

KEY SUSTAINABILITY TOPICS IN METALLURGICAL INDUSTRY

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Abstract

Sustainability is widely accepted as one of the most important approaches, which allows to reach a long-term success in the metallurgical industry. Sustainability considers three fundamental dimensions: economic, environmental and social. Each dimension contains a relatively high number of specific topics. The aim of the paper is to identify key topics used by world-leading metallurgical companies. The research work is based on the analysis of the metallurgical companies' sustainability reports and categorisation of the sustainability specific topics according to Global Reporting Initiative standards.

Keywords: Sustainability, metallurgical industry, GRI standards

1. INTRODUCTION

The metallurgical industry faces many challenges in the recent global, competitive, and turbulent business environment. Sustainability is widely accepted as one of the most important approaches, which allows to reach a long-term success in the industry. Metallurgical companies use reporting to measure, analyse and evaluate the sustainability strategy. This reporting is usually carried out according to international standards. The most often are used standards by Global Reporting Initiative (GRI), an international independent organization that helps businesses, governments and other organizations understand and communicate the impact of business on critical sustainability issues such as climate change, human rights, corruption and many others [1]. The aim of the paper is to identify key topics used by world-leading metallurgical companies based on the analysis of the metallurgical companies' sustainability reports and categorisation of the sustainability specific topics according to GRI standards.

2. LITERATURE REVIEW

2.1. Sustainability of an industrial enterprise

Sustainability is practiced globally as a comprehensive strategy for improving the sustainability performance of the manufacturing industry [2]. Although there exists a divergence of definitions of sustainability, most of them are based on the Elkington's [3] triple bottom line considering three fundamental sustainability dimensions - economic, environmental and social (e.g. definitions by Sikdar [4], Goncz [5] or Lijo and Gopalakrishnan [6])

2.2. Sustainability studies in the metallurgical industry

Sustainability issues in the metallurgical industry was studied by several authors. For example, Peng et al. [7] studied how sustainable metallurgical processes encompass new theory and techniques regarding the optimization of existing processes for improved energy efficiency, enhanced environmental benefits, and increased resource/waste/by-product utilization. The authors focused on new "cleaner" metallurgical technologies and, in this context, chose articles that in this topic exemplify how recent efforts trigger the development of metallurgy by improving its sustainability, from basic theories through methodologies to practices.

Xiaohong et al. [8] applied the eMergy analysis to the sustainability of Chinese steel production in 1998 - 2004. According to the results presented by the authors, it was obvious that sustainability was very low and declining in this period, emissions obviously reduce the sustainability although their impacts are generally decreasing, and the main reasons lie in its low non-renewable resources and energies' efficiencies. Finally, they bring suggestions for improving its comprehensive performance.

3. RESEARCH METHODOLOGY

GRI defines the topic-specific standards for each dimension. Economic sustainability includes six topics, environmental sustainability eight topics, and social sustainability nineteen topics (see **Table 1**) [1]. Each topic contains one or more disclosures. For example, the economic disclosures are shown in **Table 2**.

Table 1 GRI sustainability topics [1]

Economic Dimension	Environmental Dimension
Economic Performance	Materials
Market Presence	Energy
Indirect Economic Impacts	Water
Procurement Practices	Biodiversity
Anti-corruption	Emissions
Anti-competitive Behaviour	Effluents and Waste
	Environmental Compliance
	Supplier Environmental Assessment
Social Dimension	
Employment	Rights of Indigenous Peoples
Labour/Management Relations	Human Rights Assessment
Occupational Health and Safety	Local Communities
Training and Education	Supplier Social Assessment
Diversity and Equal Opportunity	Public Policy
Non-discrimination	Customer Health and Safety
Freedom of Association and Collective Bargaining	Marketing and Labelling
Child Labour	Customer Privacy
Forced or Compulsory Labour	Socioeconomic Compliance
Security Practices	

Table 2 GRI economics disclosures [1]

Topic	Disclosure
Economic Performance	Direct economic value generated and distributed
	Financial implications and other risks and opportunities due to climate change
	Defined benefit plan obligations and other retirement plans
	Financial assistance received from government
Market Presence	Ratios of standard entry level wage by gender compared to local minimum wage
	Proportion of senior management hired from the local community
Indirect Economic Impacts	Infrastructure investments and services supported
	Significant indirect economic impacts
Procurement Practices	Proportion of spending on local suppliers
Anti-corruption	Operations assessed for risks related to corruption
	Communication and training about anti-corruption policies and procedures
	Confirmed incidents of corruption and actions taken
Anti-competitive Behaviour	Legal actions for anti-competitive behaviour, anti-trust, and monopoly practices

GRI administers the GRI Sustainability Disclosure Database, which is a collection of all sustainability reports of which GRI is aware. To analyze sustainability topics, top 10 steel-producing companies were selected (see **Table 3**). The “GRI” column in **Table 3** indicates the company has a sustainable report according to GRI. The “Selected” column shows what companies were selected for the detailed analysis. The selection criteria were: (1) The sustainability report is available in GRI Sustainability Disclosure Database or web sites of the company; (2) The sustainability report is in English language; (3) The report includes a clear GRI content index, which presents the page number or URL for all reported disclosures. These criteria met five companies: ArcelorMittal, POSCO, Baosteel Group, JFE Steel Corporation, and Tata Steel Group.

