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Analysis of Manufacturing Businesses in Addressing the 17 UN Sustainable Development Goals

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Abstract

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The purpose of the thesis is to study individual and cumulative contribution to the achievement of the Sustainable Development Goals adopted by United Nations by analysing manufacturing case companies conducting a content analysis of their annual reports.

Present study covered six companies from United States, United Kingdom and Japan of similar business scale and operating manufacturing industry. Each case company is defined as large international enterprise with immense multi-oriented production base, human capacities, and net yearly revenue. Over the operating periods, they have established a strong presence in related industry and have a global reach.

The research was contacted as a multiple case study. Qualitative and quantitative data for the research was collected from annual reports of case companies for the latest reporting periods FY 2022 and FY 2023 as well as addressing to independent analytical resource to obtain ESG Risk rates for each case company in order to proceed with evaluation process of their endeavors. Results were analyzed using abductive approach and applying a method of content analysis and were interpreted at discussion section of the thesis.

As a result were gained comprehensive insights on operating processes of the companies from analyzed different countries considering that despite the international operations and similar global frameworks followed by the analyzed companies, were still identified deviate patterns in terms of their ESG performance. As an output were formulated main conclusions and suggestions for future research in the field.

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CSR	Corporate Social Responsibility
CSRD	Corporate Sustainability and Reporting Directive
DEI	Diversity, Equity, and Inclusion
ESG	Environmental social governance
FY	Fiscal Year
GRI	Global Reporting Initiative
REACH	Authorization of Chemicals
RoHS	Restriction on use of certain Hazardous Substances
SABS	Sustainability Accounting Standards Board
SD	Sustainable Development
SDG	Sustainable Development Goal
SECR	Streamlined Energy and Carbon Reporting
TBL	Triple Bottom Line
TCFD	Task Force on Climate Related Financial Disclosures
UNGC	United Nation Global Compact
UN	United Nations
WEEE	Waste Electronic and Electrical Equipment

1   Introduction

In September 2015 the UN Member States have adopted The Agenda for Sustainable Development (Agenda 30) for the World transformation. The 2030 Agenda declares to be representing a vision that is "supremely ambitious and transformational" (UN, 2015). Environmental, economic and humanitarian challenges have formed a basis for the seventeen Sustainable Development Goals (SDGs) which are aimed on eradicating poverty, conserving the planet's resources and ensuring prosperity for all.

Each of the 17 Goals contains number of indicators to be achieved within 15 years. The 2030 Agenda is a far-reaching blueprint for ambitious change, with 17 interlinked and inseparable SDGs and 169 targets. The Agenda is universal and concerns all countries and stakeholders who should act in collaborative partnership to implement this plan (UN, 2015).

Particular attention in this thesis is dedicated to the increased involvement level of business in the process of declaring individual achievements in sustainability field in annual reporting. It is a private sector, according to the authors of updated Agenda, that can play one of the central roles in achieving the stated Goals and objectives (Starikova & Zavialova, 2018, p. 109). Through company's business activities and their networks around the globe they may perform a positive or negative effect in contribution to sustainable development goals. Therefore, organizations or companies have a key role in achieving the goals (Ioannou, Serafeim & Eccles, 2014, p.4).

Nowadays, there are many discussions on how sustainability is defined and, hence, approaches and implemented strategies towards achieving the sustainable goals may vary by private sectors of different countries. Considering that cultures differ from place to place and can greatly influence societal efforts to move forward along a path towards sustainability. According to Harrington (2013) places, at whatever scale, differ, at the most basic, the physical environmental characteristics available for sustaining also differ . Therefore, policies of different countries are modelled on different considerations, namely philanthropic, ethical, legal, and economic or an amalgam of these (Anupama & Himangshu, 2022, p. 2).

Above ideas enhance the present work and motivate to discuss different approaches in delivering sustainable goals by comparing six case companies representing different communities and cultures from the USA, United Kingdom (UK) and Japan, but operating in the same industry and target market.

To narrow the research area is taken a manufacturing industry as its increasing role in a world economy cannot be refuted, as it is perceived as a prime driver for development and consequently needs to be sustained in the context of modern economic paradigms (Kumar & Mani, 2021). An important fact that manufacturing business plays a vital role in providing jobs, improved living standard, and economic growth, makes it an integral part of delivering sustainability goals (GMIS, 2017). It goes interconnected with technologies and innovation, which in turn represent an enabler for an agile and integrated global innovation system (Stafford-Smith, Griggs, Gaffney, Ullah, Reyers, Kanie, Stigson, Shrivastava, Leach & O'Connell, 2017). At the same time UNCTAD (2016) outlines that a broad and robust domestic manufacturing base is the key to successful economic development, since it helps to generate virtuous and cumulative linkages with other sectors of the economy, drives technological progress, industrial revolution, and has the strongest potential for productivity gains.

While business plays a crucial role in achieving the Sustainable Development Goals, it is complex to define and quantify its input to The Agenda 2030. Consequently, there is a lack of studies related to deeper investigation of SDGs efforts by international manufacturers. Therefore, current analysis is supposed to fill in this gap, even partly, from narrowed consideration and comparison of quite limited number of entities but, evidently enhance further research on this matter and contribute to global manufacturing in delivering the SDGs.

Additionally, present paper could serve as a recommendation to manufacturing companies to estimate their SDG involvement by providing a comprehensive view of different approaches to sustainability disclosure. Meanwhile, enhancing irresponsible companies to rethink their development strategies, and find improvement ways on annual reporting.

Finally, the outcomes of research may become an endowment to the development of GRI Sector Program (Sector Program) which was introduced in February 2019 to improve clarity and consistency in sustainability reporting for 40 high-impact sectors categorized by four priorities groups. The Sector Standards are designed to help identify a sector's most significant impacts and reflect stakeholder expectations for sustainability reporting (GRI Sector Program, 2021). Presently, have been released only three Sector standards for Oil and Gas (GRI 11), Coal (GRI 12), Agriculture, Aquaculture and Fishing (GRI 13) (Globalreporting, 2023). Meaning that other sectors including Group 2: Industrial, are still under review and will support the upcoming consultation on the draft GSSB Work Program 2023-2025.

The aim of this Master thesis derives from the research background and claims to investigate the actions and activities manufacturing companies direct to accomplish the SDGs based on their

annual sustainability disclosure. And since, there is no evident presumption about their strategies and priority SDGs, an abductive approach is used to collect the required data consisting of annual reporting and sustainability related publications.

Consequently, the purpose of the thesis is to determine individual and cumulative contribution of manufacturing business to the SDGs applying a method of content analysis. Therefore, the following research questions are posed in order to properly analyze and evaluate case companies' contributions to SDGs:

1. What SDGs case companies strike for?

   a. Do addressed SDG's differ among case companies?

   b. How do case companies engage with stakeholders on sustainability issues?

2. What actions have been taken towards meeting the reported SDGs?

3. What is the efficacy from case companies' actions in addressing the reported SDGs?

4. How do their SDGs enhances vary in country context?

Research is conducted as a multiple-case study and totally involved six global companies of UK, US and Japan origin and specialized in manufacturing of scientific laboratory equipment. The strategy is chosen for the reason it aiding to gain a rich understanding of the context of the research and the processes being enacted (Morris & Wood, 1991, p. 253).

The rationale for using multiple cases focuses upon the need to establish whether the findings of the first case occur in other cases and, consequently, the need to reveal common or consistent patterns from these findings (Saunders, Lewis & Thornhill, 2009, p. 146). The data for analysis is received by applying a mixed method using a quantitative and qualitative data collection techniques and analysis procedures either at the same time (Saunders et al., 2009, Chapter 5). Obtained data is analyzed applying a method of content analysis with an abductive approach. Such approach provides better opportunities to answer the research questions as well as better evaluate the extent to which a research finding can be trusted, and inferences made from them (Tashakkori & Teddlie, 1998).

Both qualitative and quantitative data is taken secondary sources and include annual reports on sustainability of case companies. Summarizing data of the 17 SDGs by UN strikes in detection of

the most relevant goals for studied field. An overview the case companies' ratios by World ESG Risk Ratings also contributed to the empirical part of the study.

2   Addressing to Sustainable Development

The first part of this chapter includes an overview of background theories that serve a base for the present research. At the beginning, it's principal to overview the formation and development of Sustainable Development (SD) concept through its evolution processes and major global events. Further, an observation of CSR concept within Carroll's framework along with stakeholder theory and triple bottom line concept to reach understanding on their relativeness and interconnection. And concluded with general review on CSR approach within countries represented by case companies to highlight particularities and main differences.

The second part is dedicated to adopted reporting directives and initiatives which designate to guide globe organisations to perform their reporting in a proper way along with implement introduced principles into business strategies. Finally, this chapter covers two main sustainability indices ESG Risk Ratings and Dow Jones Sustainability index that provide stakeholders, regulators and governments with monitoring instruments for CSR and SD performance.

2.1   SD concept and evolution

The SD concept was firstly introduced in the United Nations Conference on the Human Environment in 1972 during the world summit as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (Yang et al., 2019). It reflects the extensiveness of the current stage of development of society and the problem of resource constraints. This concept arose a great interest among the majority of international scientists such as Carson, Strong, Meadows, Lele, Azizova, Zhang, Mebratu, Schneider, Pestel, Hicks, Stern and others.

Azizova (2015) states that no other scientific idea, either in natural or social disciplines, has previously had such a wide public resonance. SD represents a new strategy for development of civilization, which should become the main key to overcoming the global environmental and other global crises, thereby ensuring the survival of civilization.

SD concept developed through practice and cannot be separated from the implementation of relevant policies and practices (Steer, 1993, p. 25). Shi, Han, Yang and Gao (2019) in their studies

have presented three evolution stages of SD concept interconnected with symbolic events as presented in Figure 1.
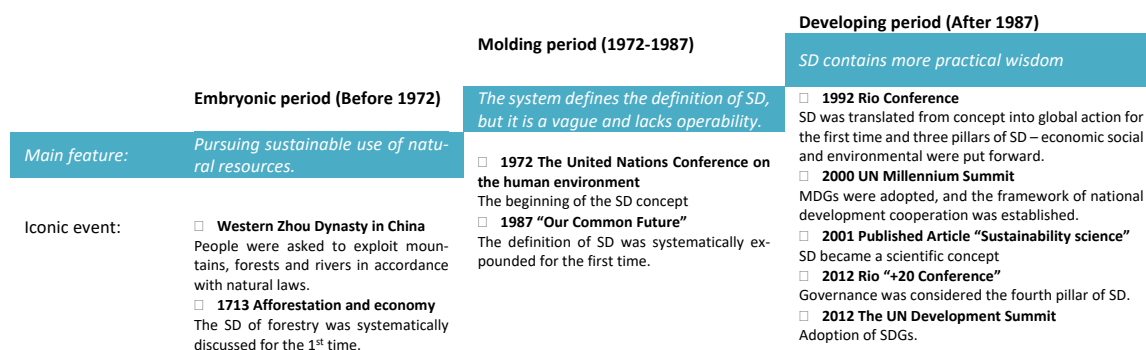
	Embryonic period (Before 1972)	Molding period (1972-1987)	Developing period (After 1987)
			SD contains more practical wisdom
		The system defines the definition of SD, but it is a vague and lacks operability.	• **1992 Rio Conference** SD was translated from concept into global action for the first time and three pillars of SD – economic social and environmental were put forward.
Main feature:	Pursuing sustainable use of natural resources.		• **2000 UN Millennium Summit** MDGs were adopted, and the framework of national development cooperation was established.
		• **1972 The United Nations Conference on the human environment** The beginning of the SD concept	• **2001 Published Article "Sustainability science"** SD became a scientific concept
Iconic event:	• **Western Zhou Dynasty in China** People were asked to exploit mountains, forests and rivers in accordance with natural laws. • **1713 Afforestation and economy** The SD of forestry was systematically discussed for the 1st time.	• **1987 "Our Common Future"** The definition of SD was systematically expounded for the first time.	• **2012 Rio "+20 Conference"** Governance was considered the fourth pillar of SD. • **2012 The UN Development Summit** Adoption of SDGs.

Figure 1 Evolution stages and symbolic events of SD theory. Modified from Shi, Han, Yang and Gao (2019)

Yang et al., refer a Stage one or Embryonic period to the middle ages of the last century until year 1972, claiming that SD concept can be traced back to core Chinese classical philosophy signifying Heaven and People in one. It was the ancient Chinese emperors who came up with the realization that natural resources such as mountains, rivers and forests should be rationally used, rather than overexploiting considering the laws of nature. That approach led to introduction of various measures gained to protect natural recourses by establishing designated management departments, enforcing state monopoly and collecting taxes in favor of natural recourses maintenance bans (Yang et al , 2019). Afterwards, different causes of environmental degradation, including farming, logging, and mining, were discussed along with possible measures to be taken in other ancient civilizations like Egyptian, Mesopotamian, Greek, and Roman (Pisani, 2006, p.83).

First attempts to consider sustainable development in a non-global context were presented by Meadows in a first report of the Club of Rome, entitled "Limits to Growth" in 1972 which characterized the beginning of the second Molding period. The paper considered four scenarios: continued depletion of resources, unlimited resources, limitation of population growth and technogenesis and a stabilization scenario. It became obvious that if the pace of industrial growth continues, this will lead to the inevitable death of mankind already at the end of the twentieth century, and that it is necessary to revise the value systems to which society is accustomed (Meadows et al., 1972).

However, Shi , Han, Yang and Gao (2019) didn't mention it in their studies, missing that this report played a crucial role in reflecting the general concern of people with the state of environment

and future prospects for civilization, since it was the first work that prompted the World community, namely the UN General Assembly, to develop international programs for the protection of the environment and its development (Meadows et al., 1972).

In 1972, the first UN World Environment Conference was held in Stockholm, attended by representatives of more than 100 countries to strengthen environmental management policies while developing their economies. Present event became the first human environment conference and symbolized the beginning of the SD concept from the position of eco-development (Yang at al., 2019).

Eco-development was defined as an environmentally oriented socio-economic development, in which the growth of human well-being was not accompanied by environmental degradation and degradation of natural systems. The idea of eco-development was considered as one of the vital and extremely difficult tasks of the time. Assuming a global change in world development, strategies for the use and distribution of resources, strong transformations in the economy and inter-state relations (Akimova & Moseikin, 2009, p. 36).

In 1987, the World Commission on Environment and Development (WCED) drafted a report on human development "Our Common Future" and claimed the idea of responsibility to future generations. The report contained eight key areas of work to ensure sustainable development, namely: population, human resources, industry, food security, species and ecosystems, problems of urbanization, public goods management and energy. After the publication of the WCED report, the concept of "sustainable development" that changed the worldview of society entered into international use (Akimova & Moseikin, 2009, p. 42).

The developing period started with a conference hosted by UN in Rio de Janeiro, Brazin to address environment and development, starting the journey of SD in a global scope. The conference passed and signed the "Rio Declaration on Environment and Development" and the "Agenda 21". This meeting has also formulated goals and action plans to implement sustainable development and establish the principle of building a global partnership to jointly solve global environmental problems (Yang at al., 2019).

Following in 2000 UN Millennium Summit adopted eight Millennium Development Goals (MDGs) which had a social, environmental and economic focus. These goals became an internationally recognized framework for guiding national development and cooperation over the next 15 years and provided guidance for the development of humanity in the new century (Yang et al., 2019).

In addition, fundamental values were presented, the observance of which would serve as a development vector for international relations in the 21st century: freedom, equality, solidarity, tolerance, respect for nature, common duty (Akimova & Moseikin, 2009, p.46).

Next year in 2001 was published an article "Sustainability Science" that served as a milestone to conceptualize and measure SD. The paper pointed out that sustainability science was aimed to explain the interaction between natural and social characteristics and to improve the ability to steer this interaction toward a more sustainable trajectory. Since then, sustainable development has become a scientific subject covering agriculture, ecological economics, forestry, etc. (Yang et al., 2019).

On summer 2012 was held another UN conference on sustainable development in Rio De Janeiro. This conference was called Rio +20, as it took place 20 years after the conference in 1992. The key outcomes demonstrated that country leaders worldwide again turned to the topic of sustainable development, and as a result of this conference was the other declaration "Future We Want" was adopted (UN, 2012).

A report defines those basic principles for the transition to sustainable development, which implies economic and social progress, while maintaining a favorable environment. Declaration outlines that the only way to achieve stated results is to act simultaneously at the local, national, regional and global levels considering the basis of green economy principles (Akimova & Moseikin, 2009, p.51).

The most symbolic event that lays as the base of current research is the United Nation Development Summit. In September 2015, more than 150 heads of state and government participated in the United Nations Sustainable Development Summit at the United Nations headquarters in New York. The summit assessed the implementation of MDGs and adopted "Transforming our World — the 2030 Agenda for Sustainable Development" (UN, 2015). The agenda set out the Sustainable Development Goals, covering 17 focus areas and 169 specific targets. SDGs changed the traditional concept of development fundamentally. Besides solely pursuing economic growth, SDGs put forward the concept of inclusive growth and SD featuring coordinated economic, social, and environmental development (Yang et al., 2019).

2.2   The World's Best Plan

The 2030 Agenda for Sustainable Development, adopted in 2015 by all UN Member States, outlines a shared blueprint for five key areas: people, planet, prosperity, peace, and international collaboration reflected in Sustainable Development Goals (SDGs). The World's best Plan which is in term a kind of call to action is built on over a decade of work by participating countries (National Geographic, 2022). Mutual efforts coming from all countries including emerging markets along with developing and developed economics aim to improve human well-being, protect the planet and achieve sustainable development in all its dimensions (United Nations, Department of Economic and Public Affair, 2023). Set forward by the United Nations (UN) in 2015, the SDGs are a collection of 17 global goals aimed at improving the planet and the quality of human life around the world by the year 2030 as seen in Figure 2.

Figure 2 The Sustainable Development Goals by UN (2015)

The 2030 Agenda for Sustainable development defines overall 17 goals, 169 targets, 3854 events, 1344 publications and 7637 actions:

Goal 1. No Poverty: End poverty in all its forms everywhere. The main idea includes the elimination of all forms of extreme poverty and hunger throughout the world. It covers a wide range of activities aimed at providing all people with a decent standard of living (UN, 2015).

Goal 2. Zero hunger: End hunger, achieve food security and improved nutrition and promote sustainable agriculture (UN, 2015).

Goal 3. Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages (UN, 2015).

Goal 4. Quality Education: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (UN, 2015).

Goal 5. Gender Equality: Achieve gender equality and empower all women and girls (UN, 2015).

Goal 6. Clean Water and Sanitation: Ensure availability and sustainable management of water and sanitation for all (UN, 2015).

Goal 7. Affordable and Clean Energy: Ensure access to affordable, reliable, sustainable and modern energy for all (UN, 2015).

Goal 8. Decent Work and Economic Growth: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (UN, 2015).

Goal 9. Industry, Innovation, and Infrastructure: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation (UN, 2015).

Goal 10. Reduced Inequality: Reduce inequality within and among countries (UN, 2015).

Goal 11. Sustainable Cities and Communities: Make cities and human settlements inclusive, safe, resilient, and sustainable (UN, 2015).

Goal 12. Responsible Consumption and Production: Ensure sustainable consumption and production patterns (UN, 2015).

Goal 13. Climate Action: Take urgent action to combat climate change and its impacts (UN, 2015).

Goal 14. Life Below Water: Conserve and sustainably use the oceans, seas, and marine resources for sustainable development (UN, 2015).

Goal 15. Life on Land: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (UN, 2015).

Goal 16. Peace, Justice, and Strong Institutions: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable, and inclusive institutions at all levels (UN, 2015).

Goal 17. Partnerships for the Goals: Strengthen the means of implementation and revitalize the global partnership for sustainable development. UN claims that all countries and all stakeholders, acting in collaborative partnership, will implement this plan (UN, 2015).

The agenda calls for action in a number of areas, including ending hunger and poverty, ensuring access to high-quality education, halting climate change, preserving ecosystems, achieving gender equality, emancipating women, fostering innovation, and fostering sustainable economic growth. Governments recognize that action to end poverty must go hand in hand with efforts to increase economic growth and address a range of issues in education, health, social protection and employment, as well as combating climate change and protecting the environment (UN, 2015). That's why SDGs rely on active involvement of govermental and not profit organizations as well as on the private business sector to make contributions that change impractical and unsustainable consumption and production patterns (National Geographic, 2022).

To monitor milestones and enactment progress of accomplishment with SDGs the UN Secretary General releases an annual SDG Progress report. It is developed in conjunction with the UN System and based on the global indicator framework, data generated by national statistical systems and information obtained at the regional level. Furthermore, the Independent Group of Scientists authorized by the UN Secretary General publishes a Global Development Report every four years (UN, 2023).

3   Theoretical framework

Present chapter is dedicated to fundamental concepts and theories that serve a background to sustainable development concept as it is understood nowadays. Stakeholder theory emphasizes the importance of considering the interests and needs of all stakeholders, including employees, customers, communities, and even the environment. Corporate Social Responsibility (CSR) theory emphasizes the responsibility of businesses to contribute to societal and environmental goals. The Triple Bottom line (TBL) concept goes beyond financial performance to consider social and environmental impacts as well. Finally, corporate governance plays a critical role in ensuring that businesses operate in a responsible and sustainable manner.

3.1   Stakeholder theory

While planning sustainability development along with determination of which SGDs goals one business is keen on to focus require the engagement of both internal and external stakeholders throughout the sustainability process. Stakeholder theory was developed by Edward Freeman and firstly introduced in his work " Strategic management: A stakeholder approach" in 1984 (Freeman, 2001).

An author proposed to consider the company's development strategy from the point of view of various individuals and organizations that it affects or depends on. The strategic management of a company should be based on striving to serve the interests of the most important stakeholders (Clarkson, 1995). Within the framework of this approach, it is argued that the sustainable development of an organization depends on the quality of relationships with different stakeholder groups.

Since publication of the Freeman's work, the theory of stakeholders has been widely developed in the scientific literature, for instance by Benpaudi and Leone (2003), Brenner and Cochran (1991), Brummer (1991), Hill and Jones (1992) which also contributed to the emergence of various interpretations of the term "stakeholder" (Gordin, 2015). Freeman defined the company's stakeholders from a theoretical point of view as any group or individual that influences or is influenced by the decision of the company's management (Freeman, 2001). Then, later the researchers turned to a narrower approach, typical for practical activities. Within the framework of this

approach, stakeholders include only those individuals and groups with whom the firm interacts most often (Clarkson, 1995).

Every company exists in a larger ecosystem in which it must compete for resources, like human capital and financial capital, with other companies. If business is responsibly acts towards its customers, suppliers, employees, investors, communities and other groups who have a stake in accompany the whole system becomes much more robust. Therefore, the most sustainable way to run a business is to make decisions in the interest of all stakeholders. It differs from the traditional theories of economics and finance by placing ethics and responsibility at the heart of value creation and therefore stakeholder thinking requires a shift in narrative away from the traditional theories of economics and finance (Gordin, 2015).

Therefore, the CSR concept is viewed through the lens of interaction with stakeholders and must work towards maximizing their interests, not only because it leads to the financial success of the company but also because it seeks to achieve a competitive advantage by gaining people's trust and, as a result, a good reputation on the market (European Commission, 2005). Stakeholder theory also succeeds in gaining notoriety as a framework for CSR practices such as adhering to ISO 26000 standards and GRI reporting that incorporate stakeholder analysis (Moore, 2010).

3.2   Corporate Social Responsibility theory

Corporate Social Responsibility (CSR) is a concept that has attracted worldwide attention and acquired a new resonance in the global economy (Jamali & Mirshak, 2007). CSR definitions, theories and models were investigated by many scholars worldwide like Safarzad, Friedman, Brusseau, Carroll, Freeman and others.

This heightened interest in CSR has stemmed from the advent of globalization and international trade, which have reflected in increased business complexity and new demands for enhanced transparency and corporate citizenship (Jamali & Mirshak, 2007). Moreover, while governments have traditionally assumed sole responsibility for the improvement of the living conditions of the population, society's needs have exceeded the capabilities of governments to fulfill them. In this context, the spotlight is increasingly turning to focus on the role of business in society and progressive companies are seeking to differentiate themselves through engagement in CSR (Nehme & Brin, 2019).

Safarzad considered CSR concept as a legal requirement for a company which includes continued commitment toward the community, stating that the main goal for a company is to increase the efficiency and productivity and maximize profit by integrating the community ethical and environmental expectations into the company economic processes (Safarzad, 2016).

Milton Friedman in a contrary supported a theory of "corporate egoism" by rejecting CSR concept as a whole and believing that companies management has only one responsibility which is to maximize the profits of its owners and shareholders. And that social problems should be resolved independently by free market system mechanism (Friedman, 2002).

