiency, materials use, and their requirements for maintenance and modification to meet changing demands. Many EU and governmental policy initiatives exist to promote and support sustainable construction, but there is no generally accepted system for assessing the sustainability of existing or planned buildings.

The EcoManagement and Audit Scheme (EMAS) regulation (EC) No 1221/2009 (EMAS III) went into force on 11 January, 2010. The EMAS III (Article 46) stated that sector reference documents (SRD) on best environmental management practice shall be developed. The structure of the EMAS III reference document on best environmental management practice for the construction sector covers the whole value chain, from land planning at public level to the end-of-life stages of construction products (buildings or civil works). The relative influence of the design phase on the environmental impact of the whole life cycle is huge, especially in the use phase. Nevertheless, special emphasis will be made on construction processes, as defined by NACE [29] codes F41 to F43, as they are not covered in detail in other EU guidelines. Regarding supply chain management, material production is not covered by the document as other tools have been already implemented, such as the Directive No 2010/75/EU of 24 November 2010 on industrial emissions (Integrated Pollution Prevention and Control - IPPC). Attention will focus on the use of recycled or reused materials, on the use of environmentally-friendly products and on the waste flows of the sector.

Reducing energy consumption and eliminating waste production are among the main goals of the EU. EU support for improving energy efficiency will prove decisive for competitiveness, security of supply and for meeting the commitments on climate change made under the Kyoto protocol. There is significant potential for reducing consumption with cost-effective measures. With 40% of our energy consumed in buildings, the EU has introduced legislation to ensure that they consume less energy.

A key part of this legislation is the Directive No 2002/91/EC, (Energy Performance of Buildings Directive - EPBD). With the adoption of the recast EPBD in 2010 (Directive 2010/31/EU), EU Member States faced new tough challenges. Foremost among them, moving towards new and retrofitted nearly-zero energy buildings by 2020 (2018 in the case of Public buildings), and the application of a cost-optimal methodology for setting minimum requirements for both the envelope and the technical systems, the current *Concerted Action*[11] thus aims at transposition and implementation of the EPBD recast, and it runs from 2011 until 2015. The first part (until 2012) focuses on transposition of the recast EPBD, the second part of the Concerted Action shall focus on implementation and lessons learned.

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III. Sustainability Indicator Evaluation and Reporting in the Building and Construction Sector

A. Introduction

The creation of reliable methods of corporate performance measurement in the Building and Construction sector where concurrent action of multiple factors is in play can be considered a prerequisite for success not only in decision-making, but also with regard to corporate governance, comparison possibilities, development of a healthy

[10] http://www.cen.eu/CEN/services/ehd/Pages/default.aspx

[11] http://www.epbd-ca.eu/

competition environment, etc.

The GRI, EU, UNEP-SBCI and OECD/IEA initiatives together with works of the ISO TC59/SC17 [33], CEN 350 [34], [35], Sustainable Buildings Alliance, UK Green Property Alliance, IFAC, DVFA and IIRC state that corporate performance and sustainability indicators in the Building and Construction sector may be both quantitative and qualitative and that they should cover the reporting entity's direct and indirect impacts across economic, environmental, social and governance dimensions.

Economic indicators measure the efficiency of an organization's use of its resources at the internal level and of other economic systems at the local, national and global level [25], [28]. These metrics also measure resources dealing with remuneration paid to employees and money received from customers.

Environmental indicators deal with the measurement of an organization's environmental impact via its products and services and its activities [1], [26].

Social indicators deal with labor practices, human rights and broader social issues affecting a broad range of stakeholders [14], [18]. An important element of the social performance is occupational health and safety. The trend underscoring the social aspects of sustainable development is the concept of CSR [10]. Other key issues related to the CSR are: human rights, employees' rights, involvement of municipalities and relationships with suppliers, information policy including issues such as releasing information, transparency, educating the consumers and anti-corruption measures.

Governance indicators enlarge Sustainability indicators and deal with corporate governance [36]. This is a term that refers broadly to the rules, processes, or laws by which businesses are operated, regulated, and controlled. The term can refer to internal governance indicators/factors defined by the officers, stockholders or constitution of a corporation, as well as to external forces such as consumer groups, clients, and government regulations [37]. The corporate governance issues in the Czech Republic from the Corporate Governance Code of companies, which is based on the OECD principles 2004 [17].