Table 3 Top 10 steel-producing companies in 2015, tonnage in million tonnes of crude steel production [9]

Rank	Company	Country	Tonnage	GRI	Selected	Identifier	References
1	ArcelorMittal	Luxembourg	97.14	x	x	I	[10]
2	Hesteel Group	China	47.75				
3	NSSMC	Japan	46.37	x			
4	POSCO	South Korea	41.97	x	x	II	[11]
5	Baosteel Group	China	34.94	x	x	III	[12]
6	Shagang Group	China	34.21				
7	Ansteel Group	China	32.50	x			
8	JFE Steel Corporation	Japan	29.83	x	x	IV	[13]
9	Shougang Group	China	28.55				
10	Tata Steel Group	India	26.31	x	x	V	[14]

4. RESULTS AND DISCUSSION

The analysis was based on the comparison of sustainability topics and disclosures, included in the sustainability reports by the metallurgical companies, with the complete list of GRI topics and disclosures recommended in GRI standards. Each GRI disclosure was evaluated using three level scale: F - fully include, P - partially included, and N - not included. Detailed results of the conducted analysis are shown in **Table 4** (economic dimension), **Table 5** (environmental dimension), and **Table 6** (social dimension).

Table 4 Economic dimension topics and disclosures

GRI Topic	Disclosure	I	II	III	IV	V
Economic Performance	Direct economic value generated and distributed	F	F	F	F	F
	Financial implications and other risks and opportunities due to climate change	F	F	F	F	F
	Defined benefit plan obligations and other retirement plans	F	F	F	F	F
	Financial assistance received from government	N	F	N	N	N
Market Presence	Ratios of standard entry level wage by gender compared to local minimum wage	N	F	F	N	N
	Proportion of senior management hired from the local community	N	F	F	N	N
Indirect Economic Impacts	Infrastructure investments and services supported	F	F	F	F	F
	Significant indirect economic impacts	N	F	F	F	F
Procurement Practices	Proportion of spending on local suppliers	N	F	F	N	N
Anti-Corruption	Operations assessed for risks related to corruption	N	N	F	N	F
	Communication and training about anti-corruption policies and procedures	P	P	F	F	F
	Confirmed incidents of corruption and actions taken	N	P	N	N	F
Anti-Competitive Behaviour	Legal actions for anti-competitive behaviour, anti-trust, and monopoly practices	N	N	N	N	N

Table 5 Environmental dimension topics and disclosures

GRI Topic	Disclosure	I	II	III	IV	V
Materials	Materials used by weight or volume	F	F	N	F	F
	Recycled input materials used	F	F	N	F	P
	Reclaimed products and their packaging materials	N	N	N	F	N
Energy	Energy consumption within the organization	P	F	F	F	F
	Energy consumption outside of the organization	N	F	F	F	F
	Energy intensity	F	F	F	F	F
	Reduction of energy consumption	F	F	F	F	F
	Reductions in energy requirements of products and services	F	F	F	F	N
Water	Water withdrawal by source	F	F	F	N	F
	Water sources significantly affected by withdrawal of water	N	F	F	F	N
	Water recycled and reused	N	F	F	F	F
Biodiversity	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	F	F	N	N	F
	Significant impacts of activities, products, and services on biodiversity	N	F	N	F	F
	Habitats protected or restored	F	F	N	N	F
	IUCN Red List species and national conservation list species with habitats in areas affected by operations	F	N	N	N	F
Emissions	Direct (Scope 1) GHG emissions	F	F	N	F	F
	Energy indirect (Scope 2) GHG emissions	P	F	F	F	F
	Other indirect (Scope 3) GHG emissions	F	F	F	F	F
	GHG emissions intensity	F	F	F	F	F
	Reduction of GHG emissions	N	F	F	F	F
	Emissions of ozone-depleting substances (ODS)	N	F	F	N	F
	Nitrogen oxides (NO _x), sulphur oxides (SO _x), and other significant air emissions	F	F	F	F	F
Effluents and Waste	Water discharge by quality and destination	F	F	F	F	F
	Waste by type and disposal method	P	F	F	F	F
	Significant spills	N	N	F	N	F
	Transport of hazardous waste	N	N	F	N	N
	Water bodies affected by water discharges and/or runoff	N	F	F	N	F
Environmental Compliance	Non-compliance with environmental laws and regulations	F	N	F	N	N
Supplier Environmental Assessment	New suppliers that were screened using environmental criteria	F	N	N	N	N
	Negative environmental impacts in the supply chain and actions taken	P	F	N	N	N

In the economic dimension, the metallurgical companies pay attention to all GRI topics, except Anti-Competitive Behaviour. They put the most emphasize on Economic Performance and Indirect Economic Impacts topics. From the Economic Performance topic are the most often mentioned these disclosures: Direct economic value generated and distributed, Financial implications and other risks and opportunities due to climate change, and Defined benefit plan obligations and other retirement plans. Infrastructure investments and services supported is the most important disclosure in the Indirect Economic Impacts topics.