Brusseau outlined CSR as a specific theory and proposed two definitions. First, it's a general name for any theory of the corporation that emphasizes both the responsibility to make money and the responsibility to interact ethically with the surrounding community. Second, CSR is a specific concept to achieve profit for a company while it plays a role in community welfare. He also argued that CSR theory was composed of four business responsibilities: Economic - to make profit, legal, ethical and philanthropic (Brusseau & Chiagouris 2013, p. 55).

Archie Carroll was one of the most popular scholars at the management field who consolidated James Brusseau definitions for CSR into a four-part definitional framework for CSR and introduced a "Carroll's Pyramid of CSR" in 1979 as demonstrated in Figure 3. According to Carrol's framework CSR was originally stated as follows: "Corporate social responsibility encompasses the economic, legal, ethical, and discretionary (philanthropic) expectations that society has of organizations at a given point in time" (Carroll, 2016, p. 4).
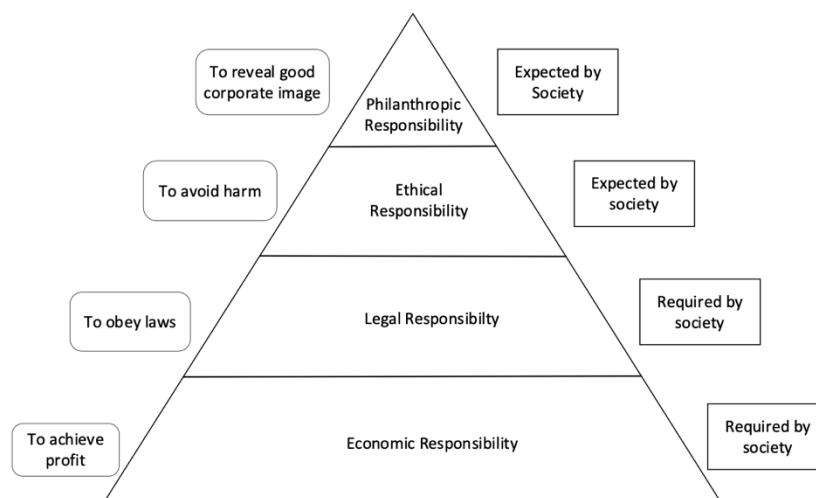
Figure 3 Carroll Pyramid for CSR. Modified from Carroll (2016)

Refer to the Figure 3, Carroll placed the Economic responsibility at the bottom of his pyramid stating that obligation for company to make profit is vital for business survival. He also added that profits are necessary to reward investors and owners. Moreover, profits must be reinvested back to maintain business growth. Economic responsibility is represented by a corporation through investments, marketing strategies, business operations, and long-term financial strategies with variant stakeholders (Carroll, 2016, p. 3).

Legal Responsibility was placed in the second level of the CSR Pyramid meaning that a responsible corporation adheres to law because it believes that fair business reflects positively on the whole economy and society (Carroll, 2016, p.3). Meanwhile, ethical responsibility states that companies must behave as a good citizen in its society and embrace fair activities done by a corporation and expected by society (Nehme & Brin, 2019, p. 23). And on the top is placed philanthropic responsibility, which is considered as a voluntary activity guided by the business's desire to participate in social activities that are not mandated, not required by law, and not generally accepted in business as ethical sense (Nehme & Brin, 2019, p. 25). Carroll defined it as business giving. Philanthropy or business giving may not be a responsibility in a literal sense, but it is normally expected by businesses today and is a part of the everyday expectations of the public (Carroll, 2016, p. 4).

Analysis of the Carroll's Pyramid revealed that each of the four components of responsibility addresses different stakeholders in terms of the varying priorities in which the stakeholders might be affected (Carroll, 2016, p. 5). Therefore, it is interconnected with a stakeholder theory, adopted by R. Edward Freeman, who was the former explorer of the relationship between two major concepts in business ethics: stakeholder theory and CSR.

3.3 Triple Bottom line concept

The term Triple Bottom Line (TBL or 3Ps) of People, Planet and Profit was coined and firstly introduced to public in 1994 by John Elkington by encompassing a new framework to measure performance in corporate America (Elkington, 1994). The key idea claimed that a company can be managed in a way that not only makes money, but which also improves people's lives and the wellbeing of the planet. TBL represents a sustainability framework that examines a company's social, environment, and economic impact along with encouraging the business to track and manage economic (not just financial), social, and environmental value added—or destroyed (Elkington, 2018).

Below statements demonstrate what 3Ps framework stands for social, economic and environmental impact as introduced in Figure 4. Elkington J. reveals the meaning of each of 3P as following:

People: the positive and negative impact an organization has on its most important stakeholders. These include employees, families, customers, suppliers, communities, and any other person influencing or being affected by the organization.

Planet: the positive and negative impact an organization has on its natural environment. This includes reducing its carbon footprint, usage of natural resources, toxic materials and so on, but also the active removal of waste, reforestation and restoration of natural harm done.

Profit: the positive and negative impact an organization has on the local, national and international economy. This includes creating employment, generating innovation, paying taxes, wealth creation and any other economic impact an organization has (Kraaijenbrink, 2019).

Further, present idea infused platforms such as Global Reporting Initiative (GRI) and Dow Jones Sustainability Indexes (DJSI), influencing corporate accounting, stakeholder engagement and, increasingly, strategy (Elkington, 2018).
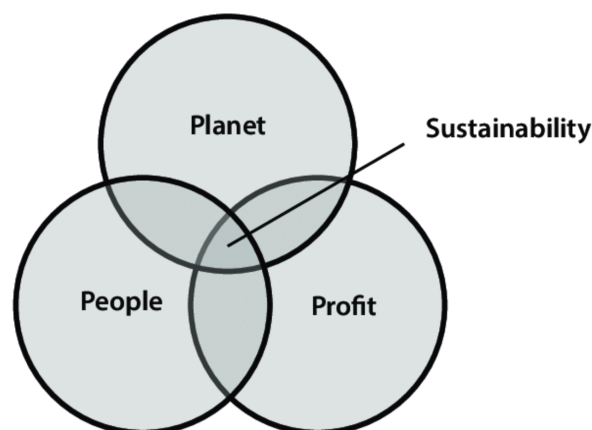
Figure 4 The Triple bottom line. Modified from Elkington (1997)

Summarising the reviewed theories it becomes evident how SD, CSR, Stakeholder theory and TBL are closely related and interrelated concepts. SD is a development concept that seeks to meet the needs of the current generation without compromising the ability of future generations to meet their own needs. It includes economic, social and environmental aspects (Akimova & Moseikin, 2009, p. 61). CSR is the concept that companies should create an added value by

considering impact of their actions on society and the environment and take steps to reduce their negative affection on them while generating a profit (Borzakov, 2015, p. 6).

CSR is an important component of any business endeavor, which activities are reflected in the system of economic, environmental and social indicators of sustainable development, carried out through a regular dialogue with society and being part of the strategic planning and management of companies. In this sense CSR represents a powerful factor in strategic development, strengthening business reputation and competitiveness, as well as increasing the market capitalization of companies. In fact, in modern conditions, the social responsibility of business is an important tool for implementation of the Sustainable Development Goals declared for by the updated UN Global Agenda until 2030 (Starikova, 2017, p. 127).

Stakeholder theory is the concept that companies should act according to key goals of their stakeholders. The theory assumes that the satisfaction of the interests of all stakeholders will lead to the sustainable development of the company and society as a whole (Gordin, 2015). As elaborated by John Elkington, the three dimensions of TBL must obtain sustainable results as sustainability is the main aim of the whole TBL concept (Elkington, 2018).

Thus, a key idea of taken concepts is to strive for sustainable development of society, environment and economy, considering the interests of all stakeholders. Organizations implementing this approach can achieve higher social responsibility and business success. However, there are many discussions on the idea that implementation of strategies towards achieving the sustainable goals may differ among the countries.

3.4   Corporate governance

Another crucial concept that should be examined in this paper is corporate governance as it plays a vital role by involving the relationships between various stakeholders, including shareholders, business management, its customers, suppliers, financiers, the government, and the community. Present term is reflected in a set of rules, practices, and processes used to direct and control an organization (Conmy, n.d.). The Corporate Governance Institute defines corporate governance as an organization's power structure, accountability structure, and decision-making process, as well as essentially a set of tools that enable management and the board to administer a company more efficiently and effectively .

The Institute also outlines fundamental principles of corporate governance including accounting, transparency, fairness, responsibility and risk management (Corporate Governance Institute, 2023). The role of the board of directors can't be exaggerated, as it is the primary force influencing corporate governance in the company and their key duty is to ensure that all the main principles of corporate governance are incorporated into the business policies and strategy of the company. Crowther D. from Montfort University (2008) claims that key principles are related to the company's CSR and that effective corporate governance procedures may assist businesses in integrating CSR into their business strategy and operations.

Corporate governance practices define every facet of the management team's responsibilities and work to maintain equilibrium and provide control mechanisms to raise both shareholder value and the well-being of other stakeholders. In other words, corporate governance focuses on striking a balance between a company's economic and social objectives, taking into account factors including effective use of resources, environmental awareness, ethical behavior and the corporation's conduct in its surrounding community (Crowther, 2008, p. 438).

Nowadays, the phenomenon of corporate governance has developed into an area of study that looks at the frameworks, procedures, rules, and values that direct how businesses, their management, and stakeholders behave. At the same time this trend enhanced the development of different corporate governance models. Thus, Chen in his studies outlines three: Anglo-Saxon, Continental and Japanese (2023).

Anglo-Saxon model is mainly common for English speaking countries and have several variations including a shareholder model, which is based on the idea that the shareholders and the board of directors are in control whereas other stakeholders have a lack of it. The model accounts for the fact that shareholders provide the company with funds and may withdraw that support if dissatisfied. This can keep management administer efficiently in a way that maximizes shareholder interest (Chen, 2023). In other words, the key elements of this model are a strong role for the shareholders' committee, active competition in the share market and the principle of the primacy of shareholders' interests in making strategic decisions.

Meanwhile, controlling authority of the Continental model, which prevails in European and Latin American countries, is composed of two completely separated groups: supervisory board that includes shareholders and union representatives of the number determined by the governmental law, and management board. With this system of corporate governance, national interests have a significant impact on companies, meaning that business strategies may align to government

goals (Corporate Governance Institute, 2023). The emphasis is on the long-term sustainability of the company and the importance of cooperation with labor unions and government agencies.

The Japanese model of corporate governance has its own specifics associated with national culture and values. A key control role is allocated to financial institutions, affiliated entities, major shareholders and management, while governance influences corporate management through regulations and national policies(Chen, 2023). There is a strong emphasis on collaborative decision-making, long-term partnerships with suppliers and an emphasis on corporate social responsibility (Corporate Governance Institute, 2023). Overall, research on various corporate governance models provides understanding and applying appropriate methods and approaches for strategic decision-making and organization management, as each model has its own characteristics and advantages, depending on the company's context and conditions (Conmy, n.d.).

3.5 CSR approach in country context

Firstly, Palmer and More (1996) argue that sustainability is a fuzzy concept and defined differently by different communities and interest groups. In a broader sense meaning that cultures differ from place to place and can greatly influence societal efforts to move forward along a path towards sustainability. Therefore, CSR policies of different countries are modelled on different considerations, namely philanthropic, ethical, legal, and economic or an amalgam of these (Anupama & Himangshu, 2022, p. 4).

The perception of the importance of CSR has increased as well. According to a cross-county (Japan, the United States and Britain) survey on those interested in equity investment (Ministry of Environment, Japan, 2003), the importance of CSR is perceived more in Japan than in Britain, although less than in the United States (Tanimoto & Suzuki, 2005). Mainly former studies were focused on the Western countries. Further, academics began becoming inclusive with comparing the West, particular the United Kingdom and the global South countries. The findings confirmed that CSR activities depend on the social political settings of a country at least when the West and South were compared (Bvepfepfe, 2015, p. 13).

According to Crane, Mattern and McWilliams (2008) there are different types of comparative analysis of CSR performance as well as comparisons could be legal or institutional. The former centers on the governmental policy of CSR, while the latter on various stakeholders involved in the CSR across countries like investors, employees, top management.

US approach

A representative study was performed by Matten and Moon (2008) of explicit and implicit CSR. Authors made a comparison of US and European countries and revealed that the United States practices explicit CSR, using CSR term to clearly incorporate social responsibility into the business agenda, while European companies tend to practice implicit CSR, fulfilling their social responsibilities by cooperating with the government and establishing industrywide obligations. In other words, CSR activities in US is seen mostly as a voluntary effort by individual companies, while it is seen in Europe to focus more on institutional efforts.

The US market is free for labour and capital to operate on, implying that there are fewer state provisions and no firm regulations insisting US corporations to spend the specific amounts of CSR activities. The main drive force for involvement into CSR is a legislative expectation of the society. Nevertheless, in 1971 the Committee for Economic Development expressed the concept of social contract between businesses and society that erose on idea that companies can operate because of public consent, therefore they owe a duty to constructively serve the society. This social contact appended three duties to businesses including applying job places and promoting economic growth, fair and transparent business activities towards employees and business involvement into in improving the community and environment in the vicinity of their operations (CSR Journal, 2019).

However, US government pressures on businesses to be socially responsible. There are in place policies and voluntary checks that include soft laws where the large corporations have to report their CSR related activities (Himangshu, 2022). For instance, the US Bureau of Economic and Business Affairs which main function is to promote responsible business practices and inculcate sustainable development and simultaneously ensuring economic security (U.S. Department of State, 2023). And in the same way, USA has developed numerous mechanisms for the participation of business in the social support of society through corporate funds aimed at solving various social problems at expense of business.

Matten and Moon (2008) also emphasize a role of government, stating that USA has traditionally eyed the role of government in the market with suspicion, while political parties and unions are regarded as key players in Europe. Should be admitted, that US companies tend to demonstrate transparency and social responsibility since stocks of many companies are held by number of shareholders. Conversely, in Europe, companies maintain long-term relationships with major shareholders and banks, and strong influence is exerted by other stakeholders as well. More

European companies have been adopting the US style of explicit CSR in the wake of globalization, but this is often a hybrid type that also retains certain European features (Motoki, 2022).

UK approach

In terms of promoting CSR in a Global context, British government has a fundamental role over the last 40 years . The UK Government (2014) defines CSR as the responsibility of an organisation for the impacts of its decisions on society and the environment above and beyond its legal obligations, through transparent and ethical behavior. A number of legislative acts provide for a preferential taxation regime for companies that conduct their own business in a socially responsible manner and adhere to the basics of business ethics, in particular issues of energy use, recycling of production waste. At the same time, business itself shows the initiative to implement projects in the field of CSR (Belyaeva, 2008, p. 87).

Alongside, the government plays a functional role in development of CSR in the country by creation of public-private partnerships in the education sector, supporting for CSR initiatives through project co-financing, provision of tax incentives, promotion of initiatives to comply with national international standards. In 2014 was adopted a CSR strategy aimed to bring together and recognize the range of CSR activities that are taken place and outline future commitments under each of four standards: environment, people (human recourses, health and wellbeing), procurement (finance and purchasing) and community (volunteering, skills matching and fundraising) (UK Government, 2018).

At the same year the UK changed an enterprise reporting as voluntary, thus many non-profit organizations were no longer required to report on their CSR and SD performance meaning that many related programs were ended. Nevertheless, over 60% of British enterprises across all industry sectors report on their CSR activities, and in the last year have seen showed an increased rate due to media and public awareness (Rangan, Chase and Karim, 2015; Wells et al., 2016; UK Government, 2020). As a result of the United Kingdom's CSR advances in sustainability thinking and societal conformity persons expect a sound, just CSR practice. Its enterprises are exemplar to other countries, especially developing, in terms of economic development and arguments for compliance to CSR activities (Das, Cirella, 2020).

Additionally, the government's efforts, along with the fostering of a company culture aimed at caring for and involving its own stakeholders, have led to the United Kingdom being considered one of the global leaders in adopting CSR principles. This is also apparent in specific training

courses that are widely spread over the country with 15 post-graduate master's Courses dedicated to CSR at the most prestigious British universities (Sofidel, 2018).

Japan approach

Previous international CSR comparative analysis performed by Welford Survey already included North America, Western Europe and Asian countries along with Japan. The outcomes pointed out a rather low rate of CSR performance among Asian countries, however Japan had a comparatively high level. The study concludes that Western CSR initiatives are being closely followed in Asia, a trend particularly prevalent in Japan (Welford, 2005). Analysis of CSR in Japan held by Tanimoto and Suzuki (2005) have revealed that Japan is the country with the highest number of companies publishing their sustainability reports based on the Guidelines of Global Reporting Initiative.

Those research that have been focused on cultural aspects, explained the differences in CSR approach within Japan and Western countries. For instance, Lewin (1995) found that Japanese companies are highly aware of CSR, but tended to avoid formal administrative processes, which was preferred by Western companies. As an example, Japanese organizations predominantly use cultural mechanisms such as philosophy and guiding principles to address such issues. The planning and management of the most important issues is conducted through teams or committees, and little formal monitoring is conducted (Lewin, 1995, p. 95).

Similar exploration outlines the definitive role of culture in CSR performance. Thus, Richard Welford (2004) in his study "Corporate Social Responsibility in Europe, North America and Asia" exposed noteworthy links between culture and CSR policies, claiming that CSR policies are more prevalent in countries with social democratic traditions. Along with interconnection of CSR and economic development of the country considering that the more developed the country the likelier it is to engage in CSR policies.

In further observations Wokutch and Shepard (1999) have discussed CSR in Japan by what they named the "micro moral unity paradigm", meaning that companies in Japan follow moral values, but only within carefully circumscribed communities of interest, that is, excluding minorities, foreigners, and various other individuals on the fringes of Japanese society. Such approach was explained with referral to three key characteristics which distinguishes Japan and Western countries: the within-group, out-of-group distinctions and Confucian sense of duty to those with whom one has a specific relationship, and the strong emphasis placed on the value of loyalty.

Also, analysis the sustainability reports of Japanese companies conducted by Tanimoto and Suzuki (2005) revealed the tendency towards the environment-related issues rather than to social and

corporate governance. Western companies, in contrast, addressing more to social challenges instead of environmental. Such outcome may imply the existence of strong cultural resistance in Japan and claim that Japan promotes CSR under pressure from the West and tends to emphasize the environment (Ono, 2022).

In addition to explanation of cultural deviations in CSR, Tanimoto (2004) outlined strategic integration of various stakeholders into the Japanese system where corporate interests received greatest value, against the background of rapid economic growth after the World War II. Confirming this way a stakeholder theory in Japanese corporate context.

The other research performed by Baughn, Bodie, and McIntosh in 2007 consisted in comparative analysis of CSR performance among North America, Western Europe, the Middle East, Africa, Latin America, Eastern and Central Europe, and Asia using a questionnaire survey conducted by the World Economic Forum. The results showed that while Japan's CSR in the domain of societal challenges lags behind the levels in North America, it is ahead of Western Europe. And Japan's environmental activities stand head and shoulders above all other countries.

The performed groundwork notes that Japan's CSR is exceptionally well-developed in the Asian context. In international comparisons, Japan is often included among Western industrial democracies rather than as part of Asia because Japan's political and economic systems are perceived to be closer to those of the West (Ono, 2022).

As per the governmental orientation, an important aspect of the national policy in the field of sustainable development is to ensure a balance of social, economic and environmental objectives, including the UN SDGs. In general, states start from their own conditions and prioritize measures to solve urgent problems of national development (Ignatov, 2018). For instance, Japan declares the priority of issues related to human security, the development of health care, reducing the risk of natural disasters and gender equality. For Japan SDGs are a national idea. Thus, The Prime Minister of the country created and led an entire headquarters for the promotion of the SDGs. And country has a special award for private companies that contribute to progress in sustainable development (Bik, 2022).

Summary through Carroll's model

To structure the overall view on CSR approach in reviewed countries was applied a Carroll Pyramid as a base for gaining a comprehensive insight as presented in Figure 5.

	USA	UK	Japan
Philantropic Responsibility	Voluntary. Extends to various area. Carried out through charitable foundations.	Voluntary participation. Initiation of SD projects.	Voluntary corporate charity as part of philosophy.
Ethical Responsibility	Determined by the level of corporate support for the local community.	Development of CSR consulting services. Government support	Guided by local ethical codes and government bodies. Importance of family factor in social assistance.
Legal Responsibility	Low level of legally enshrined rules of corporate conduct. Least government engagement.	Clearly defined and established business rules of corporate conduct.	Reliable legal foundation enhanced by government.
Economic Responsibility	Focus on profitability and responsibility to shareholders.	Focus on profitability and responsibility to all stakeholders	Focus on market share and responsibility to all stakeholders.

Figure 5 CSR approach in US, UK and Japan. Modified from Carroll's model (2016)

In Economic Responsibility US businesses focuses mainly on its profitability and responsibility to all shareholders (Matten and Moon., 2008) whereas the UK CSR model additionally refers to issues of responsibility to employees and local communities. Japan model of CSR outlines an occupied market share of organization and focus on building of stable relationships with stakeholders with as main criterion of effectiveness (Motoki, 2022).

Legal Responsibility is the basis for any form of social responsibility in UK. Business considers the state as an institution that enforces the accepted rules of conduct (Belyaeva, 2008) and in the United States, similar state intervention is regarded as a violation of business freedom (Matten and Moon., 2008). The Japanese model of CSR represents an implicit form, which implies official and unofficial institutions of the state, where the social responsibility of organizations includes certain rules, traditions, binding and existing formally (Wokutch and Shepard, 1999).

The US Ethical Responsibility is determined by the support level of local community. Social programs are implemented based on interests of key internal and external stakeholders, on the assumption that, in a strategic sense, the organization will receive a certain social and economic outcome. Besides, US government has developed numerous mechanisms to involve businesses in the social support through corporate funds aimed at solving social issues (Matten and Moon, 2008).

UK can be characterized by well-developed public welfare and health care system along with broad development of independent CSR consulting services and a growing trend in the number of socially responsible investment funds (Belyaeva, 2008). Meanwhile, the Japanese social model

in corporations implies cohesion, the presence of a collective spirit. Business activities are aimed not only at making a profit, but also at establishing core social values, awareness of responsibility within the whole society, emphasis on environmental values, increase the level of education and culture in society (Motoki, 2022).

Charity is voluntary and understood by American companies extensively and extends to various areas including culture, art and education. Realization of charity programs are held through charity funds. As well as in UK businesses voluntary tend to initiate CSR projects along with close government cooperation (Belyaeva, 2008). Volunteering in Japan is precepted as responsible behavior of citizens towards their country and CSR is accepted as a philosophy for corporate governance (Tanimoto & Suzuki, 2002).

4   Institutional frameworks and reporting standards

Businesses have an important role in driving and investing in innovation to meet the requirements of SD and in reporting to decision-makers about the way in which their activities contribute to the global sustainability agenda. The relevance of corporate sustainability reporting for the global sustainability agenda has been highlighted in UN conferences on SD in 1992, 2002 and 2012 (Guthrie et al., 2013). It is also anticipated that companies engaged in such businesses as manufacturing, natural resources and energy are more likely to adopt guidelines, as they have much to do with environment (Welch et al., 2001). Therefore, a role of reporting directives, guidelines and initiatives in SD is paramount as they formulate and establish common rules and standards to manage with reports.

Firstly, they assist organizations to assess and track their contribution to sustainability, by providing a guidelines and standards for measuring economic, environmental and social impacts. Therefore, come up with proper estimation of their environmental, social risks and opportunities, improve their processes and activities, as well as business reputation (G&A Institute, 2020).

Secondly, reporting guidelines and standards contribute to more transparent company reporting and increased stakeholder confidence. Investors, employees, contractors, and communities are looking for a high-quality sustainability data that is reliable, relevant, and comparable. Since stakeholders need insight into how an organization is managing its ESG risks and opportunities, and where it stands on its path to a sustainable future, this information enables them to make decisions on further cooperation and investments activities (Barnes, 2023). The Sustainability Indices guide investors and stakeholders to identify companies that are committed to sustainability and assess their financial results in terms of CSR and SD. They can also be applied as a measurement tool for improvement of SD strategy and sustainability performance (Searcy, 2012, p.36). And finally, they provide governments and regulators with monitoring and management instruments for companies' activities in CSR and SD and result a further improvement of sustainability regulations and standards (Schmutz & Tehrani, 2020).

4.1   Corporate Sustainability and Reporting Directive

With publication of the European Corporate Sustainability Reporting Directive in December 2022 organizations have really started to focus on the sustainability reporting obligations coming down

the track in the next few years. The CSRD is a quite new directive that introduces more detailed reporting requirements and ensures that large companies and listed SMEs have to report on sustainability matters such as environmental rights, social rights, human rights and governance factors (Council of the EU, 2022). The CSRD also makes it mandatory for companies to have an audit of the sustainability information that they report. In addition, it provides for the digitalisation of sustainability information (A&L Goodbody, 2023).