B. Economic performance and its KPIs

Financial reporting standards, such as IFRS and US Generally Accepted Accounting Principles (U.S. GAAP) and ESG reporting frameworks, principally the G 3.1 Guidelines [18], will act as structural supports for potential integrated reporting frameworks of integrated economic performance [25].

Research of the direction of the economic performance indicators of project No P403/11/2085 has focused on the analysis of the reporting framework of the GRI and IFAC Sustainability Framework 2.0 [38]. Furthermore, the research dealt with economic indicators which have been published in the Yearbook of Czech Statistical Office [39] and selected economic indicators of financial statements according to Czech accounting standards (from 2011) and a comprehensive analysis of the voluntary reporting of 10 large Czech companies of the Construction and Manufacturing sector has also been done [25].

We proposed the Key Performance Indicators (KPIs) for the measurement of economic performance in relation to the sustainability and ESG indicators. The economic performance indicators provide quantitative forms of feedback which reflect the results in the framework of corporate strategy. The approach is not different when we control environmental, social and governance resources. The non-financial KPIs that an organization develops, manages and ultimately reports – whether internally or externally – will depend on its strategic priorities, and will reflect the unique nature of the organization. What is most important is to recognize what is measured, what is controlled, and it is important that the measures create value for the company and its stakeholders.

The proposed KPIs can help organizations to plan and manage their economic priorities, in particular, when the economic indicators are focused on the core business strategy, by means of operational plans, which include performance targets.

The proposed KPIs for measurement of the corporate economic performance in relation to the ESG indicators were established on the basis of the results of empirical research by the team of FBM BUT, [25], see Tab. 1.

Table 1. Economic KPIs

Indicator	KPIs	Measurement
EC1 Profit	EBIT	Earnings before Interest and Taxes
	EBITDA	Earnings before Interest, Taxes, Depreciation and Amortization.
	EAT	Earnings after Taxes / Net profit
	EPS	Earnings Per Share, P/E = Price Earnings Ratio.
EC2 Cash Flow	FCF Free Cash Flow	EBIT * (1-Tax rate) + Depreciation and Amortization - Changes in Working Capital - Capital expenditure.
	OCF Operating Cash Flow	All the cash flows arising from the main activity of the company, which is the subject of its business (the movement of stocks, receivables, obligations).
EC3 Revenues	TR Total revenues	Total revenue is the total receipts of a company from the sale of any given quantity of a product, i.e. Revenues from own goods and services + Revenues from sale of merchandise (goods for resale) + Revenues of fixed assets + Revenues from sale of materials + Revenues of securities.
EC4	Turnover	Revenues from own goods

Turnover size	size	and services + Revenues from sale of merchandise (goods for resale) + Revenues of securities
EC5 Profit margin	Profit margin	The difference between turnover (revenues) from sales of goods and expenses on merchandise sold (i.e. on goods sold in the same condition as received).
EC6 Indicators of economic performance	Return on Equity	ROE = EAT / Equity
	Return on Investment	ROI = EBIT /Total capital
	Return on Assets	ROA = EBIT / Assets
	Return on Sales	ROS = EAT / Revenues
	Return On Capital Employed	ROCE = EBIT / Equity + Long-term liabilities
EC7 EVA	Economic Value Added	EVA = (ROE – Cost of Equity) * Equity

The economic indicators EC1, …, EC7 in the Table 1 differ from economic indicators proposed in the FP7 OPEN HOUSE project and also in CRESS [30], where there are only several defined indicators EC1, EC2, EC7, EC8 and EC9 following the G3.1 Guidelines of the GRI:

- *Economic Performance indicators*: EC1 (Direct economic value generated and distributed, including revenues, operating costs, employee compensation, donations and other community investments, retained earnings, and payments to capital providers and governments) and EC2 (Financial implications and other risks and opportunities for the organization's activities due to climate change and other sustainability issues).
- *Market Presence indicator*: EC7 (Procedures for local hiring and proportion of senior management and all direct employees, contractors and subcontractors hired from the local community at locations of significant operation).
- *Indirect Economic Impact indicators*: EC8 (Development and impact of infrastructure investments and services provided primarily for public benefit through commercial, in-kind, or pro bono engagement) and EC9 (Understanding and describing significant indirect economic impacts, including the extent of impacts).