In the environmental dimension, the metallurgical companies put the smallest emphasis on Environmental Compliance and Supplier Environmental Assessment topics. The greatest attention is paid to Energy and Emissions topics, but relatively significant are also Water, and Effluents and Waste topics. The most important Energy disclosures are Energy intensity and Reduction of energy consumption and Emissions ones are GHG emissions intensity, and Nitrogen oxides (NO_x), sulphur oxides (SO_x), and other significant air emissions.

Table 6 Social dimension topics and disclosures

GRI Topic	Disclosure	I	II	III	IV	V
Employment	New employee hires and employee turnover	P	F	F	F	F
	Benefits provided to full-time employees that are not provided to temporary or part-time employees	N	F	F	F	F
	Parental leave	N	F	F	F	F
Labour / Management Relations	Minimum notice periods regarding operational changes	P	F	F	N	F
Occupational Health and Safety	Workers representation in formal joint management-worker health and safety committees	F	F	F	F	F
	Types of injury and rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities	F	F	F	F	F
	Workers with high incidence or high risk of diseases related to their occupation	N	F	F	N	F
	Health and safety topics covered in formal agreements with trade unions	N	N	F	N	F
Training and Education	Average hours of training per year per employee	F	F	F	F	F
	Programs for upgrading employee skills and transition assistance programs	F	F	F	F	N
	Percentage of employees receiving regular performance and career development reviews	F	F	F	N	F
Diversity and Equal Opportunity	Diversity of governance bodies and employees	F	F	F	F	N
	Ratio of basic salary and remuneration of women to men	N	F	F	N	N
Non-Discrimination	Incidents of discrimination and corrective actions taken	N	F	N	N	P
Freedom of Association and Collective Bargaining	Operations and suppliers in which the right to freedom of association and collective bargaining may be at risk	F	F	N	N	F
Child Labour	Operations and suppliers at significant risk for incidents of child labor	N	F	N	N	N
Forced or Compulsory Labour	Operations and suppliers at significant risk for incidents of forced or compulsory labour	N	F	N	N	N
Security Practices	Security personnel trained in human rights policies or procedures	P	N	N	N	N
Rights of Indigenous Peoples	Incidents of violations involving rights of indigenous peoples	P	P	N	N	P
Incidents of violations involving rights of indigenous peoples	Operations that have been subject to human rights reviews or impact assessments	N	F	N	N	N
	Employee training on human rights policies or procedures	P	F	N	F	F
	Significant investment agreements and contracts that include human rights clauses or that underwent human rights screening	N	N	N	N	F
Local Communities	Operations with local community engagement, impact assessments, and development programs	N	F	F	F	N
	Operations with significant actual and potential negative impacts on local communities	F	N	F	F	N
Supplier Social Assessment	New suppliers that were screened using social criteria	F	F	F	N	N
	Negative social impacts in the supply chain and actions taken	P	N	N	N	N
Public Policy	Political contributions	N	N	N	N	N
Customer Health and Safety	Assessment of the health and safety impacts of product and service categories	N	F	F	F	F
	Incidents of non-compliance concerning the health and safety impacts of products and services	N	N	F	N	F
Marketing and Labelling	Requirements for product and service information and labeling	N	F	F	N	F
	Incidents of non-compliance concerning product and service information and labelling	N	P	F	F	N
	Incidents of non-compliance concerning marketing communications	N	N	F	N	N
Customer Privacy	Substantiated complaints concerning breaches of customer privacy and losses of customer data	N	N	F	N	N
Socioeconomic Compliance	Non-compliance with laws and regulations in the social and economic area	F	N	F	N	N

In the social dimension, the metallurgical companies pay attention to all GRI topics, except Public Policy. However, there are many topics, which have very small significance for analyzed companies (especially Non-Discrimination, Child Labour, Forced or Compulsory Labour, Security Practices, and Customer Privacy). On the other hand, they put the most emphasize on Employment, Occupational Health and Safety, Training and Education topics. The most important Employment disclosure is New employee hires and employee turnover. In the Occupational Health and Safety are the most significant these two disclosures: Workers representation in formal joint management-worker health and safety committees, and Types of injury and rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities. In the Training and Education topic is substantial Average hours of training per year per employee. Relatively high attention is paid to Labour / Management Relations, Diversity and Equal Opportunity.

5. CONCLUSION

The comparative study of sustainable topics in the metallurgical industry allows to identify the most important topics and disclosures in the economic, environmental, and social sustainability dimensions. It has been confirmed an essential role of the economic dimension in the form of economic performance and indirect economics impacts. Economic performance is the most important success factor of each metallurgical company for many years [15], but as a standard are also understood infrastructure investments into the affected region. Analysis of the environmental dimension indicates the dimension is very crucial for the metallurgical industry due to very serious negative impacts on environment, especially in the area of energy consumption and emissions release. Employee aspects are very important for social dimension. Employment is underlined because the industry belongs among the largest industrial employers. The health and safety area is crucial since the metallurgical operations have the increased risk of injuries or fatalities. Training and education is important factor for internal sustainability of the metallurgical companies.

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