The aim of new directive is to update and amend the non-financial reporting requirements set for companies under the Non-Financial Reporting Directive (NFRD) which are no longer tailored to the EU's transition to a sustainable economy (Council of the EU, 2022).

A new adopted reporting rules are applying to all large companies, as well as to all companies listed on regulated markets and listed SMEs, except listed micro undertakings. Requirements to provide sustainability reports are also applied to non-European entities that generate a net turnover EUR 150 million in the EU and have at least one subsidiary or branch in the EU exceeding certain thresholds. These companies must provide a report on their environmental, social and governance (ESG) impacts, as defined in this directive (Council of the EU, 2022).

New standards will ensure that investors and other stakeholders have access to the information they need to assess investment risks arising from climate change and other sustainability issues. They will also create a culture of transparency about the impact of companies on people and the environment. Finally, reporting costs will be reduced for companies over the medium to long term by harmonising the information to be provided. Companies subject to the CSRD will have to report according to European Sustainability Reporting Standards (ESRS). First reports complying the new European sustainability standards have to be applied in respect of 2024 financial year (Directive of the European Parliament and of the Council, 2022).

Czech Minister for Industry of Trade Josef Sikela (2022) claimed that new rules would make more businesses accountable for their impact on society and will guide them towards an economy that benefits people and the environment. Data about the environmental and societal footprint would be publicly available to anyone interested in this footprint. At the same time, the new extended requirements are tailored to various company sizes and provides them with sufficient transition period to get ready for the new requirements.

Nowadays, organizations are at different stages in terms of their engagement with sustainability reporting. As a first step companies determine if and when CSRD will apply and where it does apply establish a working group and start developing an action plan to prepare for compliance

with reporting obligations. Those already reporting under NFRD or that have been voluntarily reporting sustainability information typically already have processes in place in terms of collating the data needed for this type of reporting. For everyone else that falls within scope work should be started in the coming year to develop processes around sustainability reporting and the capturing of the data necessary for this (A&L Goodbody, 2023).

4.1   United Nation Global Compact

UNGC is an international initiative for businesses in the field of CSR and SD aimed at encouraging the social responsibility of business and providing reports on implementation of such policies. With over 8,500 signatories in over 135 countries, the UN Global Compact became the largest voluntary corporate responsibility initiative (UN Global Compact).

Established in 2000 at the call of former UN Secretary-General Kofi Annan, the UNGC has become an important tool for involving business in the formation and promotion of the concept of sustainable development. It strives to reach two main goals. Firstly, the UN Global Compact calls on businesses joining this initiative commit to align their activities and strategies with ten universally recognized principles based on key conventions and declarations of the UN, such as human rights, labor relations, the environment, and anti-corruption, following Figure 6 And secondly, to step up an action in support of other global UN goals such as the Millennium Development Goals (MDGs) and the SDGs (Kingo, 2019).

Any business may voluntarily become a member of the UN Global Compact by committing itself to making the UN Global Compact and its principles an integral part of its business strategy, daily operations and organizational culture as well as to include them into management decision-making processes.

Human rights

- Principle 1. Businesses should support and respect the protection of internationally proclaimed human rights;
- Principle 2. Businesses should not be complicit in human rights violations;

Labour

- Principle 3. Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
- Principle 4. Businesses should eliminate all forms of forced and compulsory labour;
- Principle 5. Businesses must advocate for the total elimination of child labour;
- Principle 6. Businesses should uphold the elimination of discrimination in respect of employment and occupation;

Environment

- Principle 7. Businesses should support a precautionary approach to environmental challenges;
- Principle 8. Businesses could undertake initiatives to promote greater environmental responsibility;
- Principle 9. Businesses should encourage the development and diffusion of environmentally friendly technologies;

Anti-corruption

- Principle 10. Businesses should work against corruption in all its forms, including extortion and bribery.

Figure 6 Ten principles of the UN Global Compact. Modified from UN Global Compact

Additionally, companies should partner with UN agencies to assist in achieving a broader development and include in its annual and SD reports a description of the way these principles were implemented. Also, such companies should be involved into expanding the membership of the UNGC and promote responsible business practices through active public support (Corporate Sustainability in the World Economy, 2014).

4.2   Global Reporting Initiative

The Global Reporting Initiative is an independent international organization founded in 1997 to assist businesses, governments, and other entities to understand and communicate their sustainability performance. The GRI standards provide a framework for reporting and set of guidelines designed to enable organizations to report on their ESG impacts in a consistent, comparable, and transparent manner, as set out in UN and Organization for Economic Co-operation and Development (OECD) intergovernmental documents (Global Reporting Initiative).

Now GRI is the most acknowledged comprehensive reporting system of CSR performance (Tanimoto & Suzuki, 2005). It represents a modular system of interconnected standards: the GRI Universal Standards, the GRI Sector Standards and the GRI Topic Standards as presented in Figure 7.

Which allow organizations to publicly report the impacts of their activities in a structured way that is transparent to stakeholders and other interested parties (Globalreporting, 2023). The Universal Standards come into force for reporting on January 1, 2023. A document Short Introduction to the GRI Standards (2021) include three key standards:

GRI 1. Foundation 2021, introduces the purpose and reporting system of GRI, setting out the key concepts, requirements and principles that all organizations must comply with to report in accordance with the GRI Standards.
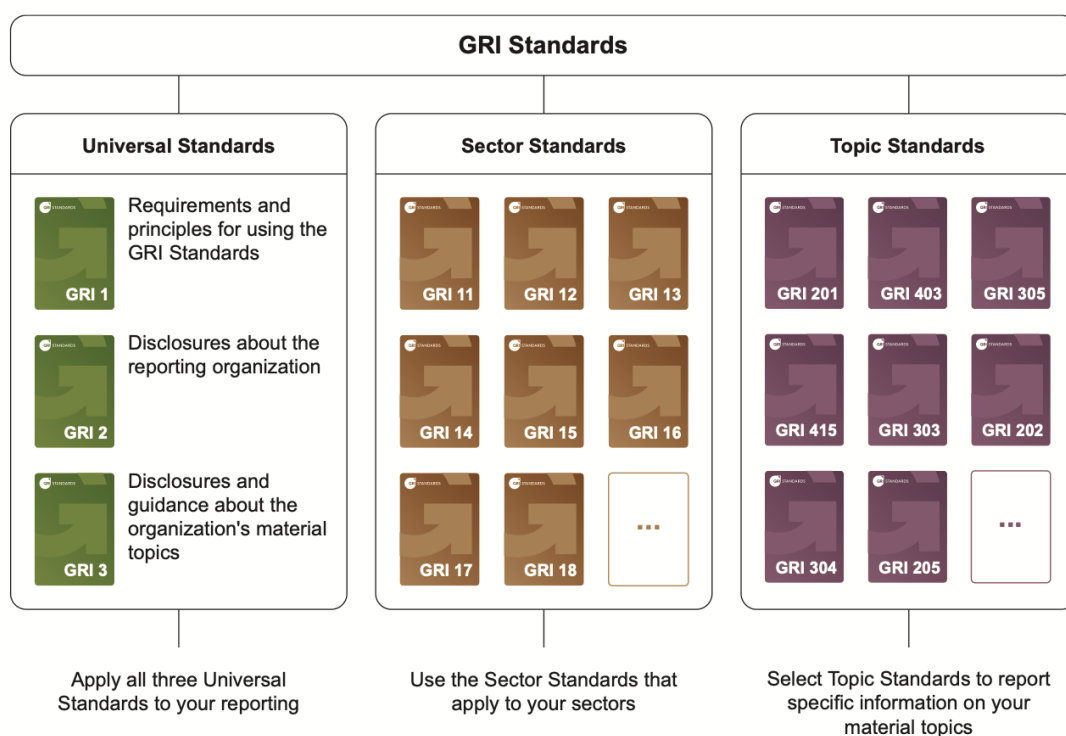
Figure 7 The GRI Standards: Universal, Sector and Topic Standards (A Short Introduction to the GRI Standards., 2021)

GRI 2. General Disclosure 2021, an updated and consolidated disclosures on reporting practices, activities and employees, management, strategies, policies and practices and interaction with stakeholders.

GRI 3. Material Topics 2021 explains the steps by which an organization can determine the topics most relevant to its impacts.

GRI Sector Standards are designed to improve the quality, completeness and consistency of reporting organizations. Standards will be developed for 40 sectors, starting with the most impacted

sectors such as oil and gas, agriculture, aquaculture and fisheries. The Standards list topics that are likely to be material to most entities in the sector and identify related disclosures on those topics. If there is an applicable industry standard, the organization is obliged to use it when reporting under the GRI standards.

The GRI Topic Standards contain disclosures for providing information on topics. Examples include standards on waste, occupational health and safety, along with taxes. Organization selects those thematic standards that correspond to the material topics it has identified and uses them for reporting.

4.3   ESG Risk Rating

Risks associated with environmental, social and governance issues are idiosyncratic company risks. The purpose of ESG ratings is to measure the unmanaged ESG risk of a company (Horn, 2023) in order to help investors and other stakeholders identify and understand financially material related risks within their portfolios and the way these risks might affect performance (Sustainalytics, 2020). Not having an ESG rating can be interpreted as very low ESG transparency of a company and, therefore, negatively affects firm value (Wong, 2021).

ESG Risk Rating is established by international rating agency Sustainalytics which is one of the world leaders in research and ratings in the field of ESG. The agency explains (2020) ESG Risk Ratings as a way of measuring a company's environmental, social, and governance performance and risk. These ratings evaluate a company's sustainability practices and their impact on the environment, society, and corporate governance.

There are three core building blocks that make up ESG risk ratings including corporate governance, material ESG issues and idiosyncratic ESG issues. An agency applies two-dimensional lens. By first measuring a company's exposure to industry specific material ESG risks, and second measures how well a company is managing those risks. Accepting an exposure as a company's vulnerability and susceptibility to ESG risks. A low level of exposure implies that the risk is negligible, whereas higher exposure suggests it could be material and therefore, impact company value (Sustainalytics, 2020).

Sustainalytics (2020) differentiates between 138 sub-industries with number of risk profiles based on their level of exposure to various ESG issues. Further, this sub-industry exposure is refined through company specific adjustments based on a company's business model. The management

dimension refers to actions taken by a company to tackle a particular ESG issue. This can include a company's ESG programs and policies. Controversies, that are built into a ESG ratings framework, have a negative impact on the company's management score since they act as a signal that management initiatives are insufficient or ineffective. Then agency combines these two dimensions i.e. management and exposure to get an absolute risk assessment or a company overall ESG risk rating. An outcome is a quantitative rating i.e. unmanaged risk score that expresses the amount of ESG risks for a company which ties to a risk level from negligible to severe, as presented in Figure 8.

Negligible	Low	Medium	High	Severe
0-10	10-20	20-30	30-40	40+
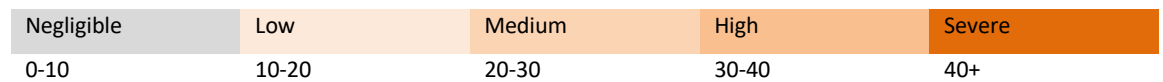
Figure 8 Ratings score for ESG performance. Modified from Sustainalytics.com

These scores are considered equivalent across the sectors and therefore company outcome can be directly compared to each other regardless of industry. The assessment of company's performance is hold in areas such as climate change, human rights, labor practices, board composition, and executive compensation, among others the data of which is used by hundreds of the world's leading investors. An agency claims the numerous use cases for Sustainalytics ESG Ratings outlining the more common uses for ESG integration, best-in-class analysis, screening, benchmarking and reporting.

5   Research method

A third part of the master thesis includes empirical part that is conducted as a multiple-case study. Research addresses to the subject of present analysis defined by each reviewed manufacturing company taken as an individual case (Yin, 2014, p. 56), but in total current study analysis as a whole covers six entities, therefore a multiple-case study were used. An abductive analysis of the findings is applied by method of content analysis focusing on primary research questions. Initially, to obtain a clear and structured approach in planning and execution of the present research was taken a Mapping research method by O'Gorman and Macintosh (2015) as presented in Figure 9.
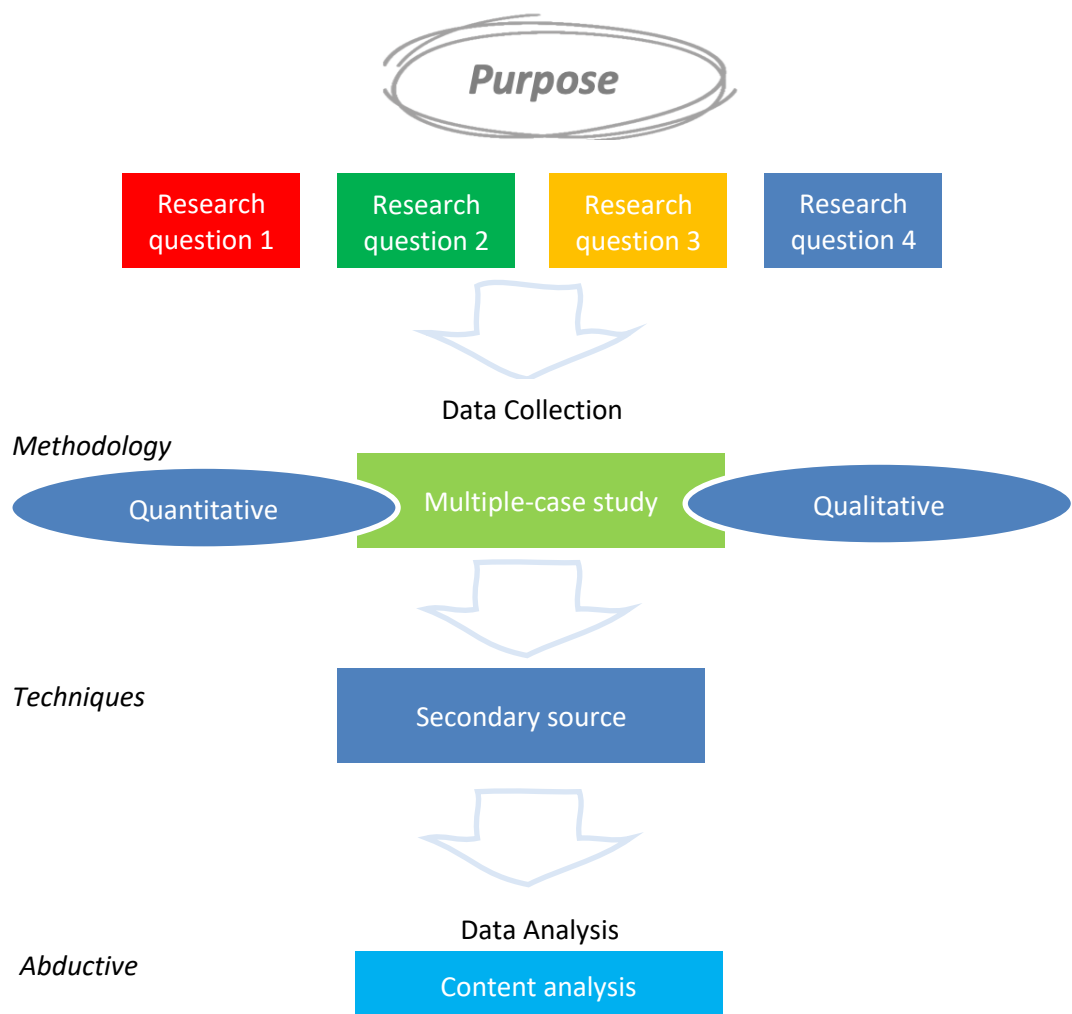
Figure 9 Research Method Map. Modified from O'Gorman and Macintosh (2015, Chapter 4).

5.1   Multiple case-study

A choice for research method is based on the aim of the thesis and related research questions. This approach allow for an examination of potential patterns or variations in business performance related to the SDGs while also considering the influence of cultural factors on these differences. By replicating the case through pattern-matching, a technique linking several pieces of information from the same case to some theoretical proposition (Campbell, 1975, p. 178), multiple-case design enhances and supports the previous results. This helps raise the level of confidence in the robustness of the method (Zainal, 2007). Exploring these aspects helps to get a thorough awareness of the context of the study and the procedures being used (Morris & Wood, 1991, p. 253).

Case studies can cover multiple cases and then draw a single set of "cross-case" conclusions (Yin, 2014, p. 18) in order to provide insights into the relationship between regional disparities and SDG implementation in manufacturing companies. A case study enables to concentrate on a "case" and maintain a comprehensive and practical viewpoint, which is useful when examining things like individual life cycles, small group behavior, managerial and organizational processes, neighborhood change, academic performance, global effect.

According to Yin (2014, p. 29) five components of research design were taken in consideration: a case study questions (1), its propositions (2), it's units of analysis (3), the logic linking data to the propositions (4), criteria for interpreting the findings (5).Data was collected from annual reports of 2022, 2023 years provided by public sources of case companies.

Traditional case study research often lacks formal designs, unlike survey or experimental research (Yin, 2014, p. 50). However, incorporating potential case study research designs can enhance the strength and ease of conducting new case studies, making them more effective. An author outlines four types of case designs as suggested at Figure 10.
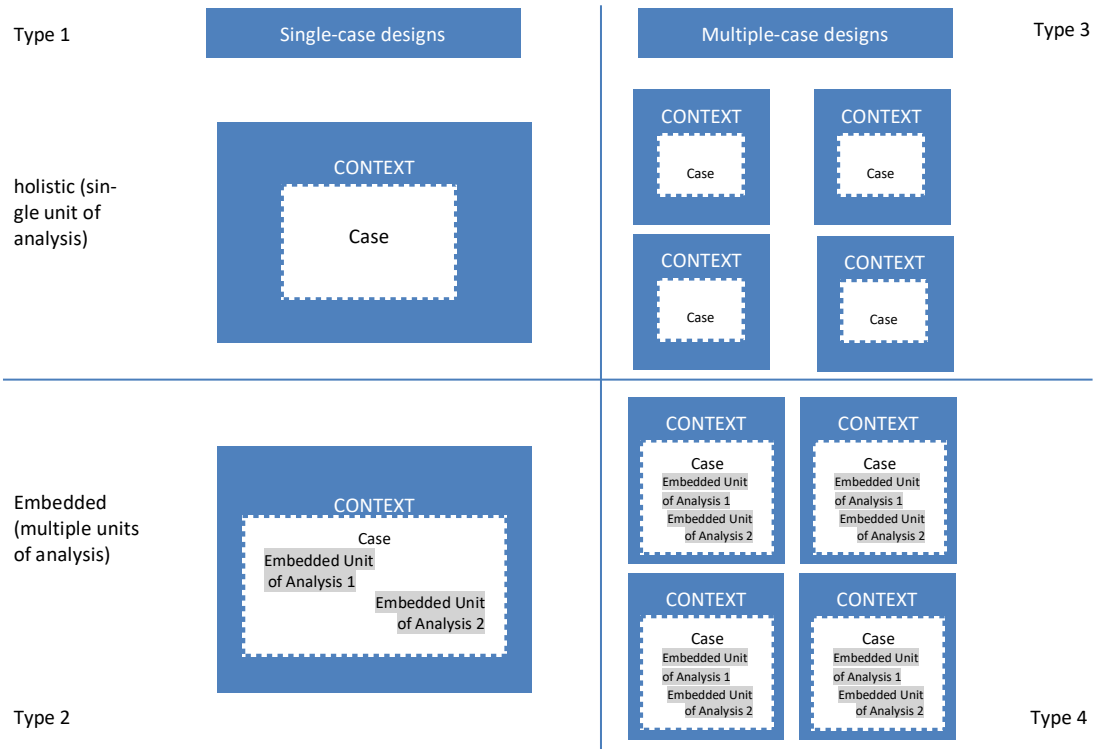
Figure 10 Basis types of case study designs. Modified from Yin (2014, Chapter 2)

Present matrix indicates that every design type involves analyzing contextual conditions in relation to the case, meanwhile the dotted lines signalize that there might be a weak boundary between the context and the case. Figure also demonstrates that single- and multiple-case studies exhibit varying design situations, with the latter allowing for unitary or multiple units of analysis. As presented four types of case study designs: single-case (holistic), single-case (embedded), multiple-case (holistic), and multiple-case (embedded). The fourth type of case study design is the most applicable to the present work as there are overall six case companies and each case involves several units of analysis, such as corporate governance, CSR, both internal and external polices, and activities in the context of Sustainable Development.

At the beginning, it was planned to analyze a limited number of three case companies, however, to obtain more compelling and robust results their number was doubled. As Yin suggests (2014, p. 57) that conducting 6 or 10 case studies effectively within a multiple-case design is similar to conducting 6 to 10 experiments on related topics. Some cases (2 or 3) may be literal replications, while others would be designed to pursue two different patterns of theoretical replications.

5.2   Data collection

By including both quantitative and qualitative data, case study helps explain both the process and outcome of a phenomenon through complete observation, reconstruction and analysis of the cases under investigation Tellis (1997). Yin (2014, p. 102) states that data for case study evidence may come from six sources: documents, archival records, interviews, direct observation, participant-observation, and physical artifacts (Figure 11) and each source is associated with an array of data or evidence.

Source of evidence	Strengths	Weaknesses
1. Documentation	• Stable-can be reviewed repeatedly • Unobtrusive-not created as a result of the case study • Specific-can contain the exact names, references, and details of an event • Broad-can cover a long span of time, many events, and many settings	• Retrievability-can be difficult to find • Biased selectivity if collection is incomplete • Reporting bias—reflects (unknown) • Bias of any given document's author • Access-may be deliberately withheld
2. Archival records	• [Same as those for documentation] • Precise and usually quantitative	• [Same as those for documentation] • Accessibility due to privacy reasons
3. Interview	• Targeted-focuses directly on case – study topics • Insightful—provides explanations as well as personal views (e.g., perceptions, attitudes, and meanings)	• Bias due to poorly articulated questions • Response bias • Inaccuracies due to poor recall • Reflexivity-interviewee gives what interviewer wants to hear
4. Direct Observation	• Immediacy-covers actions in real time • Contextual-can cover the case's	• Time-consuming • Selectivity-broad coverage difficult without a team of observers • Reflexivity-actions may proceed differently because they are being observed • Cost-hours needed by human observers
5. Participant Observation	• [Same as above for direct observations] • Insightful into interpersonal behavior and motives	• [Same as above for direct observations] • Bias due to participant-observer's manipulation of events
6. Physical artifacts	• Insightful into cultural features • Insightful into technical operations	• Selectivity • Availability

Figure 11 Six sources of Evidence: Strengths and weaknesses. Modified from Yin (2014, Chapter 4)

To gain a comprehensive view of each case study and answer the research questions the secondary data is collected from the fist type of sources offered by Yin (2014). Documentation is represented by documentary written materials as annual reports of case companies along with multiple area based and time-series based sources as governments publications, industry ratings and the United Union releases and reports. According to Saunders, Lewis and Thornhill (2009, p. 259)

research studies that make use of documentary secondary data often do so as part of a within-company action research project or a case study of a particular organisation, which aligns well with the thesis research strategy. Authors also claim (2009, p. 269) one major benefit of using secondary data is that it can offer comparative and contextual information, which allows a researcher to take actions with greater flexibility by placing its own findings in a more general context or triangulating the results. The other point is that unlike self-gathered data, secondary data provides a permanent and accessible source of information, making it more accessible for public examination, unlike self-gathered data, thereby increasing the exposure of the study's results to the public.

While working with secondary data it is of crucial importance to carefully evaluate the data sources. Eventhought many authors suggest a variety of validity and reliability criteria to evaluate potential secondary data, Saunders (2009) incorporated the evaluation process into three stages as presented in Figure 12. Although many of the secondary data sets available from governments and companies official data archives are of higher quality than self-gathered, but this is not always the case (Saunders, 2009, p. 272). For the thesis research it was of high importance to evaluate the suitability of secondary sources in terms of their capacity to address the research questions and achieve the study's goals. Alongside, the accessibility to secondary sources may also be hampered by restrictions on who is allowed access to any kind of close or sensitive information held by organizations.

1. Examine the overall data's suitability to the goals and research questions
- measurement validity
- coverage including unmeasured variables

2. Assess precise suitability of data required for analysis to answer the research questions and meet the goals

- Validity
- Reliability
- Measurement bias

3. Judge whether to use data based on assessment of costs and benefits compared to any alternative sources

There is no sense in moving forward if the data is determined to be unsuitable

Figure 12 Evaluating potential secondary data sources. Modified from Saunders et al., (2009, Chapter 8)

The secondary data evaluation process starts with measurement validity. This part is of high importance, since invalid information coming from secondary data sources that doesn't match research questions or the objectives of the study would lead to incorrect answers. Researches don't provide clear solutions to this problem. Measurement invalidity problems require evaluation and decision-making, often based on previous research on similar secondary data sets and contexts. (Saunders, 2009, Chapter 8). The reliability and validity of the secondary data are highly dependent on the data source. This is how Saunders, Lewis & Thornhill (2009) assert that the reliability and trustworthiness of secondary data from established, reputable organizations is largely reliant on the credibility of their information. As well as for the present research were used official secondary sources from case companies with strong market positions and a long history, ensuring the credibility of their data.