All our proposed economic performance indicators EC1, …, EC7 are measureable by economic and financial data (values), which are produced in the corporate bookkeeping system. Every company in the Czech Republic in Building and Construction sector can compare some of them with the country's benchmark value, e.g., the EC7 (EVA) indicator is able to calculate and compare with the benchmark value online on the web of the Ministry of Industry and Trade of the Czech Republic[12] using the Benchmarking diagnostic system of financial indicators INFA [40].

We have also used our developed XBRL tools to facilitate the calculations and the visualizations of these integrated economic performance indicators [27] in corporate reporting.

C. Environmental performance and its KPIs

An environmental indicator is "*…a parameter, or a value derived from parameters, which points to, provides information about, describes the state of the environmental performance of a technique or measure*" [32].

We have introduced environmental KPIs (environmental protection expenses, wastes, charges, air pollution, waste water discharge, etc.) using results of our previous research in this field [1], [26] including ideas of the G3.1 guideline, CRESS [30] UNEP-SBCI [31], FP7 project OPEN HOUSE and EMAS III reference document [32] indicators.

The EMAS III reference document takes into account both EU Directives IPPC and EPDB. It is divided into several chapters addressing *Best Environmental Management Practice* (BEMP) description, sector specific indicators and benchmarks of excellence for:

1) Land planning;
2) Building design;
3) Building construction and refurbishment;
4) Building operation and maintenance;
5) Building deconstruction;
6) Civil works.

There are identified direct and indirect environmental aspects for more than six building phases of, see Fig. 3.

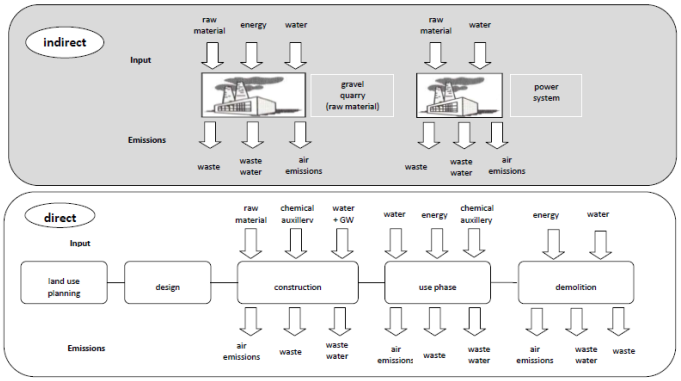

Fig. 3. Direct and indirect environmental aspects of the building and construction sector. Source: [32]

The conclusions on the environmental indicators and benchmarks of excellence have been derived by expert judgment of the European Commission (EC) through the IPTS JRC, and by the technical working group (TWG).

Table 2. Common specific KPIs of the building and construction sector. Source: [32]

Indicator	Units	Short description
BUILDING DESIGN AND USE		
EN1 Specific energy consumption	kWh/m^2/yr	Energy consumption (electricity, heat from gas or others) per unit of useful area and year.

[12] http://www.mpo.cz/cz/infa.html

EN2 Use of localised renewable energy sources	% (of total primary energy demand)	Renewable energy consumed from own generation at site or equivalent.
EN3 Lighting Power Density	W/m^2	Lighting power installed to meet illumination needs per unit of area.
EN4 Water Monitoring	%	Percentage of building zones or units with separate water monitoring and/or relevant process for water consumption.
EN5 Water consumption	L per occupant/position per day	Volume of water consumed per occupant of the building or per full position (e.g. for office and industrial buildings).
EN6 Water recycling	%	Percentage of available water from rainwater or from grey water treatment being reused in internal processes
BUILDING CONSTRUCTION AND DECONSTRUCTION		
EN7 Specific waste generation	Weight per unit of area kg/m^2	Waste generated during construction phase per square meter.
EN8 Use of dust suppression	Dust is removed y/n	When appropriate, dust generation is avoided.
EN9 Use of checklist-based performance	Site performance is monitored and benchmarked according to monit. systems y/n	A comprehensive list of criteria according to section is used to control site environmental performance.
EN10 Workers are trained in EMS aspects	y/n	Site workers are trained in the EMS of the company.
EN11 There are environmental criteria in tenders and in private consents	y/n	Tenders include relevant environmental criteria regarding the construction phase and these are checked periodically.
CONSTRUCTION PRODUCTS		
EN12 Use of DoP and ecolabeled materials according to type I ecolabel (ISO 14024)	y/n	Use of materials bearing an ecolabel or equivalent (third party verified) can be proved.
EN13 Hazardous products are avoided	y/n	It is proved that hazardous materials to be avoided regarding accepted third party verified schemes (e.g. ecolabel, GPP, etc)??? are ???avoided.
EN14 Percentage of wood with certificates of chain of custody	%	Percentage of wood bearing a certificate of chain of custody.