5.3   Data analysis

Present thesis explores which SDGs are the most followed by case manufacturing companies and seeks to outline common and deviate patterns of their relative actions. Trochim (1989), George and Bennett (2004, Chapter 9), Yin (2014, Chapter 5) claim pattern-matching logic is a useful technique for case study analysis, comparing empirically based patterns with predicted ones made before data collection. If the empirical and predicted patterns appear similar, the results can strengthen the internal validity of a case study. Data analysis is performed by abductive approach to estimate which themes or issues to follow up and concentrate on to identify frequent features and if the empirical and predicted patterns align, the results can enhance the internal validity of a case study (Yin, 2014, p. 143).

To characterize the phenomena and draw new conclusions from the data, a qualitative content analysis is selected as an appropriate analysis method (Hsieh & Shannon, 2005, p. 4), while focusing on conventional approach that involved coding categories of data which were derived directly from raw data (Shava et al., 2021, p. 554). Main sources of raw data for present research are published textual reports therefore, according to Shava and Hleza (2021, p. 557), applied method is an unobtrusive, as there were no unwanted interaction effects occurred between case companies and researcher. A prerequisite for successful content analysis is that data can be reduced to concepts that describe the research phenomenon y creating categories, concepts, a model, conceptual system, or conceptual map (Kääriäinen, 2014).

6   Research process

The aim of the present multiple-case study was to investigate the endeavors of manufacturing businesses in achieving the SDGs. Both qualitative and quantitative data was obtained from company's annual reports as they are the most relevant in solving the discussed problem in the thesis. The overall research process was created based on multiple-case study procedure offered by Yin (2014, Chapter 2) as illustrated in Figure 13.

In the beginning, four primary research questions were posed:

1. What SDGs case companies strike for?

2. What actions are being taken towards meeting the reported SDGs?

3. What is the efficacy from case companies' actions in addressing the reported SDGs?

4.   How do their SDGs enhances vary in country context?

The first research question was divided into two sub-questions in order to come up with proper definition:

a. Do addressed SDG's differ among case companies?

b. How do case companies engage with stakeholders on sustainability issues?
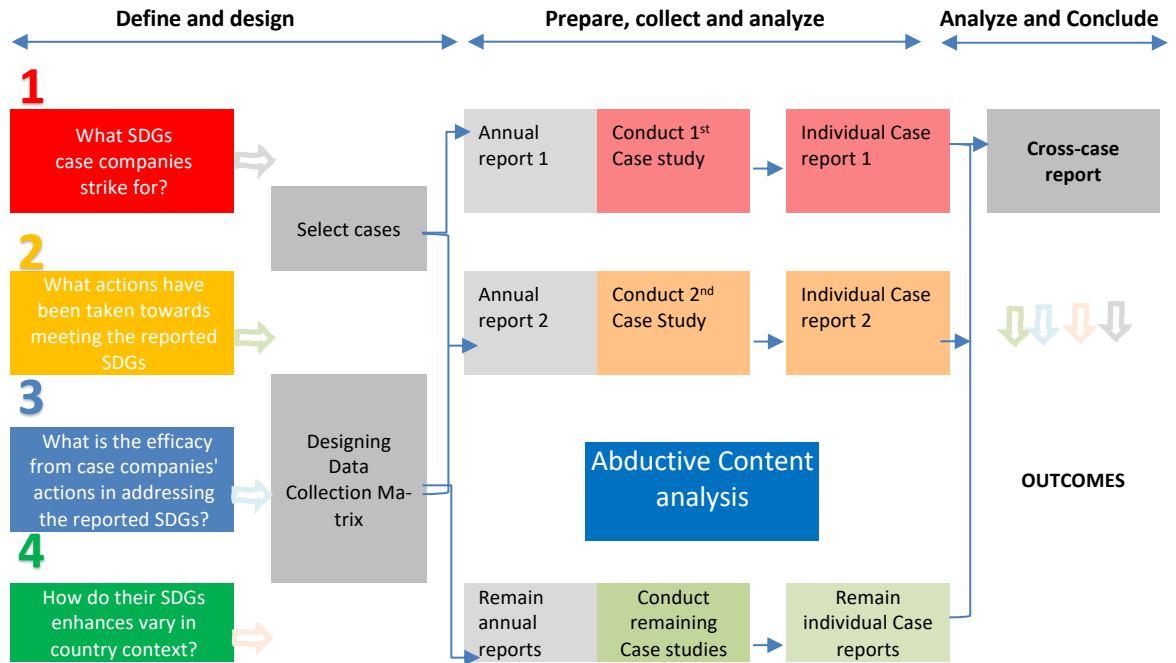
Figure 13 Overall research process of the thesis. Includes key research questions, sources of qualitative data, data collection, analysis and outcomes.

The research process started by selecting case study companies and studying their brief background to obtain more comprehensive view and validate their belonging to related industrial field. Simultaneously was designed a Data Collection Matrix which aimed to organize, and structure required raw information obtained from case companies reports that develop an answers to research questions.

An abductive content analysis included study of each company's report consisting of general structural analysis , highlighting their sustainability goals which play an important role in its business strategy and the actions taken towards meeting them, as well as the indicators claimed by case companies to assess their achievement. Answers on the first two research questions were obtained due to development of individual case reports accomplish each case company. Remain questions were revealed in further cross-case report of results section.

6.1   Data collection

Raw data were collected according to the scheduled plan 15.06.2023 – 3.09.2023 through ana-
lyzing of annual and sustainability reports for FY2022 and FY 2023 of six case companies. As well
as addressing to their official web sites to obtain the general overview, and business scale. To
organize information more carefully and focus on data relevant to research questions, prelimi-
nary, was created a Data Collection Matrix in Excel program which played a key role in overall
collecting and analysis processes. Data matrix included two parts: data collection matrix and cod-
ing (Appendix 1, Appendix 2). The first part reflected both qualitative and quantitative outcomes
obtained from analyzed reports, and summary of calculated coding resulted from the second part.

The data collection started by obtaining a general overview of analyzed companies. Names of the
companies were replaced by numeric order: 1, 2… etc. Therefore, Oxford Company was linked
with code number 1, DiscoverIE with code number 2, Shimadzu with code number 3, Hitachi -
code number 4, Danaher company - code number 5 and Bruker with code number 6. Additionally,
companies were grouped by country region with intent to outline the cultural aspects of each
group during the study (Figure 14). The year of foundation, the operating area, the number of
employees, and the net annual turnover were all taken into account to confirm a lengthy history,
steady market position, company scale, and the relativeness of operating industries.

Group	Case Company code number	Found, year	Operating field	Number of employees	Net Annual turnover 2022, $mln
Group 1. UK	1	1959	Technology	1 878	38.6
	2	1986	Technology hardware	4 886	25.2
Group 2. Japan	3	1875	Technology hardware	13 200	384.2
	4	1910	Industrial conglomerate	397 732	91 355
Group 3. US	5	1984	Industrial conglomerate	81 000	6 430
	6	1960	Scientific test equipment	7 400	2 418

Figure 14 Case-companies coding and grouping

Every case company has been operating for decades already and is identified as large interna-
tional enterprise with huge multi-oriented production base, human capacities, and net yearly rev-
enue. Evidently, they established a strong presence in mentioned industries and have a global

reach. An extensive manufacturing capability allows to produce a wide range of products that cater to diverse markets. With substantial human capacities, businesses are able to employ a large workforce and effectively manage running operations. Furthermore, remarkable net annual turnovers demonstrate the financial strength and market stability of analyzed companies.

All studied organizations are large-scale, have a long history, operate globally through their subsidiaries and branch corporations, and compete with one another in nearby areas. Therefore, the actual choice of case companies was made due to their significant presence and influence in the industry through a wide range of innovative technologies. The diverse and innovative product portfolios include solutions for renewable energy, sustainable transportation, efficient waste management, and access to clean water and sanitation. By focusing on these crucial aspects of modern life, case companies are not only driving economic growth but also making substantial contributions towards achieving the 17 Sustainable Development Goals (SDGs) set by the United Nations.

Further, as the first step of content analysis were highlighted the general data from the reports consisted of its type, period, number of pages, frameworks and supported global communities to perform a structural analysis of the reports as illustrated in Table 1.

Table 1: General overview of case companies' reports

Code n	Type of report	Period	Total pages	SD pages	Frameworks	Membership
1	Annual & Financial statement	FY 2022	212	20	CSRD, TCFD	
2	Annual	FY 2023	228	36	CSRD, TCFD	
3	Integrated	FY 2022	110	45	Internal Disclosure policy	UNGC
4	Sustainability	FY 2022	-	194	GRI, SABS, SICS, TCFD	
5	Sustainability	FY 2022	-	96	GRI	UNGC
6	Sustainability	FY 2023	-	22	GRI, SABS	

Additionally, to identify the general focus of all business activities performed and reported by the case companies on the way to meet relevant SDGs, in the reports were outlined the declared SD strategies of case companies, which were included into individual case companies reports.

The further data collection required a deeper look into the reports' context in order to identify the Sustainable Development Goals that companies claimed to meet along with taken actions and introduced programs towards the SDG's achievement, together with assessment indicators and interaction with stakeholders on their way. The relevant textual data of each case company were entered into the rows of the coding part with seven columns indicating all SDGs going from the first till the last 17th, actions, indicators reported at the SDGs level, programs and initiatives taken by each of case company referred to relevant SDGs, and interaction with stakeholders. To recognize relationships and patterns in the data during the analysis stage later were included code, category and cluster tables. The overall Data Collection Matrix is presented in Appendix 1. However, the applied template is as following in Table 2.

Table 2: Applied coding template for entering the data

SDG	Actions	Code	Category	Cluster	Indicators	Programs & initiatives	Stakeholders
1 NO POVERTY	Company code number 1						
	1 – 1.1				FY 2022: FY 2021:		
	1 – 1.2						
	Company code number 2						
	1 – 2.1				FY 2022:		
	1 – 2.2				FY 2022:		
	Company code number 3 …						
	1 – 3.1				FY 2022: FY 2023:		
2 NO HUNGER	Company code number 1						
	2 – 1.1				FY 2022:		
	Company code number 2						
	2 – 2.1				FY 2022:		
….	…						

In order to clearly correlate each of the reported actions of the analyzed company with a specific sustainable development goal being covered, was used encoding list numbering where the first number stood for the relevant SDG, the second - for the company code number and the third for the serial number of action towards current SDG. Following this logic, the example of encoding number 1 – 1.1 should be read as the Case company under the code number 1 took its first action towards the SDG 1 - No hunger.

To evaluate the effectiveness of actions taken by case companies as well as their compliance with the principles of sustainable development and the level of risk associated with the environmental, social, and governance aspects of their activities, the research was directed at Sustainalytics

official ESG Risk rating database. The obtained data for each case company were summarized as presented in Table 3.

Table 3: Case companies' ESG Risk ratings

Company code n.	Industry group	Exposure	Manage-ment	ESG Risk rating	Risk level
1	Technology Hardware	Low	Average	13.0	Low
2	Technology Hardware	Low	Strong	11.6	Low
3	Technology Hardware	Low	Average	12.4	Low
4	Industrial Conglomerates	High	Strong	30.6	High
5	Pharmaceuticals	Low	Strong	11.9	Low
6	Pharmaceuticals	Low	Average	20.7	Medium

Note. Modified by author from Sustainanalytics.com

The summary contained information referred to each company code number and related to its industry group, exposure and management level. Finally presented a calculated ESG Risk rating with transcript of its level.

6.2   Data analysis

Raw data were evaluated applying a conventional content analysis while focusing on the research questions, following the steps suggested by Hsieh & Shannon (2005, pp. 4–6). The overall data analysis process was performed as presented in Figure 15.
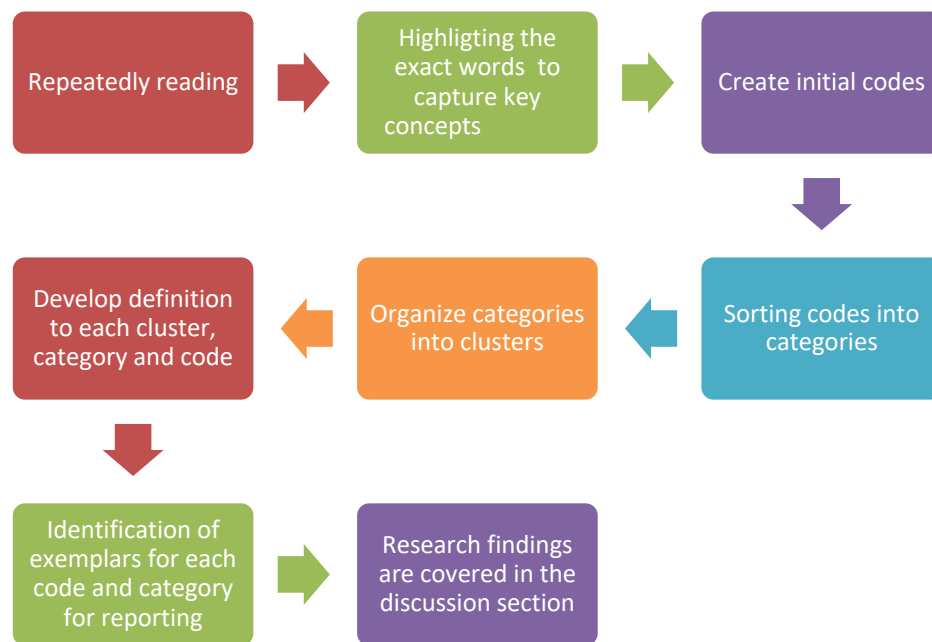
Figure 15 Applied steps for conventional content analysis. Modified from Hsieh & Shannon (2005, pp. 4–6)

To establish immersion and a sense of entirety, analysis started with repeatedly reading of provided reports in prescribed order defined by the case company code number. To maintain focus on the primary research questions and objectives, the analysis deliberately excluded sections containing annual financial statements, as these components could potentially introduce extraneous variables and distract from the core investigation.

Throughout the report reading, key terms and definitions pertaining to actions associated with related SDGs were highlighted, initially analyzed and subsequently developed into codes. Afterwards, was carried out the categorization process including sorting created codes into categories based on their interrelationship and linkage and then grouping them into meaningful clusters. The greater the number of formulated clusters the more effectively codes will be accommodated which provide a broader categorization while maintaining meaningful distinctions within the coded data (Hsieh & Shannon, 2005, p. 4).

Utilization of the above categorization methodology facilitated the systematic organization of codes, enabling a comprehensive understanding of their relationships. Such approach provided the ability to streamline code exploration and analysis, thereby enhancing their capacity to identify patterns and extract valuable insights from the data.

Once a categorization table was developed (Table 4), explicit definitions were formulated only for each cluster and category, as the code names themselves were already notably specific and

indicative of their respective content. Overall were generated fifty-three codes related to twelve categories and grouped into four clusters: Product, People, Governance and Planet. Each cluster was formulated applying a Triple Bottom Line (TBL) concept, keeping in mind that present sustainability framework assist to track company's social, environment, and economic impact resulted from its activities (Elkington, 2018) managed by established in a company set of rules, practices, and processes (Conmy, n.d.). Exemplars for each code and category were found in the raw data of reports in the form of general citations and were included into Results of analysis section.

Depending on the purpose of the study, researchers might decide to identify the relationship between categories and subcategories further based on their concurrence, antecedents, or consequences (Hsieh & Shannon, 2005, p. 4). Since for the study was essential to get knowledge not only about the content of efforts directed towards achieving the SDGs, but also the quantity of that efforts, relative indicators and programs to obtain more holistic picture of the research topic. Therefore, was made a quantification for number of followed SDGs, number of initiated actions, related indicators and programs as well as the overall summary of codes and categories to identify its weight and, consequently, main focus spheres of case companies (Appendix 2).

Finally, to estimate the effectiveness of case companies enhances on their way to comply SDGs, obtained calculation results were correlated with ESG risk ratios corresponding to each case company. The next Results chapter contains a presentation of all data analysis outcomes that were finally obtained.

Table 4: Categorization table with developed codes, categories and clusters with explicit definitions

n	Code	Category	Cluster
1	Food industry	**1.Industry oriented products** products intended for various industries	**1.Product** Contribution to SDGs through product utility and value
2	Medical industry		
3	Marine industry		
4	Industrial manufacturing		
5	Aircraft industry		
6	Machinery industry		
7	Mass transport solutions		
8	Water use reduction	**2.Environment oriented products** products aimed to solve environmental and health issues	
9	Eco-products		
10	Renewable energy		
11	Analytical & screening instruments		
12	Safe drinking water	**3.Health oriented products** products for promoting healthy way of living	
13	Supporting health		
14	Water quality		
15	Digital solutions	**4.Science development** innovative products contributing to RnD field	
16	Life saving innovation		
17	Scientific research		
18	Charity & Voluntarism	**5.Social** actions that provide social utility and benefits	**2.People** Contribution to human care development
19	HR strategy		
20	Education		
21	Community engagement		
22	DEI		
23	Mental health	**6.Health & Wellbeing** actions directed to maintain human's health and wellbeing	
24	Physical health		
25	Working environment		
26	Work & Home balance		
27	Risk management	**7.Management** Actions resulted from management and control systems	**3.Governance** System of management practices and activities directed to enhance SDGs
28	Complying standards		
29	Code of Conduct & Ethics		
30	Health & safety management system		
31	Information security		
32	Reporing (TCFD, SECR)		
33	Business strategy		
34	Quality control		
35	Digital innovation	**8.Investment** Types of investments aimed to assist in complying SDGs	
36	Outside-in innovation		
37	RnD		
38	Value chain management	**9.Stakeholders** Interaction activities within interested parties for SDGs	
39	Partnership		
40	Clean & safe water	**10.Environmental impact** Actions taken to minimize environmental impact by focusing on essential issues	**4.Planet** Contribution to saving the Planet through activities aiming to resolve environmental challenges
41	Zero waste		
42	Emissions		
43	Onsite optimization		
44	Circular manufacturing		
45	Environmental concervation		
46	Urban development		
47	Water use	**11.Resource control** Control actions over the consumed natural resources	
48	Energy control		
49	Minerals		
50	Green areas		
51	Plastic		
52	Complying legislations	**12.Environmental management** Safeguarding nature by complying world standards and regulations	
53	Standards & Guidelines		

7   Results

The research results consist of the general overview of each case company together with out-
comes from initial structural analysis of annual reports and cumulative cross-case report with key
ideas generated from individual case reports. Evaluation of the obtained results was performed
by transferring the coded data into numeric and summarizing results to receive a weight of each
coded category.

7.1   Structural analysis

In order to answer initial research questions annual reports for FY 2022 and FY 2023 of 6 selected
manufacturing companies from US, UK and Japan have been analyzed totaling 413 pages related
to their sustainable performance. Initial structural analysis disclosures the type of presented re-
ports with 3 out of six sustainability reports, whereas the rest included sustainability part in their
annual and integrated reports as presented in Table 1 (page 44). At the top of the list with 194
number of pages dedicated to sustainability stood Japanese company Hitachi (Company code
number 4). Next follows the US Danaher company (Company code number 5) with 96 pages, UK
companies Oxford (Company code number 1), DiscoverIE (Company code number 2), and US
Bruker (Company code number 6) left far behind with 20, 30 and 22 pages respectively.

Regarding reporting frameworks, it was observed that Japanese and US companies exclusively
adhered to the Global Reporting Initiative (GRI) standards when formulating their sustainability
and integrated reports. At the same time, Japanese Shimadzu was the one who applied internal
Disclosure policy. Half out of six companies excluding Bruker, Danaher and Shimadzu included
Task Force on Climate Related Financial Disclosures (TCFD) created by Financial Stability Board to
improve and increase reporting on climate-related financial information. According to The Finan-
cial Stability Board (2023) this framework strives to describe both board oversight of and man-
agement's role in assessment and management of climate-related risks and opportunities. Addi-
tionally, Hitachi and Bruker applied other reporting standards as Sustainability Accounting Stand-
ards Board (SABS), Standards for the Electrical & Electronic Equipment industry and Sustainable
Industry Classification System (SICS). Finally, only two companies Shimadzu and Danaher became
a signatory to the United Nations Global Compact (UNGC).

7.2   Individual case reports

Each individual case report includes case company' background and results of reporting information related to SD strategy followed by each case company on their way to achieve the Sustainable Development Goals by applying number of related actions resulted from introduced initiatives and programs, assessment indicators, and interconnection with stakeholders. This approach was aimed to receive an answers to the following research questions:

1.   What SDGs case companies strike for?

2.   What actions have been taken towards meeting the reported SDGs?

3.   How do case companies engage with stakeholders on sustainability issues?

Case company 1 individual report

Case company 1 is a UK based manufacturing company positions itself as a leading provider of high technology products and systems for industry and research. A product range is presented by analytical and laboratory equipment, microanalysis, scanning and cryogenic systems, spectrometers, superconducting magnets and wire, UHV systems and X-ray tubes and integrated sources. The company is headquartered in Abingdon, Oxfordshire, England, with sites in the United Kingdom, United States, Europe, and Asia Highly motivated on enabling a greener economy, increased connectivity, improved health and leaps in scientific understanding.

Case company introduced an annual report for FY 2022 of total 212 pages including 20 pages dedicated to sustainability and TFCD reporting according to CSRD directive. The company claimed to apply four pillars driving its operating model and relating to sustainable development and business strategy including: Market Intimacy, Innovation & Product Development, Operational Excellence and Customer Service & Support. According to the results for FY 2022 the company has been addressing 8 out of 17 SDGs (Table 5) with total number of activities 49, indicators 17 and 9 programs.

Summary of reported actions pointed out key SDGs the company has been focusing on. Thus equal 12 out of 49 number of activities were addressed the Good health & wellbeing (SDG 3) and Peace justice and strong institutions (SDG 16) UN goals, meanwhile Decent work and economic growth (SDG 8) with the largest number of introduced programs and Affordable and clean energy (SDG 7) with the highest indicators were also prioritized over the rest.

Table 5: Summary of SD results for case company 1

SDGs by UN	Actions	Indicators	Programs
1 NO POVERTY			
2 NO HUNGER			
3 GOOD HEALTH & WELLBEING	12	3	3
4 QUALITY EDUCATION			
5 GENDER EQUILITY	3	3	1
6 CLEAN WATER AND SANITATION	3	1	0
7 AFFORDABLE AND CLEAN ENERGY	8	6	0
8 DECENT WORK AND ECONOMIC GROWTH	10	2	5
9 INDUSTRY, INNOVATION AND INFRASTUCTURE	1	0	0
10 REDUCED INEQUALITIES			
11 SUSTAINABLE CITIES AND COMMUNITIES			
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	1	0	0
13 CLIMATE ACTION			
14 LIFE BELOW WATER			
15 LIFE ON LAND			
16 PEACE, JUSTICE AND STRONG INSTITUTIONS	11	2	0
17 PARTNERSHIPS FOR THE GOALS			
total	49	17	9

Categorization results (Appendix 2) discovered that majority of actions were towards contribution to People and Governance development (23 and 16 actions respectively) that stand for Peace, justice and strong institutions (SDG 16) with 13 and 16 actions considerably, by strengthening a management system with implementation and guiding the Code conduct and Ethics.

> *Conducting our business in ethical manner is vital to our ongoing success.*
> *Introduction of Anti-Slavery and Human Trafficking Statement.*
> *Implementation of Global policies: Code of Business Conduct and Ethics, Global Anti-Bribery and Anti-Corruption Policy, Global Human Rights Policy.*

The role of stakeholders is also valuable and regulated by developed policies. Thus, adoption an approved vendor list for or the supply of continuous use production materials, which is managed by Group Strategic Sourcing and enhances the reduction of direct suppliers to the most responsible and reliable ones.

> *Over the last year we have achieved a 15% reduction in our direct supplier base; a reduction of 55% since we started this strategy.*

Additionally case company delivered an internal compliance with export control and customs to confirm a compliance with UK, US, EU and UN sanctions by attracting external consultants.

> *We also introduced a Group Customs Policy to document our specific expectations in export control and customs.*

Adopted mental health (6 actions) and physical health activities (2 actions) mostly contributed to health & wellbeing category that correlates to Good health & wellbeing (SDG 3) and reflected in various programs as Mental Health First Aiders program, Mental health initiatives which assist to keep work and home balance.

Development of Unmind, a workplace mental health application.

Empower people with long-term mental health issues or a disability to thrive in work.

Flexible working mode: secondments, career breaks, apprenticeships and support towards external qualifications.

As well as the company was striving to provide safe workplaces and working environment also by committing the principles of Diversity, equality and inclusion, or DEI (2 actions) and supporting the Pride movements together with restricting a US healthcare package to cover domestic partners and gender reassignment.

Introduction of "Zero" program aimed to decrease the number of accidents within the Group.

Use of our employee engagement survey, to gather feedback from our teams about how they feel we are doing with regard to equality, diversity and inclusion.

This approach resulted a 30% decrease of accidents in ongoing business over the last five years. Charity and voluntarism programs were also presented by 2 actions as a part of social activities aimed to contribute to society.

Encourage employees to join volunteering schemes, charity outreach GoGreen teams program.

With cooperation of nearby businesses, colleges, and post-graduate institutions, the company's HR strategy and community involvement programs (6 and 1 action) promoted Decent work and economic growth (SDG 8). Case company included its own talent management programs, career mapping, and skill academy to improve employee's skill and competency levels and speed up apprenticeships with career promotions.

We also engage in externally run schemes offering internships and career opportunities in our diversity and inclusion focus areas.

Additionally, SDG 8 was determined by contribution into the Planet by complying local UK and EU environmental legislations presented by directives such as Waste Electronic and Electrical Equipment (WEEE), Restriction on use of certain Hazardous Substances (RoHS) regulations, Authorization of Chemicals (REACH).

The dominant input into the Planet was going through Affordable and clean energy (SDG 7) which implied recourse control (total 3 actions in category) and decrease environmental impact (total 4 activities in category) by running energy control measures as maintaining supply of 100% of renewable electricity and searching ways to reduce fossil fuel consumption to minimize carbon footprint, as well as using general waste to generate electricity. All five out of declared actions accompanied with list of indicators over the 2021 and 2022 period related to level of energy consumption and type of emissions (Scope 1, 2 and 3) together with included reports according to TFCD and Streamlined Energy and Carbon Reporting (SECR) frameworks, which referred to Governance management policies of case company. The company also stated about evaluation its future efforts towards Net Zero in FY 2023 and addressing extra Climate action (SDG 13).

Case company 2 individual report

Case company 2 represents an international group of businesses with a London based headquarter, that designs and manufactures customized electronic components for industrial applications. The corporation is striving to develop cutting-edge electronics that serve to better the planet and people's lives, according to one of its primary proclaiming missions.

Case company has presented an annual report for FY 2023 period with 36 of sustainability pages out of overall 228 pages. The company's SD strategy includes three pillars (Planet, People, Products) that correlate to three aspects of ESG. Report was performed according to CSRD directive for non-EU countries.

Total were reported five SD goals including SDG 3, SDG 7, SDG 9, SDG 11 and SDG 13 ((Table 6).

). Overall number of activities 41, indicators 15 and programs 6. The prevail number of undertaken activities (19 and 11) relates to Climate action (SDG 13) and Good health and wellbeing (SDG 3). Whereas the other goals had been supported almost four times less (Table 6).

Table 6: Summary of SD results for case company 2

SDGs by UN	Actions	Indicators	Programs
1 NO POVERTY			
2 NO HUNGER			
3 GOOD HEALTH & WELLBEING	11	7	3
4 QUALITY EDUCATION			
5 GENDER EQUILITY			
6 CLEAN WATER AND SANITATION			
7 AFFORDABLE AND CLEAN ENERGY	3	1	0
8 DECENT WORK AND ECONOMIC GROWTH			
9 INDUSTRY, INNOVATION AND INFRASTUCTURE	4	1	0
10 REDUCED INEQUALITIES			
11 SUSTAINABLE CITIES AND COMMUNITIES	4	0	0
12 RESPONSIBLE CONSUMPTION AND PRODUCTION			
13 CLIMATE ACTION	19	6	3
14 LIFE BELOW WATER			
15 LIFE ON LAND			
16 PEACE, JUSTICE AND STRONG INSTITUTIONS			
17 PARTNERSHIPS FOR THE GOALS			
total	41	15	6

Case company strived to contribute to SDG 13 through three main focuses on Product, Planet and Governance. With creation of product value and utility by designing and producing Eco-products company promoted a positive environmental impact.

> *We design products that are more energy efficient and less harmful to the environment than the ones they replace.*

> *Our focus is on products that reduce carbon emissions, aiding electrification, automation and improving efficiency, assists in combating climate change.*

Tracing its environmental impact milestones on Planet revealed in setting a Net-zero plans divided in two future decades as well as recourse and energy control actions and sharing key metrics of carbon emissions.

> *We play our part in tackling climate change by reducing carbon emissions.*

> *Our net zero plans set out our commitment to reduce emissions to net zero within our operations (Scope 1 & 2) by 2030, and within our value chain (Scope 3) by 2040.*

> *FY 2022: Energy consumption during 2022 was 4% lower.*

Climate actions were also conditioned by environmental management enhances complying local legislations as WEEE, RoHS, Producer Responsibility Obligations (Packaging Waste) Regulations

and Waste Batteries and Accumulators Regulations and ISO 14001 (Environmental Management System) accreditation of sites according to Group-wide supplier audit program.

The sustainability governance framework includes the general governance structure consisting of a board with sustainability, audit and risk committees divided into related departments and responsible for development and implementation of policies such as Anti-bribery and corruption, diversity, Code of conduct & Ethics, Supplier Code of Conduct, Conflict mineral, Environmental, Human rights and Whistleblowing policies.

Product, People and Governance pillars also stood behind Good health & wellbeing (SDG 3). Production of components for medical industry and analytical screening instruments for environment monitoring promote well-being and health care.

> *We design and make products that go into medical devices and systems, such as ultrasound machines and defibrillators.*

> *The Group's sensing products are used in environmental management systems, such as indoor temperature monitoring and water treatment plants.*

Focus on the social aspects reflected by running HR strategies, creating safe and comfortable working environment with education and promotion perspectives which also aligned with SDG 11.

> *It is our responsibility to ensure that our employees operate in a safe and healthy working environment.*

> *We have flexible and hybrid working which helps our employees achieve a better work-life balance.*

> *Creation of jobs and contribute to the social and economic well-being of the communities through tax revenues, donations and volunteering.*

Diversity and inclusion claimed to be an essential part of corporate culture and reflected in company Code of Conduct and Ethics.

> *We believe that diversity is a strength and that everyone should be treated with respect, dignity and fairness.*

The company also engaged with local Community Foundation for Surrey and other employee volunteering opportunities.

We value community engagement and strive to be an active participant in the local communities where we operate.

Complying standards of ISO 45001 (occupational Health and Safety Management System), ISO 14001 (Environmental management system) and ISO 9001 (Quality management) were also outlined as vital results of management policy.

FY 2022: six sites achieved ISO 45001 accreditation.

FY 2021: 92% of group products manufactured under ISO 9001

Contribution through product value also aligned with all other declared SDGs. Thus, case company produces components for environmental control and industry-oriented businesses that addressed Affordable and clean energy (SDG 7) and Industry innovation and infrastructure (SDG 9).

We provide transformers, switches, and sensors for wind and solar systems, supporting the generation and distribution of renewable and clean energy.

We supply connectivity solutions to infrastructure that underpins the 'Internet of Things' (IoT), enables industrial automation and digitalisation.

Additionally, an input to SDG 7 was reported the similar to case company 1 in energy and resource control actions.

Case company 3 individual report

Case company 3 is a Japanese manufacturer based in Kioto, of a wide range of technology hardware including laboratory equipment, measuring instruments, analytical and medical equipment. Following the goal to create a bright future based on a two-prolonged approach of solving challenges in society through business operations and engaging in responsible activities in harmony with Earth, society and mankind (Shimadzu, 2022).

Case company released a 110-page integrated report for FY 2022 according to company's internal Disclosure Policy and dedicated 45 pages to sustainability topic. The company outlined its core idea as contribution into society through science and technology interconnected with company's corporate philosophy that based on seeing the world and business through VUCA concept.

Given the difficulty of predicting the future of society and business today due to VUCA (volatility, uncertainty, complexity and ambiguity) for company to continue

solving challenges in the society it will be essential to constantly generate new value and innovation.

The sustainability chapter was divided into Environmental, Social and Governance reports. Particular emphasis was placed on the critical role that product production plays in addressing the problems of modern society considering VUCA changes in external conditions. Evidently, case company 3 enhanced to cover 12 out of 17 SDGs by directing efforts almost to all vital issues facing the Globe brining totally 46 actions, 20 indicators and 15 related programs (Table 7).

Table 7: Summary of SD results for case company 3

SDGs by UN	Actions	Indicators	Programs
1 NO POVERTY			
2 NO HUNGER	3	0	1
3 GOOD HEALTH & WELLBEING	11	2	4
4 QUALITY EDUCATION	1	1	1
5 GENDER EQUILITY			
6 CLEAN WATER AND SANITATION	2	1	1
7 AFFORDABLE AND CLEAN ENERGY	1	1	0
8 DECENT WORK AND ECONOMIC GROWTH			
9 INDUSTRY, INNOVATION AND INFRASTUCTURE	3	2	0
10 REDUCED INEQUALITIES			
11 SUSTAINABLE CITIES AND COMMUNITIES	1	1	0
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	1	0	0
13 CLIMATE ACTION	15	11	6
14 LIFE BELOW WATER	1	0	0
15 LIFE ON LAND	3	2	2
16 PEACE, JUSTICE AND STRONG INSTITUTIONS			
17 PARTNERSHIPS FOR THE GOALS	4	0	0
total	*46*	*20*	*15*

The dominant number of actions 15 and 11 referred to Climate action (SDG 13) and Good health & wellbeing (SDG 3) accordingly. Measures done in support of SDG 13 are in line with Planet, Product and Governance clusters which are comparable to those of the previous case study. Planet actions include conserving of energy and water, maintaining green areas, achieving a Net zero emission target of 2050 and transition of business to renewable energy by optimization of sites.

Achieving a carbon-free society by installing solar power equipment and other ongoing through measures to reduce energy usage and utilize renewable energies.

We are committed to reducing water usage such as by watering green areas with rainwater and installing water efficient fixtures.

In April 2022 a Group company set up a target of achieving a net-zero CO$_2$ emissions from business activities.

FY 2021: Emissions decreased by 47.8% due to transition to renewable energy sources.

Case company stated about its support and endorsement of recommendations of the TCFD reporting, however this part had not been yet developed and presented into the integrated report, but future intentions were tracked.

Will proactively disclose information on both the risks and opportunities that climate change poses to our business from the perspective of strategy, risk management, and corporate governance.

An input with Product actions represented by design and production of specialized industrial, science and environment-oriented equipment that contribute also to all other claimed SDGs.

We provide instruments and services that help to ensure compliance with environmental regulations as well as support for alternatives energies.

Thereby, referring to SDG 3 a case company provides solutions and instruments to healthcare and medical field, to SDG 2 – instruments for monitoring and analyzing food components ensure its safety, analytical and screening instruments are aimed to check water quality as per the SDG 6. For Industry, innovation and infrastructure (SDG 9) case company is involved into providing the equipment for industrial purposes that contribute to resilient infrastructure, development of aircraft technologies. This core idea also stands behind Sustainable cities and commodities (SDG 11)

We contribute to industrial development by supply high-quality and high-performance key components, parts and systems that integrate advanced technologies with sophisticated precision machining technologies.

Social valued activities in the company are mainly directed to Good health and wellbeing (SDG 3) and Quality education (SDG 4). They are represented in investing in human resources by effective health management system that is directed both inside and outside the organization.

The company's Social valued initiatives are primarily focused on achieving SDGs 4 and 3: Quality education and Good health and wellbeing. Their investment in human resources is exemplified by an efficient health management system that serves both internal and external stakeholders. The internal strategy includes number of programs and policies encouraging physical and mental

health, personal productivity and promotion of employees as well as cultivating corporate culture.

> *Beginning in FY 2020, we have been conducting unconscious bias workshops and holding Diversity days in effort to reform employee biases.*

> *Our aim is to incorporate D&I into behaviors of employees and the corporate culture so that employees and organizations engage in D&I practices as their own responsibility.*

External strategy addressed customer satisfaction by ensuring product safety and generation of joint value with customers managed by set Bias Policy for Product Safety.

> *We aim to fulfil our social responsibilities and earn customer's trust by providing them with safe products.*

> *We shall create new value by sincerely considering customer views and wishes.*

With management practices that created a Governance cluster, case company contributed to SDG 9 with investing in digital innovations and modern technologies, SDG 12 by quality control practices on entire manufacturing processes, SDG 13 with risk management considering two world scenarios of increase of global temperature, and SDG 17 by introducing supply management systems, encouraging close partnership with local governments, public research institutions, banks and organizations.

Case company 4 individual report

Case company 4 is defined by a manufacturing limited company as part of one of the world's largest industrial Japanese conglomerate, involved into design and production of high-tech equipment and systems, analytical and measuring instruments.

Case company reported its sustainability efforts for FY 2022 on 194 pages. Information was disclosured according to requirements of GRI, industry relevant disclosure standard as SABS,SICS and TCFD. Report was performed covering each aspect of ESG concept driving by idea of supporting people's quality of life with data and technology that foster a sustainable society (Hitachi Sustainability report, 2022, p.7).

Total were covered 13 SDGs supported by prevail number of 143 actions, 112 indicators and 89 running programs and initiatives over the last reporting period (Table 8).

Table 8: Summary of SD results for case company 4

SDGs by UN	Actions	Indicators	Programs
1 NO POVERTY			
2 NO HUNGER			
3 GOOD HEALTH & WELLBEING	22	20	32
4 QUALITY EDUCATION	13	9	8
5 GENDER EQUILITY	5	4	2
6 CLEAN WATER AND SANITATION	2	0	2
7 AFFORDABLE AND CLEAN ENERGY	6	3	1
8 DECENT WORK AND ECONOMIC GROWTH	17	13	9
9 INDUSTRY, INNOVATION AND INFRASTUCTURE	18	8	3
10 REDUCED INEQUALITIES	11	6	7
11 SUSTAINABLE CITIES AND COMMUNITIES	2	0	1
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	8	8	3
13 CLIMATE ACTION	14	14	6
14 LIFE BELOW WATER			
15 LIFE ON LAND			
16 PEACE, JUSTICE AND STRONG INSTITUTIONS	15	14	8
17 PARTNERSHIPS FOR THE GOALS	10	13	7
total	143	112	89

Overall, the SDG 3 topped the list of prioritized goals ranking the vast number of programs, actions and indicators, whereas SDGs 8 and 9 shared the second places with almost equal actions. Another relatively significant goals are 16, 13, 4 and 10 that had involved from 11 to 15 of related actions. Remained SDG's 17,12,11,7,6 and 5 have been covered to a lesser extent up to 10 actions inclusive.

Environmentally oriented actions supported by strong management policies and risk management procedures, which were included to Planet and Governance clusters, arose from company's environmental vision which aimed to resolve environmental issues and achieve both a higher quality of life and a sustainable society through its Social Innovation Business in collaborative creation with its stakeholders (Hitachi Sustainability report, 2022, p.31). Such approach contributed to sustainability goals 6,7,9,11,12,13,17 and mainly referred to categories environmental impact, control of resources, management and stakeholders.

> *Enhancing environmental governance and environmental management systems. FY 2021: Registered data from about 1,500 business sites in 67 countries in the Environmental Data Collection System (Eco-DS) to estimate environmental load.*

> *Achieving a decarbonized society and carbon neutrality throughout our value chain. FY 2021: Formulated a roadmap to achieving carbon neutrality at business sites (factories and offices) by fiscal 2030.*

> *Achieving a Resource Efficient Society by reduction of wastes, water usage, transition to circular economy. FY 2021: Reduction rate in water use per unit (Compared to FY2010): 36% (FY 2021 reduction target: 26%).*

> *Achieving a Harmonized Society with Nature by promoting initiatives to minimize impact on natural capital. FY 2021: Calculated positive impacts (e.g., benefits of forest conservation activities) and negative impacts due to business activities by using data from the Environmental Data Collection System (Eco-DS).*

Case company has been cooperating with World Intellectual Property Organization (WIPO) aimed at creating environmental value in terms of registration wind-generating technology that assisted in resolving climate change issues with WIPO Green, a platform for environmental technology transfer.

The importance of Product cluster activities and their input into above SDGs should not be underestimated as the case company has been designing and producing a large scale of environmentally oriented solutions and technologies as wind generations, energy-saving features, electrification, smart solutions for many products of medical, industrial and urban categories.

> *FY 2021: Promoted eco-designs for each product; Enhancing energy-saving features of servers and storage; Promoting electrification through electric powertrain systems; Developing smart data centers.*

Adaptation of social policies and practices together with development of management system refers to clusters People and Governance, stand for SDGs: 3,4,5,6,8,10,12 and 13. High weight of the efforts towards these goals were resulted from innovation strategy claiming to expand both outside-in and digital investments as well as R&D and effective utilization intellectual property (IT) and information security.

> *Accelerating outside-in innovation through startup investments. FY 2021: Launched a second fund and invested in a total of 17 startup companies.*

> *FY 2021: Hitachi Group R&D expenditure: 317.3 billion yen (R&D expenditure as a percentage of revenue: 3.1%).*

> *Global deployment of IP activities based on our IP strategy. FY 2021:Globally implemented an intellectual property strategy comprising three pillars: Competition, Collaboration, and IP for society.*

Strengthening information security management. FY 2021: Advanced the strengthening of information security governance worldwide, based on our rules for information security, established in compliance with the ISO/IEC 27001 standard, and furthermore enhanced with NIST SP 800-171 U.S. government standard.

Being involved into Global Human Capital management case company is engaged into implementation of growth strategy which, in term, has found its reflection in the number of adopted principles such us respecting of fundamental human rights, providing equal career advancement opportunities, ensuring occupational safety and health, strengthening recruitment and development of digital human capital, promotion of DEI, which together constituted Social and Health & Wellbeing categories.

We believe that respecting human rights is our duty as a global company, and essential to conducting business.

We aim to develop human capital that can contribute resolve social issues. In addition to on-site work-task instruction, we are expanding training programs globally across the Group to improve individual capabilities, skills, and specialties.

We are working to advance DEI with global and regional perspectives.

We believe that practicing work-life management will enrich employees' work and private lives, enhance professionalism, and build personal character resulting in both individual and organizational growth sustainably.

Our Health and Safety Policy is shared with Group companies worldwide as part of our efforts to create safe, secure, comfortable and healthy workplace that are accident-free.

In turn, these principles are formalized into official documents and policies as Code of Conduct and Ethics, Human Rights Policy, Group Health and Safety Policy and etc.

Case company 5 individual report

Case company 5 stands for US corporation involved into developing an innovating and leading-edge diagnostics tools, advancing life-serving research and instruments for protection a global food and water suppliers. Realization of company's mission is seen into both innovating products that improve lives and Planet and building the best team (Danaher, 2022).

A sustainability report was presented for the previous FY 2022 on 96 pages according to GRI frameworks and outlining top priority topics: innovation, team and environment that formulated a company's SD strategy based on 3 pillars: Product, People and Planet.

> *Sustainability strategy is to help generations of our stakeholders Realize Life's Potential by three pillars: Innovating products that improve lives and our planet, Building the best team, and Protecting our environment.*

Table 9 presents the quantitative findings of the reporting analysis, where ten out of 17 SDGs were addressed. Nonetheless, the majority of activities were focused on achieving SDGs 3 and 13, while SDGs 8 and 10 received equal support. Overall number of reported activities resulted 76, indicators 46 and programs 44.

Case company contribution to human care and development represented by cluster People and aligned with SDGs 3,4,5,8 and 10. The company's employees are said to be its most important strategic asset.

> *Our people are our most important strategic resource in the pursuit of innovative solutions to solve our customers' most complex challenges.*

The main strategy that focuses on human aspect is realized by talent recruitment processes (HR strategy code) that involved partnering with local universities and organizations and based on principals of diversity and inclusion (DEI code) which claimed to be key dimensions of overall company's engagement strategy.

> *We have invested in comprehensive talent acquisition capabilities across all levels of recruitment including robust branding, labor market analytics, advanced sourcing, leading technology and streamlined processes.*
>
> *A key element of this diverse talent attraction involves establishing and fostering partnerships with diverse professional organizations.*

Table 9: Summary of SD results for case company 5

SDGs by UN	Actions	Indicators	Programs
1 NO POVERTY			
2 NO HUNGER			
3 GOOD HEALTH & WELLBEING	19	6	12
4 QUALITY EDUCATION	5	2	2
5 GENDER EQUILITY	3	1	2
6 CLEAN WATER AND SANITATION	8	4	4
7 AFFORDABLE AND CLEAN ENERGY			
8 DECENT WORK AND ECONOMIC GROWTH	9	3	3
9 INDUSTRY, INNOVATION AND INFRASTUCTURE	7	4	1
10 REDUCED INEQUALITIES	9	11	5
11 SUSTAINABLE CITIES AND COMMUNITIES			
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	2	2	1
13 CLIMATE ACTION	13	9	13
14 LIFE BELOW WATER	1	1	1
15 LIFE ON LAND			
16 PEACE, JUSTICE AND STRONG INSTITUTIONS			
17 PARTNERSHIPS FOR THE GOALS			
total	*76*	*43*	*44*

A talent development was claimed the other key priority for case company and was also assigned to HR strategy and Education codes which included actions aimed to attract and keep new talents by introduced career growth programs, motivating and regarding policies, learning and development opportunities.

> *In cooperation with state universities we offer internships and leadership development programs in science, technology, engineering and math (STEM), operations, general management and human resources.*

Another significant input to the society was performed in frames of Charity and Voluntarism, and Community engagement codes definitions. Company has been striving to drive community engagement around the Globe by developing voluntaries programs at associate platforms, grants programs and donations to eligible organizations. Additionally, case company was in supporting associate resource group which includes diverse people by race, religion, orientation and gender, that had a close interconnection with providing a safe and comfort working environment.

> *Creation of a strong sense of belonging and realization of employees potential.*

The other cluster that resulted the greatest number of actions towards SDGs 3,6,9,12,14 was Product with company's innovative technologies which aimed to improve lives and the planet and advance an access to healthcare in developing markets. Thus, the main focus was set on medical industry-oriented products, which according to the coded data resulted dominantly 10 actions

(Appendix 2), as well as a set of activities directed to improve of access to healthcare in developing markets.

> *We provide a broad range of leading solutions that help healthcare systems and clinicians meet the needs of acutely and chronically ill patients.*

> *HemoCue helps to detect anemia with its lab-accurate hemoglobin point-of-care testing and enables clinicians to provide immediate corrective treatment to improve the health of young children, mothers and babies. FY 2021: Over 23 million HemoCue tests across at-risk communities in Africa, India and Latin America were shipped.*

Other health, marine and food industry-oriented instruments and technologies that were performed by environmental and applied solutions that have been actively involved into ensuring water quality and usage, managing the world's water data and decrease of environmental impact.

> *Our products and services play a vital role in improving the efficiency and sustainability of the water treatment process.*

> *Trojan ultraviolet (UV) treatment systems treat over 70 billion gallons of drinking water and wastewater every day.*

> *Aquatic Informatics' real-time data management and analytics platform enables water operators to make better decisions at any time and from any location.*

Global Planet issues covered in SDG 12 and SDG 13 were generally covered by onsite company's optimization that struggled to reduce environmental impact, resource and energy control, transition to circular economic and adhering relevant operating standards ISO 14001, ISO 45001 (Health and safety management), ISO 50001 (energy management) , guidelines and risk management programs.

> *Package optimization design reducing storage and transportation needs and ultimately reducing the environmental impact. FY 2021: Eliminated the need for 18,100 trucks on the road, 10,000 gallons of gasoline and 909,000 trucking miles—equivalent to two round trips to the moon—and saved 3.4 million pounds of CO_2.*

> *Adopting a system, Benchmark ESG, to collect and manage EHS information globally. FY 2021: Reduction of CO_2 over 25%*

FY 2021: reduced the percentage of non-hazardous/non-regulated waste sent to landfill from 43% in 2019 to 31% in 2021.

FY 2021: Number of sites adhering to EHS ISO Standards: ISO 14001- 56; ISO 45001 - 19; ISO 50001 - 5

The other related to Governance cluster actions were referred to SDGs 3,8, and 9 and resulted in adopting company's Code of Conduct and joining UN Global Compact.

FY 2021: We became a signatory of the UN Global Compact to demonstrate our commitment to the 10 principles of the UNGC on human rights, labor, environment and anti-corruption.

Followed a strategy to promote sustainability throughout the whole supply chain, case company had adopted Sustainable Supply Chain Policy, risk assessment and management program, including supplier risk assessments, Conflict Mineral Policies, Supplier Code of Conduct.

Case company 6 individual report

Another American manufacturer of scientific instruments for molecular and materials research, as well as for industrial and applied analysis, represented by case company 6. A corporation seeks to improve people's quality of lives by positioning itself as a worldwide innovation leader in the development and marketing of cutting-edge analytical technologies and solutions.