The TWG proposed the following benchmarks of excellence [Executive summary, 32]:

- *Building design*:
  - The building (new) is designed according to the *Passive House Standard* (e.g. CEN standards EN15251, EN15193, EN 12464 and EN 12464-1) including EPDB or equivalent, with a consumption value less than 15 kWh/m^{2}yr for heating and cooling.
  - The building (existing) is retrofitted according to the Passive House standard or equivalent, with a consumption value less than 25 kWh/m^{2}yr for heating and cooling.
  - The building's final installation for heating or cooling is less than 10 W/m^2, according to the definition of the Passive House Standard or equivalent.
  - An integrative concept is used to cover building energy requirements with renewable energy sources.
  - All relevant water consuming process are monitored in all building units.
  - Water consumption is less than a relevant benchmark for building typology.
  - Building is designed for minimizing waste and achieving best recycling and reuse at deconstruction, using the concepts of [section 3.6.6, 32].
- *Building construction*:
  - Less than 5% of recyclable material is sent to landfill or incineration without energy recovery.
  - Dust prevention efficiency is higher than 90% according to the methodology defined in [section 5.7.2.1, 32].
  - Water use is monitored at construction sites (per source).
  - Site environmental management is checked comprehensively and monthly according to a semiquantitative method across all processes.
  - Environmental criteria are used in public private and private-private consents in an environmental management plan.
  - All site foremen are trained according to an environmental management system.
- *Construction products*:
  - More than one product category is 100% compliance with ecolabel criteria (type 1 ecolabel or equivalent in ISO 14024).
  - 100% of wood chain of custody is certified.
  - Hazardous materials are 100% avoided according to GPP or other ecolabel criteria.

However we have selected a certain subset of environmental KPIs [1], [41] following key areas of the environment from CRESS [30], EMAS III [32] and have taken into account also Environmental Quality sub-indicators of FP7

project OPEN HOUSE. We are using CRESS and EMAS III (Table 2) notations:

1) *Efficiency of material consumption*, where we have chosen EN1 (Materials used by weight or volume) and EN2 (Percentage of materials used that are recycled and reused input materials) indicators of CRESS;
2) *Energy efficiency*, where we have selected EN1 (Specific energy consumption) and EN2 (Use of localized renewable energy sources), EN3 (Lighting Power Density) indicators of EMAS III and an additional CRE1 indicator (Building Energy Intensity) of CRESS;
3) *Water management*, where we have selected EN4 (Water Monitoring), EN5 (Water consumption), EN6 (Water recycling) of EMAS III indicators and additional CRE2 indicator (Building Water Intensity) from CRESS;
4) *Waste management*, where we have selected EN7 (Specific waste generation) and additional EN22a indicator (Total annual generation of hazardous waste) from [1];
5) *Biodiversity*, where we have selected EN12 (Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas) indicator of CRESS;
6) *Air pollution*, where we have selected EN16 (Total direct and indirect greenhouse gas emissions by weight), EN17 (Other relevant indirect greenhouse gas emissions by weight), EN19 (Emissions of ozone-depleting substances by weight), EN20 (NO, SO, and other significant air emissions by type and weight) indicators of CRESS and additional CRE3 (Greenhouse gas emissions intensity from buildings) and CRE4 (Greenhouse gas emissions intensity from new construction and redevelopment activity) indicators of CRESS;
7) *Other relevant indicators of the influence of the organization's activity on the environment*, where we have selected EN12 (Use of DoP and ecolabeled materials according to type I ecolabel (ISO 14024)), EN13 (Hazardous products are avoided) indicators of EMAS III and additional CRE5 (Land and other assets remediated and in need of remediation for the existing or intended land use according to applicable legal designations) indicator of CRESS.

The above subset of selected environmental KPIs differs from our past set of KPIs introduced in [1], [2], [3], [41] and describes more appropriate KPIs in sustainability and ESG indicators for the building and construction sector.