Case company disclosured related information in its sustainability report for FY 2023 on 22 pages with reference to GRI and SABS standards. The concept of the report was produced with consideration of SD strategy "Innovation driving Sustainability" carrying this idea through all factors of ESG content structure of the document. However, unlike the other companies under review, present company did not reflect the pursued SDGs in its report, but only highlighted its contribution to three sectors: Environmental, Social and Governance.

Nevertheless, to come up with comprehensive evaluation of the research topic, all reported actions were manually correlated to adequate SDGs by logic principal. The following Table 10 was resulted with overall 52 number of actions supported by 13 indicators and 18 programs.

Table 10: Summary of SD results for case company 6

SDGs by UN	Actions	Indicators	Programs
1 NO POVERTY			
2 NO HUNGER			
3 GOOD HEALTH & WELLBEING	11	2	5
4 QUALITY EDUCATION			
5 GENDER EQUILITY			
6 CLEAN WATER AND SANITATION	2	2	0
7 AFFORDABLE AND CLEAN ENERGY	3	0	1
8 DECENT WORK AND ECONOMIC GROWTH	8	3	1
9 INDUSTRY, INNOVATION AND INFRASTUCTURE	4	0	2
10 REDUCED INEQUALITIES	3	1	1
11 SUSTAINABLE CITIES AND COMMUNITIES			
12 RESPONSIBLE CONSUMPTION AND PRODUCTION			
13 CLIMATE ACTION	16	5	5
14 LIFE BELOW WATER	3	0	2
15 LIFE ON LAND	2	0	1
16 PEACE, JUSTICE AND STRONG INSTITUTIONS			
17 PARTNERSHIPS FOR THE GOALS			
total	*52*	*13*	*18*

Among the overall number of stated actions, the greatest of 23 (Appendix 2) referred to Product cluster and were forwarded towards SDGs 3,6,7,9,13,14. Thus by providing health-oriented technologies with total number of 9 actions (Appendix 2) company addressing real life environmental challenges.

> *Quantifying greenhouse gases in the atmosphere.*

> *Identifying harmful gas leakages.*

> *Combating cardiovascular disease.*

> *Advancing neurodegenerative disease research, based on recently announced a new global monitoring system for dementia by UN.*

An equal number of supported actions stood behind environment-oriented products assisted in identifying of hazardous and harmful materials in environmental areas complying to global standards such as ASTM D7575.

> *Our health depends on a healthy living environment. Our products are used to analyze the air we breathe, the food we eat, the water we drink and the environment we live in to identify any hazardous or harmful materials.*

Additionally, analytical and screening instruments (5 actions) struggled to solve issues related to recycle, waste management and Green energy.

We support scientists at companies across the world in understanding material properties, and our solutions are helping recycling become a greater tool for a more sustainable future.

We supply BEST Cleantech Technologies that make Green Energy even cleaner.

A wide range of affordable applications and testing instruments contributed to science development (3 number of actions) and industrial manufacturing (1 action).

Solutions enable forensic testing to analyze the authenticity and compliance of materials from artwork to pharmaceutical drugs thereby contributing to fighting criminal activities.

Planet cluster which addressed SDGs 6,9,13 and 15 included 8 actions in total with 5 assigned to environmental impact category, 2 for resource control and 1 for environmental management. Therefore, case company took care of water and energy consumption, waste generation and control, tracking CO_2 emissions (Scope 1 and Scope 2) and transmitting to circular manufacturing by introduction of End-to-life cycle program for manufactured products .

Once a product has reached its End-of-Life (EOL) date, we introduce a program to discontinue sales of the product to new customers.

Remained SDGs 8 and 10 were covered by People cluster and included 8 total actions (Appendix 2), 3 for Social category and 1 for Health & wellbeing. Social activities were represented by adopted HR strategy, driving under the motto "Our colleagues are our greatest asset" and included recruitment management system. Education category involved training and development programs on basis of private Development Academy. Charity and voluntarism activities were a part of community involvement and expressed by handling number of projects, creation of charity teams and donations practices.

Motivation to help others is put into action across our organization through events and programs intended to support the broader community in which we operate.

As well as the previous companies, case company 5 supported an idea of diversity and inclusion by making it a part of corporate culture and adaptation of related policies and programs in cooperation with societies and organizations.

> *We partner with The Society for Women in Natural Sciences (WiNS) to promote female empowerment at the company.*

Case company claimed to be committed to protect its employees and provide safe working environment by taking measures to increase safety awareness, holding up independent audits and reporting on accident rates.

The Governance cluster incorporated total 9 actions indicated by corporate management system and was assigned to SDGs 3,8,13,14. The greatest reflection of the actions was found in Code of Conduct and Ethics code (4 actions), which also included creation of Supply Chain ecosystem and adopting a Supplier Code of Conduct. Quality control code followed by 2 actions included measures aimed to manage cooling liquids in manufacturing process, and interrelated to Health & safety management system code which implied to control a product safety

> *Quality Management System in place for all business divisions that governs the process of malfunctioning products from initial detection to sharing information with relevant (governmental) bodies.*

The measures or risk management included reporting on conflict minerals but missed Global heating scenarios plan.

7.3   Cross case report

Cross case report was aimed to generalize the obtained results for all case companies and came up with answers to remained research questions:

1.   Do addressed SDG's differ among case companies?

2.   What is the efficacy from case companies' actions in addressing the reported SDGs?

3.   How do their SDGs enhances vary in country context?

The Data Collection Matrix's results shed light on the SDGs that the case companies had been emphasizing in their disclosures. Consequently, colorful cells in the pivot table represent each case company and the SD goals it accomplish with summarized total number for each case company (Figure 16). To demonstrate the background of undertaken actions was created a decomposition of each SDG (Figure 17) which resulted from summary of categorization data from Data Collection Matrix (Appendix 1) .

As it could be seen disclosure on No poverty goal (SDG 1) was the one that stood apart and had not been considered none of the case companies. Although it may be assumed that present goal is not valid or not correlates to the activities undertaken by reviewed companies. However, according to report of Global Manufacturing & Industrial Summit, the contribution of manufacturing industry to SDG 1 represents a provision of equitable growth by running production activities that have a crucial impact of job creation and sustainable livelihoods, that are key requirements for eradicating poverty (GMIS, 2017, p. 14).

No hunger goal (SDG 2) also showed the significant difference in terms of its disclosure by single Japanese case company 3. The goal was supported by production of industry-oriented equipment and technologies ensuring food security and applicable for laboratory food innovation, that stood behind a Product cluster (Figure 17).

SDGs	Case companies					
	Group 1		Group 2		Group 3	
	1	2	3	4	5	6
1 NO POVERTY						
2 NO HUNGER			●			
3 GOOD HEALTH & WELLBEING	●	●	●	●	●	●
4 QUALITY EDUCATION			●		●	
5 GENDER EQUILITY	●				●	
6 CLEAN WATER AND SANITATION	●		●		●	●
7 AFFORDABLE AND CLEAN ENERGY	●	●	●			●
8 DECENT WORK AND ECONOMIC GROWTH	●			●	●	
9 INDUSTRY, INNOVATION AND INFRASTUCTURE	●	●	●	●	●	●
10 REDUCED INEQUALITIES				●	●	●
11 SUSTAINABLE CITIES AND COMMUNITIES		●				
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	●				●	
13 CLIMATE ACTION		●	●	●	●	●
14 LIFE BELOW WATER			●		●	●
15 LIFE ON LAND			●			●
16 PEACE, JUSTICE AND STRONG INSTITUTIONS	●			●		
17 PARTNERSHIPS FOR THE GOALS			●	●		
total	8	5	12	13	10	9

Figure 16 Cumulative results of covered SDGs by case companies.

SDG	People	Planet	Product	Governance	Total for SDG
1 NO POVERTY	0	0	0	0	0
2 NO HUNGER	0	0	3	0	3
3 GOOD HEALTH & WELLBEING	45	0	28	15	88
4 QUALITY EDUCATION	18	0	0	1	19
5 GENDER EQUILITY	11	0	0	0	11
6 CLEAN WATER AND SANITATION	0	9	8	0	17
7 AFFORDABLE AND CLEAN ENERGY	0	9	9	3	21
8 DECENT WORK AND ECONOMIC GROWTH	26	1	1	16	44
9 INDUSTRY, INNOVATION AND INFRASTUCTURE	1	6	17	13	37
10 REDUCED INEQUALITIES	23	0	0	0	23
11 SUSTAINABLE CITIES AND COMMUNITIES	2	0	5	0	7
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	0	2	1	9	12
13 CLIMATE ACTION	1	50	16	10	77
14 LIFE BELOW WATER	0	0	4	1	5
15 LIFE ON LAND	0	4	1	0	5
16 PEACE, JUSTICE AND STRONG INSTITUTIONS	1	0	0	25	26
17 PARTNERSHIPS FOR THE GOALS	2	0	0	12	14
total for cluster	130	81	93	105	

Figure 17 Decomposition of SDGs by clusters

A significant overlap in reporting the addressed goals showed that 2 out of 17 SDGs (12%) were covered by all case companies from UK, US and Japan and focus on Good health & wellbeing (SDG 3) and Industry, innovation and infrastructure (SDG 9). Number of total actions for the most followed SDGs 3 and 9 with 88 and 37 activities accordingly in all clusters, demonstrated that Good health & wellbeing (SDG 3) with over double lead was the most prioritized goal among all case companies. The most efforts were supported by actions included to People cluster (45) and expressed by activities to gain social benefits and ensuring people's health and wellbeing backed up almost by all action codes of management category. As well as contribution of case companies with product utility and value included all categories of oriented products (Appendix 2).

The SDG 9 is primarily determined by endeavors from Product and Governance clusters (17 and 13 respectfully). Thus, according to categorization table, products specialized for industrial manufacturing, aircraft industry and widely applied for science development had a key contribution to Global industry, innovation and infrastructure. Accompanied by company's investments into digital and outside-in innovations, adopted manufacturing standards and ensuring information security as part of developed business strategy.

The research findings showed that case companies had been actively involved into addressing to number of overlapping goals. Thereby, Clean water and sanitation (SDG 6), Affordable and clean energy (SDG 7) and Climate action (SDG 13) steadily presented in the key focus of five different case companies at the time. According to obtained results, all three SDGs were supported dominantly by Planet and Product clusters. While input by products were mainly done by manufacturing of environmental-oriented products, Planet cluster involved the major number of actions. With efforts to minimize the environmental impact case companies struggled to promote the renewable energy, control of emissions, adaptation of energy-efficient technologies in industrial processes and onsite optimizations to rich a circular manufacturing as well as transfer of best environmental practices to conserve water and other natural resources while complying to international environmental standards.

Decent work & economic growth (SDG 8) together with Responsible consumption and production (SDG 12) followed the list of the most addressed goals, disclosured by case companies 1, 4, 5, 6 and case companies 1, 3, 4, 5 accordingly, but missed by the second case company report. SDG 8 is characterized mostly by People cluster and included activities of social category which enhanced HR strategies, professional education and development, events and policies to promote and raise awareness of DEI by engaging with communities and social groups. For both SDGs 8 and 12 were typical activities of Governance cluster under the management category and included

corporate Code of Conduct, risk management, quality control of manufacturing and ensuring information security actions and policies.

SDGs 4, 5,10 and 14 resulted to be the goals that had been addressed to by half of case companies during research. Quality education (SDG 4), Gender equality (SDG 5) and Reduced inequalities (SDG 10) refer to social challenges, therefore, benefited from People cluster and its number of social-oriented activities which played a key role for case companies that had been followed them. Code results for SDGs 4 ,5 and 10 are similar to SDG 3 and may indicate that their relatively low rate of disclosure was resulted due to combination of both topics and including them into Health & wellbeing (SDG 3) disclosure by case companies. As for the SDG 14, the Product cluster with industry-oriented equipment and water control purpose contributed the most.

Remain three goals including Life on the land (SDG 15), Peace justice and strong institutions (SDG 16) and Partnership for the goals (SDG 17) had found the smallest number of disclosured support by only two out of six case companies, although all of six case companies were actively engaged with stakeholders such as local governments, research centers, institutions, communities and Global organizations as part of their business strategy. As seen in Figure 17, accomplishment of SDG 16 and 17 characterized by Governance cluster and included categories of management with risk management policies, complying standards and Code of conduct including Supplier code of Conduct and engagement with stakeholders to create value chain. SDG 15 was supported mainly by reported actions of environmental conservation which included active involvement of case companies 3 and 6 into foresting, ensuring nature balance and production of health-oriented products.

Results of the maintained research had not revealed significant differences referred to country aspect of each case company since all analyzed companies were operating internationally guided by global institutional frameworks and followed the similar codes for People, Product, Governance and Planet cluster to face Global challenges. Despite, that all of the observed companies had a strong engagement with stakeholders, only companies of Group 2 disclosured Partnerships for goals (SDG 17). Current fact may be explained referred to particularities of Japanese cultural values and model of CSR explained in chapter 3.5 (p. 24) of the thesis, outlining the vital importance of collectivism, and strong interconnection with various stakeholders to ensure corporate interests as well as intertwining philosophy into corporate culture and business strategy as was resulted by case company 3. The other aspect concerned SDG 15 in terms of number of actions and indicators towards creation and maintaining new green areas, combating desertification and

remedy soil oil by case company 3 (Appendix 1). It is noteworthy that just one Japanese company paid such a high degree of attention to environmental conservation.

Another SDG that was covered dominantly by Group 2 companies and one UK case company 2 represented by Sustainable Cities and Communities (SDG 11). The main input was made through a Product cluster with industry-oriented products for aircraft industry, public transportation and development of digital solutions to enhance smart urban applications.

Finally, as it is shown in categorization table (Appendix 2) Group 2 and Group 3 companies significantly contributed to SDGs with their input to science development field and high rates of manufactured industry and environment oriented products. Meanwhile, Group 3 companies provided the highest rates of input to sustainability performance by Product cluster.

ESG Risk Ratio was applied as a demonstrative tool to estimate the effectiveness of reported actions addressed to SDGs by case companies. As was discussed in chapter 4.3, the ESG Risk Ratio is a commonly used tool for assessing a company's ESG performance and issues. It is a way of measuring a company's environmental, social, and governance performance and risk. These ratings evaluate a company's sustainability practices and their impact on the environment, society, and corporate governance (Sustainanalytics, 2020). It also provides investors and stakeholders sufficient information on investment risks and assists businesses to determine the level of its management efficiency. Not having an ESG rating can be interpreted as very low ESG transparency of a company and, therefore, negatively affects firm value (Wong, 2021).

The overall summary of case companies endeavors with reported indicators and programs towards disclosured SDGs and determined by Sustainanalytics ESG Risk ratio are shown in case companies performance metrics (Table 11).

Table 11: SD performance metrics

Code n		Disclosured SDGs	Total actions		Total indicators		Total programs		ESG Risk ratio
Group 1	1	8	49	90	17	32	9	15	13.0
	2	5	41		15		6		11.6
Group 2	3	12	46	189	20	132	15	104	12.5
	4	13	143		112		89		30.6
Group 3	5	10	76	128	43	56	44	62	11.9
	6	9	52		13		18		20.7

Table 11 highlights that prevail number of addressed SDGs were disclosed by case companies of Group 2 (12 and 13), whereas each case company of Group 1 and Group 3 have covered below or equal to 10 SDGs. Supported with overall number of 189 actions for Group 2, 128 to Group 3 and 90 to Group 1. Total number of reported indicators and programs correlates with number of actions for each group demonstrating that Group 2 topped the list and Group 1 is at the bottom.

The ESG Risk ratio resulted low risk level (10 – 20) for companies of Group 1 considering the smaller number of total metrics obtained during the research. However, case company 3 and case company 5 with large number of results were also assigned to a low risk level. Low ESG Risk level signified that company succeed in its ESG performance and company's value is considered to have a low risk of material financial impact driven by ESG factors.

The case company 4, which is a leader by all reported metrics was assigned with the high level of ESG risk. According to Sustainanalytics detailed explanation provided by their online service, an agency pointed out top material ESG issues for case company 3: Corporate Governance, Product Governance, Business ethics and Data privacy and Security resolved from events related to anti-competitive practices of customer incidents. Meaning that undertaken ESG actions in pointed spheres are not of high effectiveness as may result high ESG related risks for the company. At the same time, agency reported a high level of exposure, which refers to the extent to which a company is exposed to different material ESG issues but strong level of management, which include assesses the robustness of a company's ESG programs, practices and policies (Sustainanalytics, 2023). Considering that case company 3 possesses strong management resources to level out current ESG Risk level.

Case company 6 was leveled as medium level risk company (20-30) with low level of exposure and average management level. Nevertheless, top material ESG issues for case company 6 were ccorrelated to Corporate Governance, Product Governance, Human capital and Business Ethics, caused by reported Business Ethics Incidents including Accounting and Taxation issues (Sustainanalytics, 2023). Current ratio confirmed rather sufficient level of ESG performance of case company 6 and effectiveness of its programs, however, there were still unsolved issues remained.

8   Discussion

The aim of present thesis was to analyze undertaken actions and initiatives implemented by manufacturing companies to align their operations with the 17 Sustainable Development Goals (SDGs) set forth by the United Nations in 2015. By examining these actions, the thesis sought to gain insights into the extent to which manufacturing companies are actively contributing to sustainable development and addressing global challenges. Therefore, the purpose of the current study was to evaluate each example company's individual and cumulative contribution to the attainment of the SDGs and, if any disparities in performance were found, to explain them.

The reason that the manufacturing sector is essential to achieving sustainability goals is due to its significant contribution to economic development, employment creation, and higher living standards. While the modern world is changing in a rapid pace and as a result of increasing resource scarcity, global warming and shifting demographics, developing technologies are fostering innovation and had become main drivers to manufacturing businesses (Joannou & Serafeim, 2012).

On the report of Global Manufacturing & Industrial Summit (2007) these transformative dynamics have a profound impact on business models and ownership structures, underscoring the fundamental essence of the SDGs in compelling manufacturers to reassess not only the production methodologies but also the product portfolio itself. By analysing their alignment with the SDGs, companies can better understand and respond to the risks and opportunities they face in a world characterized by rapid change and disruption. Following this idea, main research questions were formulated with the aim of systematically examining and assessing the extent to which case companies contribute to the SDGs:

1. What SDGs case companies strike for?

     a. Do addressed SDG's differ among case companies?

     b. How do case companies engage with stakeholders on sustainability issues?

2. What actions have been taken towards meeting the reported SDGs?

3. What is the efficacy from case companies' actions in addressing the reported SDGs?

4.   How do their SDGs enhances vary in country context?

The overall research process was conducted as a multiple case study covering six global manufacturing companies represented three countries: US, UK and Japan. The research addressed to the subject of each reviewed company as an individual case, with abductive approach of the findings applying a content analysis focusing on primary research questions. Exploring these aspects contributed to obtain a thorough awareness of the context of the study (Morris & Wood, 1991, p. 265). Both qualitative and quantitative data for present reach was collected through analyzed annual and sustainability reports of case companies for last two years as well as addressing to official analytical web resource in field of ESG risk assessment established by Sustainanalytics agency. To organize an obtained data more properly and structured was created a Data Collection Matrix which further performed as a key tool for categorization process to manage and code all raw data. The data analysis was performed applying a conventional content analysis which included 8 consecutive steps. Finally was developed a categorization table with clusters, which in turn included 12 categories and 53 related codes. Introduced clusters correlated to TBL concept, including aspects related to Product, People and Planet, and the fourth cluster stood for Governance.

General outcomes

General results of conducted analysis included three parts. The first part referred to structural analysis of provided reports and included type of the report, total number of pages related to sustainability and reporting frameworks. The structure of the reports demonstrated that 50% of the reports were sustainability reports, whereas the other share included both annual and integrated reports. Number of pages related to sustainable performance first of all brought and information value of case companies accomplishment with sustainability. Thus, the greater number of pages devoted to analyzing and providing information on a company's implementation of the SDGs, the more detailed and complete insights of their contribution to sustainable development and compliance with the goals, providing a more accurate understanding of their effectiveness and impact. Regarding the number of pages disclosured by case companies, Hitachi company covered the top of the ranking with 194 pages in sustainability report, followed by Danaher company with 96 pages. Other three companies: Oxford, DiscoverIE and Bruker were at the bottom of the list with 20, 30 and 22 pages considerably.

However, it should be noted that the number of pages dedicated to SD in company's disclosure may not considered as the single indicator of performance and contribution to the SDGs. It was also important to estimate the quality of information, the clarity of goals and metrics, and the measures the company had been taking to achieve SD. Therefore, the individual case reports

represented a second part of total findings. The main focus in this part was to connect numbers of identified activities, actions and programs represented by clusters, categories and codes under each case company with corresponding SD goals. This analysis allowed for a comprehensive understanding of how each case company's activities aligned with the SD goals and revealed their engagement level with stakeholders. By examining the specific actions and programs within each cluster, category, and code, it became clear which SD goals were being addressed and to what extent. This information provided valuable insights into the overall impact of the case companies' efforts towards sustainable development.

Outcomes from cross case report contributed to answer the remain research questions regarding the types of addressed SDGs among case companies, level of efficacy of their endeavors to cover reported SDGs and determination of any differences regarding the country context of case companies. The results of the initial comparative analysis indicate that Japanese companies have demonstrated a broader engagement with a higher number of Sustainable Development Goals (SDGs), specifically addressing 12 and 13 of the total 17 goals. In contrast, UK companies have focused on 8 and 5 goals, while US companies have shown similar results, aligning with 9 and 10 SDGs.

The cumulative results of covered SDGs by six case companies shows a substantial level of convergence in reporting practices, indicating that two out of the 17 SDGs, namely Good health and wellbeing (SDG 3) and Industry, innovation, and infrastructure (SDG 9), were addressed by all case companies. A total of 88 actions were identified for SDG 3, making it the most prioritized goal, followed by SDG 9 with 44 activities across various clusters. Notably, the majority of efforts were concentrated in the People cluster, demonstrating a strong focus on achieving social benefits and ensuring the health and wellbeing of individuals. These actions were supported by a comprehensive range of management-related codes. Furthermore, the contribution of case companies extended across all categories of product utility and value, reflecting their commitment to integrating sustainability considerations into all aspects of their offerings.

Meanwhile, none of the case companies considered the goal of No Poverty (SDG 1) in their disclosure practices. This notable absence suggests a lack of relevance or alignment between this specific goal and the activities undertaken by the reviewed companies.

Results for the other SDGs demonstrate a uniform distribution of covered goals. And overall number of actions related to Product, People, Planet and Governance clusters indicates that analyzed companies more widely apply social oriented actions of People cluster with the highest number of actions 130, Governance and management practices stand behind with 105 total actions in this

cluster, but still demonstration a strong input weight. Contribution to SDGs through product utility rates the third addressed approach within the observed companies with overall 93 actions. Finally, activities aimed to resolve environmental challenge close the list with a smaller number of 81 activities.

The relatives outcomes may be made considering that manufacturing companies primarily undertake social-oriented activities to accomplish the 17 SDGs due to the inclusive nature of sustainability, expectations from stakeholders, recognition of long-term business success, the regulatory and policy environment, and the business case for social sustainability. By prioritizing social impact, companies contribute to the broader goals of sustainable development and meet stakeholder expectations, enhance their reputation, and build positive relationships with communities, customers, employees, and other stakeholders.

At the same time, results of the conducted research did not indicate significant differences among the case companies related to their country aspect. This was attributed to the fact that all analyzed companies were operating on an international scale, driven by global institutional frameworks, and adhering to similar clusters pertaining to People, Product, Governance, and Planet to address global challenges. However, Japanese companies exhibit a comprehensive approach, addressing the highest number of SDGs, namely 12 and 13 out of 17. This indicates a broader scope of sustainability initiatives, encompassing goals like Sustainable Cities and Communities (SDG 11) outlining the strong commitment to technological urban development and Partnership for a goal (SDG 17). This observation confirmed the attribution of influence of Japanese cultural values and philosophy aspects on their CSR model and business strategy. An outcome emphasized the significance of collectivism, strong interconnections with various stakeholders, and the integration of philosophy into corporate culture and business strategy. Additionally, in relation to SDG 15 (Life on land), Shimadzu company stood out in terms of the number of actions and indicators implemented to create and maintain green areas, combat desertification, and remediate soil oil.

In summary, the research findings suggest that despite the international operations and similar global frameworks followed by the analyzed companies, identified patterns emerged in terms of stakeholder engagement, SDG partnerships, and environmental conservation efforts, particularly within the context of Japanese cultural values and CSR practices.

Outcomes for ESG Risk assessment

Finally, the comparative analysis of ESG Risk for each case company resulted the highest ESG risk level for Hitachi company which has disclosured the greatest number of SDGs, related actions, indicators and programs, whereas the other companies with lower metrics obtained low and medium ESG Risk level. The explanation may lay behind that there is no direct relationship between disclosured SDGs and ESG Risk level and the findings that case company with the highest disclosure rate and number of reported SD activities was rated the high ESG risk raises questions about the quality and effectiveness of the disclosed activities. It highlights the importance of considering not just the number, but also the substance and impact of the SD activities undertaken by companies. As well as contextual factors, such as industry-specific risks, geographic location, and company-specific characteristics, also influence the ESG risk level (Sustainanalytics, 2023). The relationship between SDG disclosure and ESG risk should be examined within the broader context of industry dynamics, company operations, and stakeholder expectations.

Obviously, the performed analysis reveals that the number of disclosed SDGs does not directly correlate with the ESG risk level among the studied manufacturing companies. The findings emphasize the need to go beyond the quantity of SD activities and consider the quality, impact, and contextual factors in assessing a company's ESG risk. Further research and analysis are encouraged to explore the specific risk factors that shape ESG ratings and to develop a more holistic understanding of the relationship between SDG disclosure and ESG risk in the manufacturing sector.

Limitations of the study

Among the limitation of the study, the relatively small number of analyzed companies and periods were involved into current research. What in turn, provided a deepen study of specific case companies, meanwhile didn't sufficiently contribute into gaining a comprehensive view for entire manufacturing industry. Present study covered the manufacturing businesses of similar large scale and limited country regions, but to gain more general results of the findings, future research could benefit from expanding the sample size of case study companies. By including more diverse range of manufacturing companies of different countries, and scales would provide a broader perspective on the practices, indicators and programs reported to address the SDGs.

Implications and suggestions for further research

The implications of the performed study for further researches contain, first of all, the longitudinal impact and effectiveness of SDG-focused initiatives within manufacturing businesses. Examining how these efforts evolve over time and their enduring impact on sustainable development practices could provide valuable insights to guide long-term strategy and policy development. Additionally, conducting a comparative studies across different industries, geographical regions, and company sizes could offer a deeper understanding of the varying strategies and challenges in addressing the SDGs. Meanwhile, a sector analysis within one industry would provide wide knowledges about unique challenges and solutions for addressing the SDGs. Manufacturing companies operate within diverse industries characterized by unique challenges and opportunities (GMIS, 2017, p. 10). Future research could consider industry-focused analysis, which could provide more specific results and trends for concrete sector.

Researches may focus on revealing an industry-specific best practices and potential areas for improvement, as well as more precise determination of stakeholder engagement on the effectiveness of SDG implementation. Exploring how various stakeholder groups influence decision-making and impact organizational strategies related to the SDGs would contribute to a better understanding of successful approaches. Evaluating existing policies and regulations that support or hinder SDG implementation in manufacturing businesses could provide guidance for the development of more effective policies. Investigating the alignment between industry practices and national or international policies would further enhance the understanding of policy impact.

Finally, by considering a broader reporting period, future researches, would obtain dynamic results and ability to outline emerged trends in case companies performance. Which, in turn, would provide greater insights on the evolution of case companies endeavors, shifts of their SD focus over the periods.

Reliability and Validity

Current research is public and was conducted according to the principles of Responsible Conduct of Research established by Finnish National Board on Research Integrity TENK (2021). Present Master thesis was focused on scientific research and followed an appropriate IMRaD organizational structure. The overall study was performed in compliance with selected methods of research, data acquisition and evaluation that align with scientific criteria and ethical principles and are ethically sustainable. All obtained raw data came from valid open sources of case companies as well as independent Global analytical resource and doesn't violate copyrights of the resources.

Credibility of the present study was achieved by prolonged engagement with obtained data from the reports and identification of the most relevant elements that contributed to formulate the answers on research questions. This approach provided not only the scope of awareness of the field of Sustainable Development and Agenda 2030 but also a depth of knowledge of endeavors to comply the SDGs by large scale global manufacturing companies in three different countries.

Research method applied for current analysis involved both qualitative and quantitative data collection and analysis which provided insight to a complementary aspect of the same phenomenon. After a data was collected a multiple case study analysis was performed to review the findings of each case company. This method assisted in obtaining different insights of the data, outline common and deviate features among the cases, therefore provide a more precised data interpretation and results.

A credibility of research process was determined by detailed description of every stage of analysis based on applied scientific model for conventional content analysis. The validity of research results was confirmed by correlation of fundamental parts of theories discussed in thesis with resultative part, confirming the TBL theory in categorization part, and CSR theory in the outcomes.

Dependability of present research was gained as all case companies chosen for present analysis are World-known and of Global scale, with long history, strong background and big international market share. Each of the case company has good reputation with successful experience in a manufacturing field of study and are rated by world independent analytical agencies.

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Data Collection Matrix

SDG	Actions	Code	Category	Cluster	Indicators	Programs & Initiatives	Stakeholders
1	Not touched						
2	Company code 3						
	2 - 3.1. Support for food development by analyzing the beneficial components	Food industry	Industry oriented products	Product			Partnering with public research institutions, local governments and companies
	2 - 3.2. Laboratory for food innovation. To develop new methods for analysis of components with functual benefits.	Scientific research	Science development	Product			
	2 - 3.3. Production of instruments that ensure food safety	Food industry	Industry oriented products	Product			
3	Company code 1						
	3 - 1.1. use of our employee engagement survey, to gather feedback from our teams about how they feel we are doing with regard to equality, diversity and inclusion	Mental health	Health & wellbeing	People	FY 2022: Five-year view of accidents decreased by 30%	Zero Programme with the objective of a sustained reduction in accident levels across the Group	
	3 - 1.2. update of number of policies to include our new hybrid working model, allowing employees to balance their work and home demands	Mental health	Health & wellbeing	People	FY 2022: Five-year view of accidents/1,000 employees for ongoing businesses		
	3 - 1.3. Restruction of US healthcare package to cover domestic partners and gender reassignment	Physical health	Health & wellbeing	People			
	3 - 1.4. Striving to provide a safe workplace and working environment, for all employees	Working environment	Health & wellbeing	People			
	3 - 1.5. apply safe working practices supported by structured health and safety management systems, that are externally audited where appropriate.	Risk management	Management	Governance			
	3 - 1.6.Introduction the SHIELD health and safety software platform,	Physical health	Health & wellbeing	People			
	3 - 1.7. Providing mental health support	Mental health	Health & wellbeing	People			
	3 - 1.8. Empower people with long-term mental health issues or a disability to thrive in work	Mental health	Health & wellbeing	People			
	3 - 1.9. Development of Unmind, a workplace mental health app	Mental health	Health & wellbeing	People	FY 2022: targets Serious accidents, Accident frequency rate	Mental Health First Aiders program	

3 - 1.10. Encourage employees to join volunteering schemes, charity outreach pro-grammes	Charity & Voluntarism	Social	People		GoGreen teams program	
3 - 1.11. sponsorship of local community events.	Charity & Voluntarism	Social	People			
3 - 1.12. procedure in place to help anyone that needs to report a business mal-practice and report any concerns they have.	Mental health	Health & wellbeing	People			
Company code 2						
3 - 2.1. make products that go into medical devices and systems	Medical industry	Industry oriented products	Product			
3 - 2.2. Sensing products for environmental management systems, such as indoor temperature monitoring and water treatment plants.	Analytical & screening instruments	Environment oriented products	Product			
3 - 2.3. Creating safe and healthy working environment	Working environment	Health & wellbeing	People	FY 2022: Over 16,000 hours of training being provided across the Group.	health and safety refresher training pro-grams	
3 - 2.4. flexible and hybrid working conditions	Working environment	Health & wellbeing	People			
3 - 2.5. Stuff mental health first aiders to provide support to colleagues on sites.	Mental health	Health & wellbeing	People	FY 2022: over 20-23, Lost time incident frequency rate (LTIFR) information		
3 - 2.6. Diversity at workplaces	HR strategy	Social	People	FY 2021: Increase of females in senior management and a Board from 28 to 43%		
3 - 2.7. Creation of corporate culture with characteristics of Diligence and determi-nation; Customer-centricity; Respect, fairness, and courtesy; Open and construc-tive communication	HR strategy	Social	People	FY 2022: Gender Diversity metrics		
3 - 2.8. ISO 45001 accreditation	Complying standards	Management	Governance	FY 2022: six sites achieved ISO 45001 (Occupational Health and Safety Management System) accreditation		
3 - 2.9. Learning and development of the team	Education	Social	People	ESG KPIs for 2022, 23 and target 25: for 3 P (People, Plant, Product) Accreditations for ISO, energy audit, H&S, Staff turnover,	National Vocational Qualifications programs	
3 - 2.10. Clear, fair and competitive terms of employment	HR strategy	Social	People	FY 2023: turnover in FY2023 reduced to 10%		
3 - 2.11. Engagement to local communities	Community engagement	Social	People		Community Foundation for Surrey and other employee volunteering opportuni-ties.	Local food banks
Company code 3						
3 - 3.1. Medical system products for diagnostics, treatment, clinical application s for analytical technology, electronic medical records systems.	Medical industry	Industry oriented products	Product		Promote individualized/pre-emptive med-icine.	
3 - 3.2. Healthcare technologies	Scientific research	Science development	Product		Analysis of biological components and treatment plan forpreventive medicine	
3 - 3.3. Industrial machinery production: semiconductors, turbomolecular pumps, hydraulic technology	Machinery industry	Industry oriented products	Product			
3 - 3.4. Promotion of self-care by self-care videos, seminars, trainings	Mental health	Health & wellbeing	People	FY 2021: Decrease of smoking rate by 15.3%	Mental health initiatives	
3 - 3.5. Line care support at working place	Physical health	Health & wellbeing	People	FY 2021: Health checks 94%		
3 - 3.6. Improvement of inhouse and outside counselling	Physical health	Health & wellbeing	People			
3 - 3.7. Support for leave of absence and return to work : follow up yearly return to work.	Mental health	Health & wellbeing	People			

3 - 3.8. Subsidizing the costs of test to determine the risk of developing mild cognitive impairment.	**Physical health**	**Health & wellbeing**	**People**		
3 - 3.9. Establishing of in-House PCR testing room	**Physical health**	**Health & wellbeing**	**People**		Body health initiatives
3 - 3.10. Subsidizing breast cancer examination	**Physical health**	**Health & wellbeing**	**People**		
3 - 3.11. Introducing health web service	**Physical health**	**Health & wellbeing**	**People**		
Company code 4					
3 - 4.1. Enhancing energy-saving features of medical devices	**Medical Industry**	**Industry oriented products**	**Product**		Work-life management
3 - 4.2. Introduce and expand support systems for balancing work and child care/nursing care	**Work & home balance**	**Health & wellbeing**	**People**	FY 2021: transforming a corporate culture, including conducting manager-oriented training and expectant-father/expectant-mother seminars concerning the balancing of work and childcare/nursing care	
3 - 4.3. Preventing long working hours and overwork	**Work & home balance**	**Health & wellbeing**	**People**		
3 - 4.4. Promoting diverse work styles in the "new normal"	**Work & home balance**	**Health & wellbeing**	**People**		
3 - 4.5. Establishing occupational health and safety management systems	**Health & safety management system**	**Management**	**Governance**	FY 2021: Fatal accidents: 2 among the group 0 among LTd.	
3 - 4.6. Occupational health and safety risk assessment	**Health & safety management system**	**Management**	**Governance**	FY 2021: lost-time accidents *1: 434 Group, 3 Ltd	
3 - 4.7. Implementing initiatives to improve employee health	**Health & safety management system**	**Management**	**Governance**	FY 2021: employees with high stress according to the stress-check: 12.8%	
3 - 4.7. Inclusive corporate gatherings to let people speak up about work and non-work matters	**Health & safety management system**	**Management**	**Governance**	FY 2021: attendance 4000 employees	Employee Mentorship
3 - 4.8. providing parent-care support system	**Health & safety management system**	**Management**	**Governance**		
3 - 4.9. Providing child care support system	**Health & safety management system**	**Management**	**Governance**		
3 - 4.10. Prevent of infectious diseases (COVID-19)	**Physical health**	**Health & wellbeing**	**People**		Remote counseling by occupational physicians
3 - 4.11. Providing a balanced working schedule, flexible hours and work locations	**Work & home balance**	**Health & wellbeing**	**People**		monthly No Meeting Day for individuals to focus on their work.
3 - 4.12. Remote counseling by occupational physicians and other medical staff, provision via intranet of information for staying mentally and physically healthy, etc.	**Mental health**	**Health & wellbeing**	**People**		Main policies for supporting working from home medium- to long-term
3 - 4.13. Establishment of Health and Safety Management division GRI 403	**Health & safety management system**	**Management**	**Governance**	FY 2021: international certifications such as ISO 45001 at multiple sites.	Monthly Health and Safety Leaders Meetings; Key & Safety management designation system; coincident Investigation Database	Entire Group
3 - 4.14. Carry out appropriate health and safety trainings	**Physical health**	**Health & wellbeing**	**People**	FY 2021: 40.3% of employees who received a special health guidance	Occupational healthcare program

3 - 4.15. Strengthen a mental health support	Mental health	Health & wellbeing	People	FY 2021: Added questions related to mental health in annual Global Employee survey; FY 2021: 12.8% decrease of employees with high stress according to high-stress check FY 2021: Absence leave trend - mental 0,66; physical 0,21 (x100)	Health maintenance program including interviews, health checks, consultants and guidelines; Qualitative improvement of occupational healthcare activities and the human capital development; Establishment of a mental health consultation service; Mental health workshops and initiatives; Wellness programs (virtual yoga and wellness workshops)	Internal and external consultation services
3 - 4.16. Promoting Collabo-Health*1 GRI 403-6	Physical health	Health & wellbeing	People	FY 2021: Number of Hitachi Health insurance society Member Corporations Certified Under the Health and Productivity Management Organization Recognition Program - 75 (Including 4 with White 500 status)		
3 - 4.17. Encouraging Employees to Receive Medical Exams and Quit Smoking	Physical health	Health & wellbeing	People	FY 2021: Smoking rate decreased to 27, 6% from 28,4%	General physical exam, Uterine cancer, intestinal cancer, breast cancer, stomach cancer, lungs cancer screenings	
3 - 4.18 Health and safety considerations for nuclear businesses	Code of Conduct & Ethics	Management	Governance	FY 2021: Introduction of Nuclear Power Plant and Reactor Exporters' Principles of Conduct		
3 - 4.19. he Hitachi Global Foundation - Promotion of academic research, science and technology :	Community engagement	Social	People		Hitachi Fund Support for research related to infectious diseases	
3 - 4.19. COVID-19 related support efforts	Charity & Voluntarism	Social	People	FY 2021: Provided US$ one million to support business owners impacted by COVID-19 through loans by the nonprofit organization Kiva.; FY 2021: The Hitachi Fund Support for Research Related to Infectious Diseases was established with a fund of 150 million yen from donations of Hitachi, Ltd., its executives and employees, and Group company executives.	Support for business owners Support for research	
3 - 4.20. Understand risks and opportunities and take appropriate action	Risk management	Management	Governance	Disclosed climate-related information based on the TCFD recommendations		
3 - 4.21. Continuously improving the safety of employees sent to dangerous regions	Risk management	Management	Governance	FY 2021: Provided medical assistance for Hitachi Group employees outside Japan		
3 - 4.22. Thorough personal information protection/information security audits and inspections	Information security	Management	Governance	FY 2021: Conducted personal information protection/information security internal audits at all Group companies and divisions (Annually)		
Company code 5						
3 - 5.1. Investments into RnD research	Scientific research	Science development	Product	FY 2022: Danaher's Life Sciences companies joined the Bespoke Gene Therapy Consortium (BGTC) in May 2022 to help expedite the development of breakthrough gene therapies for rare disorders		
3 - 5.2. Production of innovative medical equipment	Medical Industry	Industry oriented products	Product			
3 - 5.3. Production of biological ingredinents	Medical Industry	Industry oriented products	Product		Support of each level of drug development	
3 - 5.4. Development of new vaccines	Medical Industry	Industry oriented products	Product			
3 - 5.5. Integration of DNA technologies	Scientific research	Science development	Product		Supporting the gene editing research	

3 - 5.6. Launching a new product for cell-sorting	**Medical Industry**	**Industry oriented products**	**Product**	`		
3 - 5.7. Software solution for diagnostics of ACS and low risks patients	**Medical Industry**	**Industry oriented products**	**Product**		Cardiac testing	
3 - 5.8. Installation of base of molecular diagnostic testing systems	**Medical Industry**	**Industry oriented products**	**Product**	FY 2022: over 40,000 Cepheid GeneXpert and Infinity systems in over 180 countries.		
3 - 5.9. Launched new express test systems	**Medical Industry**	**Industry oriented products**	**Product**	FY 2022: women's health and respiratory tests, including the Xpert Xpress CoV-2/Flu/RSV plus which returns results in as little as 25 minutes.	Molecular diagnostic program	
3 - 5.10. Cancer diagnostics equipment	**Medical Industry**	**Industry oriented products**	**Product**		Leica Biosystems platform	
3 - 5.11. Blood samples analyzers	**Medical Industry**	**Industry oriented products**	**Product**		Acute care diagnostics	
3 - 5.12. Addressing anemia health priority with its lab-accurate hemoglobin point-of-care testing. GRI 102-6, 203-1, 203-2	**Medical Industry**	**Industry oriented products**	**Product**	FY 2021: Placed over 8,000 hemoglobin testing systems and shipped more than 23 million tests across at-risk communities in Africa, India and Latin America.	Improving access to healthcare in developing markets	
3 - 5.13. Development of HydroMARK - breast cancer biopsy site markers. GRI 203-1, 203-2	**Life saving innovation**	**Science development**	**Product**		Breast cancer diagnostics	
3 - 5.14. Development of analytical methods for quantifying SARS-CoV-2 in wastewater within hours of sample collection, even in remote locations without easy access to off-site laboratories.	**Safe drinking water**	**Health oriented products**	**Product**		Simplifying Wastewater Detection of COVID-19	Water Environment Federation and CDC
3 - 5.15. Community investments	**Community engagement**	**Social**	**People**	FY 2021-2023 a timeline of evolution the community investment activities	Advancing healthcare innovation and Protecting the environment program	
3 - 5.16. An associate platform that enables the pursuit and tracking of personal and team-based volunteerism	**Charity & Voluntarism**	**Social**	**People**	Plan for FY 2023 - global Volunteer programs		
3 - 5.17. Motivating voluntarism by earning grants for each hour of charity to direct to an eligible organization	**Charity & Voluntarism**	**Social**	**People**		DOLLARS FOR DOERS program	
3 - 5.18. matching donations from associates to eligible organizations	**Charity & Voluntarism**	**Social**	**People**			subject-matter experts
3 - 5.19. Building the best team	**Business strategy**	**Management**	**Governance**		Associate Engagement in company Communities	
Company code 6						
3 - 6.1. Equipment to Identify harmful gas leakages	**Supporting health**	**Industry oriented products**	**Product**			
3 - 6.2. neurodegenerative disease research	**Supporting health**	**Industry oriented products**	**Product**			
3 - 6.3. Development of magnetic resonance angiography, magnetic resonance spectroscopy (MRS), and magnetic resonance angiography (MRA),	**Supporting health**	**Industry oriented products**	**Product**			
3 - 6.4. Equipment for pharmaceutical drug discovery	**Supporting health**	**Industry oriented products**	**Product**			
3 - 6.5. Advancing discoveries for cancer treatment	**Scientific research**	**Science development**	**Product**			

	3 - 6.6. Safeguarding the food supply	Supporting health	Industry oriented products	Product		Applications for Food & Beverage Micro-biology	
	3 - 6.7. Equipment fighting against counterfeit pharmaceutical drugs	Supporting health	Industry oriented products	Product		Application for Counterfeit Drugs	
	3 - 6.8. Screening for restricted hazardous substances (RoHS)	Supporting health	Industry oriented products	Product		Application for Restricted Materials Screening (RoHS)	
	3 - 6.9. Taking care of employee safety	Physical health	Health & wellbeing	People	FY 2022: Overall incidents rate, per day		
	3 - 6.10. Controll a products safety	Health & safety management system	Management	Governance	FY 2022: Number of recalled units from market		
	3 - 6.11. Community involvement	Charity & Voluntarism	Social	People		Girls' Day is a nationwide career-orienta-tion project for girls; Charity team pro-gram	
4	Company code 3						
	4 - 3.1. Update of the scientific knowledges of employees	Education	Social	People	FY 2021: Cost of employee trainings 639 million Yen	REACH Lab project	Partnership with Osaka University
	Company code 4						
	4 - 4.1. Bolstering recruitment and development of digital talent	HR strategy	Social	People	FY 2021: Digital talent 67 000 people	Establishing LUMADA data science lab,	
	4 - 4.2. Release guidelines on Principles guiding AI in social innovation business and white paper on company's activities in AI ethics.	Code of Conduct & Ethics	Management	Governance	FY 2021: Published a first review AI Governance and ethics in social innovation business		
	4 - 4.3. Digital specialist acquisition and development	Education	Social	People	FY 2021: Brushed up our DX training system consisting of more than 100 courses, and widely expanded the program to Group companies outside Japan Cumulative total attendance: Approx. 24,000, Digital talent: Approx. 67,000 people		
	4 - 4.4. Global Leadership Acceleration Program for Key Positions (GAP-K)	Education	Social	People	FY 2021: 33 participants from 33 country		
	4 - 4.5. Global Advanced Program for Leadership Development (GAP-L)	HR strategy	Social	People	FY 2021: 43 participants from 13 countries	Educational leadership and management programs	
	4 - 4.6. Global Group Executive Development Course (Global GEC)	HR strategy	Social	People	FY 2021: 49 participants from five regions		
	4 - 4.7. Global Leadership Acceleration Program for Managers (GAP-M, Ready to Lead)	HR strategy	Social	People	FY 2021: 2,921 participants, classes in eight regions		
	4 - 4.8. Global leraning online platform	Education	Social	People			
	4 - 4.9. Intercultural training courses	Education	Social	People			
	4 - 4.10. Quality and reliability education	Education	Social	People	FY 2021: Provided various forms of training and edu-cation in accordance with the target recipients		
	4 - 4.11. The Hitachi Global Foundation - Promotion of academic research, science and technology :	Charity & Voluntarism	Social	People		Kurata Grants; seminars; Hitachi Global Foundation Asia innovation Award Pro-gram; Hitachi Fund Support Inovator Pro-gram	
	4 - 4.12. The Hitachi Global Foundation - human development	Education	Social	People		Hitachi future innovation program; Girls in science support program	
	4 - 4.13. Education on information security	Education	Social	People	FY 2021: Held e-learning programs on information se-curity and personal information protection for all ex-ecutive officers and employees (Hitachi, Ltd. attend-ance rate: 100%)		

	Company code 5						
	4 - 5.1. Community investments	**Community engagement**	**Social**	**People**		Building a STEAM-ready workforce initiative.	
	4 - 5.2. Provide mentorship opportunities for academically outstanding students.	**HR strategy**	**Social**	**People**	FY 2021: supported 2,000 students' participation in the program free of charge and invested in academic scholarships.		Biomedical Science Careers Program (BSCP),
	4 - 5.3. charity that challenges 18- to 25-year-olds to tackle educational inequality through a year of full-time voluntary service.	**Charity & Voluntarism**	**Social**	**People**	FY 2021: Support 1,500 at-risk youth in disadvantaged communities in London, Birmingham and Greater Manchester.	City Year UK annual action - Program of training, coaching and career development opportunities.	
	4 - 5.4. Participating in a role of judgers in an annual competition of inventions among young people.	**Community engagement**	**Social**	**People**			Henry Ford Invention Convention
	4 - 5.5. Sponsorship of Convention's Health and Medical Award, which recognizes a notable student who successfully addresses a health and medical technology problem that could one day save lives.	**Charity & Voluntarism**	**Social**	**People**			
5	**Company code 1**						
	5 - 1.1. commitment to equality, diversity and inclusion in its broadest sense.	**DEI**	**Social**	**People**	FY 2022: New employees over the last year men and women.		
	5 - 1.2. encouraging a supportive and collaborative working environment, so all our people feel able to be open about their own unique identity.	**Working environment**	**Health & Wellbeing**	**People**	FY 2022: Gender split by regions	Identify several key areas of focus, including gender, ethnicity, disability, sexual orientation and gender identity.	
	5 - 1.3. Alignment with Pride for support	**DEI**	**Social**	**People**	FY 2022: Announced targets for FY23-24		
	Company code 4						
	5 - 4.1. Gender balance by empowering women	**DEI**	**Social**	**People**	FY 2021: Increased ratio of female managers 9,8%	Women Influencers Program	
	5 - 4.2. Basic salary	**HR strategy**	**Social**	**People**	FY 2021: 100:105 (women men)		
	5 - 4.3. Seminars on the environment surrounding working women, panel discussions by women in senior roles, and discussions among participants.	**DEI**	**Social**	**People**	FY 2021: Two times within a year		
	5 - 4.4. Contributing to society through The Hitachi Global Foundation	**Community engagement**	**Social**	**People**	FY 2021: Developed activities centered on the three areas of "promotion of academic research, science and technology," "human development," and "realization of an inclusive society"		
	5 - 4.5. Hitachi Global Foundation - realization of inclusive society	**DEI**	**Social**	**People**		Symposium on Realization of an Inclusive Society	
	Company code 5						
	5 - 5.1. Creation of diverse and inclusive team	**DEI**	**Social**	**People**		Board Selection, Composition and Refreshment	
	5 - 5.2. Bringing the importance of DEI throughout internal policies and communications	**DEI**	**Social**	**People**			
	5 - 5.3. Commitment to pay equity including gender and racial/ethnic group pay equity) and ensuring that pay decisions are based on merit.	**HR strategy**	**Social**	**People**	FY 2022: Awarded One of the Best Places to Work for LGBTQ+ Equality by Human Rights Campaign Corporate Equality Index	Pay equity program	
6	**Company code 1**						
	6 - 1.1. Monitoring the use of hydrofluorocarbons.	**Emissions**	**Environmental impact**	**Planet**			
	6 - 1.2. Measurement the water usage	**Water use**	**Resource control**	**Planet**			
	6 - 1.3. Reduce wastes	**Zero waste**	**Environmental impact**	**Planet**	FY 2022: 3 facilities are zero waste to landfills,		