Some constructions of KPIs (EN16, EN17, EN19, EN20 of CREEE, or EN22a [1]) represent absolute performance, which is not normalized by factors such as floor area or building users. However, where it is practical to do so and will be helpful in interpretation, the reporting organizations should consider using 'like-for-like' analysis for absolute KPIs to enable comparability over a defined period of time of our research project.

We have also used our developed XBRL tools to facilitate the calculations and the visualizations of this set of integrated environmental performance indicators [27].

D. Social performance and its KPIs

The social dimension of corporate sustainability concerns the impacts the given organization has on the social systems within which it operates. We are going to determine the KPIs for social performance based on the GRI Framework and its social performance indicators, in order to identify some key performance aspects surrounding *labor practices*, *human rights*, *society*, and *product responsibility* [7], [14], as was done in the GRI's Reporting Guidelines CRESS [30].

We have to consider that *labor practices indicators* also draw upon two instruments which directly address the social responsibilities of business enterprises: the *ILO Tripartite Declaration Concerning Multinational Enterprises and Social Policy* [36], and the *OECD Guidelines for Multinational Enterprises* [16] and we must take into account: employment; labor/management relations; health and safety; training and education; diversity and opportunity.

Therefore we have selected again a certain set of social KPIs following key areas of the social area from GRI's Reporting Guidelines CRESS [30]:

1) *Labor Practices and Decent Work* indicators are broadly based on the concept of decent work. We have taken into account following indicators for area:
   - *Employment* – LA1 (Total workforce by employment type, employment contract, and region, broken down by gender) indicator of CRESS;
   - *Occupational Health and Safety* – LA7 (Rates of injury, occupational diseases, lost days, and absenteeism, and a number of work-related fatalities by region and by gender), LA8 (Education, training, counseling, prevention, and risk-control programs in place to assist workforce members, their families, or community members regarding serious diseases) indicators and additional CRE6 indicator (Percentage of the organization operating in verified compliance with an internationally recognized health and safety management system) of CRESS;
   - *Training and Education* – LA10 (Average hours of training per year per employee by gender, and by employee category) indicator of CRESS;
   - *Diversity and Equal Opportunity* – LA13 (Composition of governance bodies and breakdown of employees per employee category according to gender, age group, minority group membership, and other indicators of diversity) indicator of CRESS;
   - *Equal Remuneration for Women and Men* – LA14 (Ratio of basic salary and remuneration of women to men by employee category, by significant locations of operation) indicator of CRESS.
2) *Human Rights* indicators require companies to report on the extent to which human rights are considered in investment and supplier/contractor selection practices. We have taken into account:
   - *Non-discrimination* indicator HR4 (Total number of incidents of discrimination and corrective actions taken) from CRESS.
3) *Society indicators* focus the attention on the impacts organizations have on the communities in which they operate, and they disclose how the risks that may arise

from interactions with other social institutions are managed and mediated. We have taken into account following indicators from CRESS for the area:

- *Local community* – SO1 (Percentage of operations with implemented local community engagement, impact assessments, and development programs), SO9 (Operations with significant potential or actual negative and positive impacts on local communities) indicators and additional CRE7 (Number of persons voluntarily and involuntarily displaced and/or resettled by development, broken down by project) indicator;
- *Public policy* – SO5 (Public policy positions and participation in public policy development and lobbying) and SO6 (Total value of financial and in-kind contributions to political parties, politicians, and related institutions by country) indicators.

4) *Product responsibility* indicators address the aspects of a reporting organization's products and services that directly affect customers. We have taken into account from CRESS namely for the area:

- *Customer Health and Safety* – PR1 (Life cycle stages in which health and safety impacts of products and services are assessed for improvement, and a percentage of significant products and services categories subject to such procedures) and PR2 (Total number of incidents of non-compliance with regulations and voluntary codes concerning health and safety impacts of products and services during their life cycle, by type of outcomes) indicators;
- *Products and Services Labeling* – PR3 (Type of product and service information required by procedures, and percentage of significant products and services subject to such information requirements) and PR4 (Total number of incidents of non-compliance with regulations and voluntary codes concerning product and service information and labeling, by type of outcomes) indicators and additional indicator CRE8 (Type and number of sustainability certification, rating and labeling schemes for new construction, management, occupation and redevelopment).

The integration process of the development of the final subset of social performance KPIs is in progress and the complete version of KPIs is planned, as a part of our research project, towards the end of this year.

We have used also our developed XBRL tools to facilitate the calculations and the visualizations of these integrated social performance indicators [27].

E. Corporate governance and its KPIs

Corporate governance is traditionally defined as the system by which companies are directed and controlled and as a set of relationships between a company's management, its board, its shareholders and its other stakeholders. The corporate governance framework for listed companies in the EU is a combination of legislation and "soft law", including recommendations and corporate governance codes. While corporate governance codes are adopted at national level, Directive 2006/46/EC promotes their application by requiring that the listed companies refer in their corporate governance statement to a code and that they report on their application of that code on a "comply or explain" basis. The EC introduced this in its COM (2011) 164 final, GREEN PAPER. The EU corporate governance framework addressed the following three subjects which are at the heart of good corporate governance:

- *The board of directors* – high performing, effective boards are needed to challenge executive management. This means that boards need non-executive members with diverse views, skills and appropriate professional experience. Such members must also be willing to invest sufficient time in the work of the board. The role of the chairman of the board is particularly important, as are the board's responsibilities for risk management.
- *Shareholders* – the corporate governance framework is built on the assumption that shareholders engage with companies and hold the management to account for its performance. However, there is evidence that the majority of shareholders is passive and is often only focused on short-term profits. It therefore seems useful to consider whether more shareholders can be encouraged to take an interest in sustainable returns and longer-term performance, and how to encourage them to be more active on corporate governance issues. Moreover, in different shareholding structures there are other issues, such as minority protection.
- How to apply the "comply or explain" approach which underpins the EU corporate governance framework. A recent study [42] showed that the informative quality of explanations published by companies departing from the corporate governance code's recommendation is - in the majority of the cases - not satisfactory and that in many Member States of EU there is insufficient monitoring of the application of the codes.

The corporate sustainability or ESG reporting usually contains governance structure of the organization, including committees under the highest governance body responsible for specific tasks, such as setting the strategy or organizational oversight (CEO, top management etc.).

The corporate governance regulation in the Czech Republic usually uses a dualistic model: the mechanism of written law enforcement (mainly the Act No 513/1991 Sb., Commercial Code), and the self-regulation mechanism, characterized by a self-imposed observance of the required rules. This mechanism is primarily implemented through the code of company governance and also through due diligence principles. The company is governed by a body of shareholders – the general meeting reported to by the board of directors as an executive managing body and by the supervisory board as a surveillance authority.

We have analyzed the corporate governance performance of an organization in construction and the real estate sector vis-á-vis clear and transparent management principles:

- efforts for clarification and transparency;
- level of clarification of stakeholders;
- transparency of stakeholders.

We are going to propose corporate governance indicators

that cover the exercise of leadership:

- direct participation by CEO;
- communication with employees;
- feedback from employees.

We also consider further corporate governance indicators that could cover, as far as management systems are concerned:

1) Functional powers of board of directors and board of auditors (or auditors) in:
   - participation in real discussion;
   - integration of external perspectives;
   - opinions of auditors/board of auditors;
   - support given to auditors.
2) Appointment and assessment of CEO in:
   - appointment;
   - assessment and removal;
   - decisions on remuneration.

Within the context of the organization's management as an effective decision-making authority for global organizations, we have developed an approach to reviewing the corporate governance effectiveness that we have structured this around three areas of risk and underperformance.

We have used this approach to conduct our interviews with CEO and executive managers of forty companies in Building and Construction Sector. Conclusions from these interviews are expected towards the end of this year.

IV. Conclusion

Current Trends of Corporate Performance Evaluation at the Building and Construction Sector have been presented. The proposed set of abovementioned sustainability indicators for all companies in this sector monitors to a greater extent the development dynamics, as up to now [30], [41]. Chief executive officer (CEO) decision-making is based on a qualified assessment (measurement) of a situation determined at the same time by multiple indicators, primarily in their horizontal development [2], [6], [14], [21], [22]. In pursuit of an outstanding information force, emphasis is currently being placed not only on the absolute data, but primarily on the changing data and the analyses of changes of these changes. That is, the dynamics of corporate management systems is the focus of attention. Vertical analyses that are applied adequately then add a further dimension to the conditions for decision making. These were carried out in the project No P403/11/2085. In this context other methods have been discussed: logical and empirical methods, methods of qualitative and quantitative research such as statistical modeling, see [6], [43], [44], [45].

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