Company code 3						
6 - 3.1.Contributing through analytical instruments for analyzing water quality	**Analytical & Screening instruments**	**Environment oriented products**	**Product**			
6 -3.2. Water use reduction activities	**Water use**	**Resource control**	**Planet**	FY 2021: Water usage increased 5.3%	Controlling plant effluents	
Company code 4						
6 - 4.1.Contributing to CO2 reduction through business	**Emissions**	**Environmental impact**	**Planet**		Net zero CO2 program	
6 - 4.2. Creation of Safe and secure urban environments	**Urban development**	**Environmental impact**	**Planet**		Safety & Security program	
Company code 5						
6 - 5.1. Creation of charity water X pantone to support people who lack basis access to clean and safe drinking water	**Clean & safe water**	**Environmental impact**	**Planet**		For the World charity day water on a water crisis campaign to raise awareness about the global lack of access to clean and safe drinking water.Using color to increase awareness of an important global issue.	teamed up with Charity Water
6 - 5.2. Development of analytical methods for quantifying SARS-CoV-2 in wastewater within hours of sample collection, even in remote locations without easy access to off-site laboratories.	**Safe drinking water**	**Health oriented products**	**Product**		Simplifying Wastewater Detection of COVID-19	collaboration with the Water Environment Federation and Centers for Disease Control and Prevention (CDC)
6 - 5.3. Production of UV water treatment systems	**Safe drinking water**	**Health oriented products**	**Product**	FY 2022: Over 150 000 of systems are installed in industrial applications worldwide and over 11,000 systems are installed in municipalities. Collectively, Trojan's systems treat over 70 billion gallons of drinking water and wastewater every day.		
6 - 5.4. Improvement of water efficiency through investment and reduce water consumption	**Water use**	**Resource control**	**Planet**	FY 2021: Annual water consumption by more than 80% since 2016.	Water consumtion reduction programs	
6 - 5.5. Production of Sea-Bird Scientific's oceanographic instruments to gather data from oceans, seas and coastal areas	**Marine industry**	**Industry oriented products**	**Product**			Maritime agencies including the U.S. National Oceanic and Atmospheric Administration and the National Aeronautics and Space Administration
6 - 5.6. Production of membrane filtration systems for breweries that require fewer processing steps and generate higher clean water yield than conventional water treatment filters.	**Food industry**	**Industry oriented products**	**Product**	FY 2021: reduce water consumption by up to 75% compared to conventional filters.		
6 - 5.7. extracting water from milk during the condensing process to achieve zero water factories	**Water use reduction**	**Environment oriented products**	**Product**			
6 - 5.8. Award Winning Water Treatment Solutions	**Water use reduction**	**Environment oriented products**	**Product**	FY 2021: save 28 million gallons of water and 55.9 billion Btu of natural gas in 2020, in addition to generating nearly $1 million in savings and promoting reliability, safety and regulatory compliance.	ChemTreat's advanced water treatment program.	U.S. Federal Energy and Water Management, The National Institutes of Health (NIH)
Company code 6						
6 - 6.1. implementing innovative solutions to reduce water consumption	**Water use reduction**	**Environment oriented products**	**Product**	FY 2022: 98,9 tons of water consumed		

	6 - 6.2. Update of production processes to reduce water usage	**Water use**	**Resource control**	**Planet**	FY 2022: 98,6, tons of waste water generated		
7	Company code 1						
	7 - 1.1. Winding scope of energy monitoring	**Energy control**	**Resource control**	**Planet**	FY 2022: Increase in energy consumption. increasing to 40.67 MWh per £m of revenue (2020/21: 37.17 MWh).		
	7 - 1.2. maintained supply of 100% renewable electricity consumed by manufacturing activities.	**Energy control**	**Resource control**	**Planet**	FY 2022: The Group's Scope 1 and 2 global carbon footprint for 2022 increased to 1,476.1 tCO e from 520.06 tCO e		
	7 - 1.3. Searching ways to reduce fossil fuel consumptions	**Energy control**	**Resource control**	**Planet**	FY 2022: Consumed a total of 14.94 GWh of energy globally during 2021/22.		
	7 - 1.4. Using general waste to generate electricity	**Zero waste**	**Environmental impact**	**Planet**	FY 2022: Type of emissions: Direct (Scope1) Indirect (Scope 2), Scope1 and 2 Total, Fuel directly purchased by the Company (Scope 3), Total gross emissions (tCO2e)		
	7 - 1.5. Utilizing the hybrid workplace model utilising digital and remote communications to help reduce ongoing travel requirements.	**Emissions**	**Environmental impact**	**Planet**	FY 2022: total carbon footprint indicator		
	7 - 1.6. Streamlined Energy and Carbon Reporting (SECR) regulations	**Reporting (TCFD, SECR)**	**Management**	**Governance**	FY 2022: Engaging with an external consultant to produce a separate report for SECR compliance		
	7 - 1.7. Introduction of SECR report	**Reporting (TCFD, SECR)**	**Management**	**Governance**			
	7 - 1.8. Reports of gas house emissions,	**Reporting (TCFD, SECR)**	**Management**	**Governance**			
	Company code 2						
	7 - 2.1. provide transformers, switches, and sensors for wind and solar systems,	**Renewable energy**	**Environment oriented products**	**Product**			
	7 - 2.2. Switching to renewable energy tariffs where possible	**Energy control**	**Resource control**	**Planet**	FY 2021: 58% ELECTRICITY FROM RENEWABLE OR CLEAN SOURCES		
	7 - 2.3. Installation of rooftop solar panels.	**Energy control**	**Resource control**	**Planet**			
	Company code 3						
	7 - 3.1. Supply of glass winders for winding glass fiber to reinforce wind turbine blades.	**Renewable energy**	**Environment oriented products**	**Product**			
	7 - 3.1. Supply of glass winders for winding glass fiber to reinforce wind turbine blades.	**Renewable energy**	**Environment oriented products**	**Product**			
	Company code 4						
	7 - 4.1. Introducing Internal Carbon Pricing framework	**Renewable energy**	**Environment oriented products**	**Product**	FY 2021: Implemented investments in 59 cases totaling.		
	7 - 4.2. Introduction of renewale energy	**Energy control**	**Resource control**	**Planet**	FY 2021: Increased by 56% the amount of renewable energy-derived electricity produced by in-house power generation facilities; FY 2021: increased by 36% the amount of renewable energy-derived electricity purchased	Green Energy and mobility program	
	7 - 4.3. Promoting power generation systems using wind and other non-fossil energy sources	**Energy control**	**Resource control**	**Planet**			

	7 - 4.4. Enhancing energy-saving features of rolling stock	**Renewable energy**	**Environment oriented products**	**Product**			
	7 - 4.5. Developing smart operating systems	**Scientific research**	**Science development**	**Product**			
	7 - 4.6. Enhancing maintenance service efficiency through rolling stock monitoring	**Renewable energy**	**Environment oriented products**	**Product**			
	Company code 6						
	7 - 6.1. Development of state-of-the-art electron microscope analyzers for ptoe-lectronic performance of solar cells	**Renewable energy**	**Environment oriented products**	**Product**			
	7 - 6.2. Developing technologies such as nuclear magnetic resonance (NMR) spectroscopy, electron paramagnetic resonance (EPR) spectroscopy, magnetic resonance imaging (MRI), X-ray diffraction (XRD), and X-ray microscopy	**Renewable energy**	**Environment oriented products**	**Product**			
	7 - 6.3. Design of superconductors for the magnetic confinement of fusion power plants potentially enabling a clean, abundant, sustainable, efficient and safe energy source.	**Renewable energy**	**Environment oriented products**	**Product**		Application for Magnetic Confinement Fusion Technologies	
8	**Company code 1**						
	8 -1.1. Ensuring a work of the group comply with all environmental legislation in countries where it operates.	**Complying legislations**	**Environmental management**	**Planet**		Complying to Waste Electronic and Electrical Equipment (WEEE) Directive UK, Restriction on use of certain Hazardous Substances (RoHS) regulations, Registration, Evaluation, Authorisation of Chemicals (REACH) Directive, European Waste Framework Directive.	
	8 - 1.2.O offering internships and career opportunities in our diversity and inclusion focus areas.	**HR strategy**	**Social**	**People**			
	8 - 1.3. establishing balanced shortlists in our recruitment processes,	**HR strategy**	**Social**	**People**	FY 2021: Employee turnover rates		
	8 -1.4. Offer high quality, stable employment and flexible careers with favorable conditions and pay.	**HR strategy**	**Social**	**People**	FY 2022: Geographical spread of employees		
	8 - 1.5. challenging assignments, learning from colleagues or targeted training.	**HR strategy**	**Social**	**People**		Talent management program	
	8 - 1.6. Est. own Academy to level up skills	**Education**	**Social**	**People**		Oi Academy with development programmes, core skills training courses and extensive e-learning opportunities.	
	8 - 1.7. Flexible working mode: secondments, career breaks, apprenticeships and support towards external qualifications.	**Work & Home balance**	**Health & Wellbeing**	**People**			
	8 - 1.8. Developing career mapping programs for all members of the Group	**HR strategy**	**Social**	**People**		Career Pathways program	
	8 - 1.9. Providing internships and career starts for scholars and graduates	**HR strategy**	**Social**	**People**			Universities, post-graduate schools
	8 - 1.10. Supporting local nearby businesses	**Community engagement**	**Social**	**People**		bringing a barber on site, running exercise classes, and dog walks. We also participated in a range of charity outreach activities, including raffles, marathon sponsorships, pub quizzes and coffee mornings.	
	Company code 4						
	8 - 4.1. Put the Right Person in the Right Place	**HR strategy**	**Social**	**People**	FY 2021: Introduced formal job descriptions aimed at transitioning to job-based HR management	Future target achieve "Employer of Choice" in the global markets.	

8 - 4.2. Improves employee engagement	HR strategy	Social	People	FY 2021: positive responses to employee engagement questions in global employee survey: 65%		
8 - 4.3. Opened a corporate museum, to introduce the corporate philosophy and founding spirit	Code of Conduct & Ethics	Management	Governance		Foster a global Hitachi culture	
8 -4.4. Develop management-level leadership	HR strategy	Social	People	FY 2021: Number of participants in management-level leadership training and management training programs: 3,976		
8 - 4.5. Development of global HR foundation	HR strategy	Social	People		Hitachi Global Grade (HGG), Global Performance Management (GPM), Hitachi University,	
8 - 4.6. Develop support systems and measures that meet diverse employee needs	HR strategy	Social	People	FY 2021: Reviewed the Cafeteria Plan program to be able to provide a fair system not dependent on working location choices in conjunction with the expansion of working from home	Cafeteria Plan Program	
8 - 4.7. Attraction of young people as a workforce	HR strategy	Social	People		Power+trainee program; Employee Mentorship Program (EMPower).	Local universities
8 - 4.8. Developing diversity in working hours and place	Work & Home balance	Health & Wellbeing	People			
8 - 4.9. Respecting the rights of employee with international standards and in accordance with the laws of each country and region GRI 102-47	HR strategy	Social	People			Signied a United Nations Global Compact
8 - 4.10. Mutual Communication Between Employees and Management	HR strategy	Social	People		Labor Management Dialogue at Regional Headquarters in China and Europe; European labor management meeting	
8 - 4.11. Notification of Work-related Transfers and Reassignments GRI 402 - 1	HR strategy	Social	People			Hitachi workers union
8 - 4.12. Labor-Management Cooperation toward Improving Occupational Health and Safety Levels	Work & Home balance	Health & Wellbeing	People			
8 - 4.13. Implementing sustainable procurement. GRI 103-2	HR strategy	Social	People	FY 2021: Revised the Hitachi Group Sustainable Procurement Guidelines and distributed them to procurement partners to raise awareness of them as a code of conduct for procurement partners	Raising awareness of the Hitachi Group Sustainable Procurement Guidelines	
8 - 4.14. Strengthening risk management systems. GRI - 103-2/403-2	Risk management	Management	Governance	FY 2021: Established a Risk Management Meeting that deliberates important matters related to Hitachi management within the Senior Executive Committee and selected top risks based on global risk trends; FY 2021: Set up Six risk-specific working groups under the Risk Management Meeting; investment risks, business risks, crisis management, compliance, Group governance and regional risks, and each WG coordinates Group corporate functions across the organization while conducting activities to mitigate the respective risks		
8 - 4.15. Understanding and responding to risks and opportunities related to investment, sustainability, etc.	Risk management	Management	Governance	FY 2021: Ascertained and appropriately responded to risks and opportunities related to investments (e.g., M&A, sale of assets, orders for projects) and assets held on the group's consolidated balance sheet; FY 2021: Implemented crisis and compliance management initiatives		
8 - 4.16. Continuously strengthening procurement BCPs	Risk management	Management	Governance	FY 2021: Expanded the number of business sites utilizing the Procurement BCPs Management System for our procurement partners in Japan and to digitize information		

8 - 4.17. Responding to personal data protection laws around the world	Information security	Management	Governance	FY 2021: Formulated and put into effect from April 2022 a Group-wide internal code of conduct concerning protection of personal information, which takes into consideration international legal frameworks, such as the European General Data Protection Regulation (GDPR)	
8 - 4.18. Acquiring third-party certification related to personal information protection	Information security	Management	Governance	FY 2021: Acquired PrivacyMark certification for 37 Hitachi Group companies in Japan FY 2021: Personal information leaks: 0	
Company code 5					
8 - 5.1. Development of science & technology ecosystem across the organization to better anticipate and serve our customers' complex, ever- evolving needs.	Digital solutions	Science development	Product	FY 2022: Recruited several globally recognized physician scientists to serve as chief science and/or technology officers across Danah	
8 - 5.2. Increase the growth	HR strategy	Social	People	FY 2021: 20% of new hires were RnD assosiated, 15% were sales and marketing	
8 - 5.3. Providing internships and leadership development programs in science, technology , STEM, engineering , management , HR	Education	Social	People		University Recruitment program	Penn State University, University of Florida, University of Virginia and Darden School of Business, Dartmouth and Tuck Business School, University of Illinois and University of California Irvine.
8 - 5.4. Operating company accountability by adding an annual PD initiative focused on D+I.	DEI	Social	People		
8 - 5.5. Guides associates and their managers in setting clear personal performance and development objectives aligned to company strategic priorities and assessing associate performance against these goals.	Code of Conduct & Ethics	Management	Governance	FY 2021: 97% of associates received a performance review.	Performance for growth program
8 - 5.6. Compensation that accounts for geography, industry, experience and performance.	Code of Conduct & Ethics	Management	Governance		Executive Compensation Program
8 - 5.7. collective bargaining arrangements and union contracts in certain countries, particularly in Europe	Code of Conduct & Ethics	Management	Governance		
8 - 5.8. Commitment of 10 principles of the UNGC on human rights, labor, environment, anti-corruption	Code of Conduct & Ethics	Management	Governance		
8 - 5.9. Code of Conduct, Supplier Code of Conduct	Code of Conduct & Ethics	Management	Governance		
Company code 6					
8 - 6.1. Attracting new talent and retaining valued employees	HR strategy	Social	People	FY 2022: Total number of employees	incentive programs to recruit, motivate, and retain our highly valued employees at all levels of the organization.
				FY 2022: % of employees eligible for variable pay	
8 - 6.2. Training and development programs	Education	Social	People		
8 - 6.3. Employee performance review	HR strategy	Social	People		
8 - 6.4. Code of Conduct	Code of Conduct & Ethics	Management	Governance		
8 - 6.5. Creating a supply chain ecosystem	Code of Conduct & Ethics	Management	Governance		
8 - 6.6. Conflict minerals reporting	Risk management	Management	Governance		

	8 - 6.7. Business Ethics	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2022: indicators of monetary loses assosiated with product safety, behavior regulations, bribery and cor-ruption		
	8 - 6.8. Supplier Code of Conduct	**Code of Conduct & Ethics**	**Management**	**Governance**			
9	**Company code 1**						
	9 - 1.1. Supply of highly innovative technologies	**Industrial manufacturing**	**Industry oriented products**	**Product**			
	Company code 2						
	9 - 2.1. supply connectivity solutions to infrastructure that underpins the 'Internet of Things'	**Industrial manufacturing**	**Industry oriented products**	**Product**			
	9 -2.2. Products enable industrial automation and digitalisation	**Industrial manufacturing**	**Industry oriented products**	**Product**			
	9 - 2.3. Creation of products for industrial applications that contribute to resilient infrastructure.	**Industrial manufacturing**	**Industry oriented products**	**Product**			
	9 - 2.4. Adopting ISO 9001 standards	**Complying standards**	**Management**	**Governance**	FY 2021: 92% OF GROUP PRODUCTS MANUFAC-TURED UNDER ISO 9001		
	Company code 3						
	9 - 3.1. Adoption of IoT, 5G technologies	**Digital innovation**	**Investment**	**Governance**			
	9 - 3.2. Aicraft equipment: technologies	**Aircraft industry**	**Industry oriented products**	**Product**	FY 2021: Net sales increased by 10,5%		
	9 -3.3. Offering key products and manufacturing equipment that contribute to a wide range of advanced manufacturing: agricultural, furnaces for ceramics.	**Industrial manufacturing**	**Industry oriented products**	**Product**	FY 2021: Sales incresed by 12%		
	Company code 4						
	9 - 4.1. Improving energy-saving features through fully IT-enhanced logistics	**Digital innovation**	**Investment**	**Governance**			
	9 - 4.2. Developing smart data centers	**Digital Solutions**	**Science development**	**Product**			
	9- 4.3. Enhancing energy-saving features of servers and storage	**Digital Solutions**	**Science development**	**Product**		Digital systems and Services program	
	9 - 4.4. Factory automatization	**Outside-in innovation**	**Investment**	**Governance**			
	9 - 4.5. Enhancing efficiency of industrial products	**Industrial manufacturing**	**Industry oriented products**	**Product**			
	9 - 4.6. Reducing CO2 through comprehensive urban energy management solutions	**Emissions**	**Environmental impact**	**Planet**			
	9 - 4.7. Enhancing energy efficiency of home appliances	**Energy control**	**Resource control**	**Planet**			
	9 - 4.8. Promoting connected home appliances	**Energy control**	**Resource control**	**Planet**			
	9 - 4.9. Enhancing energy-saving features of elevators and escalators through re-placement	**Energy control**	**Resource control**	**Planet**			

9 - 4.10.Enhancing energy efficiency through total building solutions	**Energy control**	**Resource control**	**Planet**			
9 - 4.11. Expanding investments in innovation	**Outside-in innovation**	**Investment**	**Governance**		Formation of Innovation Growth Strategy Division.	Lumada's customer co-cre-ation framework .
9 - 4.12. Generating digital service business with Lumada growth model	**Digital innovation**	**Investment**	**Governance**			
9 - 4.13. Backstaging from 2050 to create radical innovation	**Business strategy**	**Management**	**Governance**	FY:2021 Identified three social issues, "an environ-mentally-neutral society" "a society which supports an active 100-year lifespan of its citizens" and "the co-evolution of digital technologies, people and society", that must be resolved by 2050 and strived to create radical innovation to help resolve them		
9 - 4.14. Accelerating outside-in innovation through startup investments	**Outside-in innovation**	**Investment**	**Governance**	FY 2021: Launched a second fund and invested in a to-tal of 17 startup companies		
9 - 4.15. RnD Investment to accelerate Co-creation of value on personal platform technologies.	**Digital innovation**	**Investment**	**Governance**	FY 2021: RnD expenditure 3,1% of revenue.	Social Innovation Business, focusing on "Digital," "Green" and "Innovation" as the growth drivers.	Co - creation with cusomers and partners
9 - 4.16. Global deployment of IP activities based on IP strategy	**Digital innovation**	**Investment**	**Governance**	FY 2021: Globally implemented an intellectual prop-erty strategy comprising three pillars: Competition, Collaboration, and IP for society.		
9 - 4.17. Strengthening information security management	**Information security**	**Management**	**Governance**	FY 2021: Advanced the strengthening of information security governance worldwide, based on our rules for information security, established in compliance with the ISO/IEC 27001 standard, and furthermore en-hanced with NIST SP 800-171 U.S. government stand-ard. FY 2021: Implemented IT countermeasures and activ-ities to raise security awareness among employees in conjunction with promoting telecommuting FY 2021: Implemented measures to reduce security risks during deals/post-merger integration in conjunc-tion with acquisitions and sales of companies		
9 - 4.18. Security monitoring	**Information security**	**Management**	**Governance**	FY 2021: Enhanced cyber monitoring by using end-point detection and response to monitor equipment operation, implemented authentication, and strengthened cyber monitoring		
Company code 5						
9 - 5.1. Creation of innovation model for categorizing innovation types and identi-fying the market dynamics, leadership style and intellectual property (IP) attributes that best fit each one, and used by our operating companies to identify high-value innovation in the context of their particular businesses and served markets	**Digital innovation**	**Investment**	**Governance**		DBS Innovation Engine program	
9 - 5.2. Scaling up synthetic biology with automation	**Scientific research**	**Science development**	**Product**			
9 - 5.3. Releaze of new platforms	**Digital Solutions**	**Science development**	**Product**	FY 2022: Skyland Analytics, adding Skyland's PIMS manufacturing data management software capabili-ties to its BioPharma Lifecycle Management (BPLM) platform.		
9 - 5.4. Accelerating Microscopy Workflows	**Digital Solutions**	**Science development**	**Product**	FY 2022: launched the world's first Microhub, Mica—an integrated digital imaging platform		
9 - 5.5. Development of GeneXpert system	**Life saving innovation**	**Science development**	**Product**		Cepheid's Global Access program	
9 - 5.6. Videojet and Laetus technology for marking and coding of individual pack-ages of medications, baby food and formula.	**Life saving innovation**	**Science development**	**Product**	FY 2022: 9 of 10 products worldwide are touched by Danaer identification business		

	9 - 5.6. Creation of Panton for different skin tones of the human that can be used for a variety of applications including cosmetics and prosthetics, to accurately depict and celebrate diverse skin tones of the world.	**DEI**	**Social**	**People**	FY 2021: Issue of Skinetone guide		
	Company code 6						
	9 - 6.1. Equipment for Spectroscopic analysis of artwork	**Scientific research**	**Science development**	**Product**		Application for Art & Document Fraud Prevention	
	9 - 6.2. Detecting threats from explosives and narcotics	**Life saving innovation**	**Science development**	**Product**		Application for Critical Infrastructure Protection	
	9 - 6.3. Development design guidelines for sustainability that cover aspects such as material selection, conscious use of natural resources, energy efficiency, waste reduction, user satisfaction and social responsibility.	**Standards & guidelines**	**Environmental management**	**Planet**			
	9 - 6.4. Sustainability in X-ray technology (IµS DIAMOND)	**Industrial manufacturing**	**Industry oriented products**	**Product**			
10	**Company code 4**						
	10 - 4.1. Promote diversity among executives	**DEI**	**Social**	**People**	FY 2021: female executive and corporate officers: 12.2%, ratio of non-Japanese executive and corporate officers: 17.6%	Increase the number of females and non-Japanese executives and officers	
	10 - 4.2. Regularly conducted Women's Summits Held DEI strategy and media briefing session	**DEI**	**Social**	**People**			
	10 - 4.3. Accelerate the advancement of DEI based on our DEI policy and strategy	**DEI**	**Social**	**People**	FY 2021: Set targets for Business Units (BUs), corporate function, and Group company in line with our three global DEI themes: Gender-balance, Cultural diversity, and Multi-generation, and promoted related efforts		
	10 - 4.4. Enhance employees' understanding of DEI	**DEI**	**Social**	**People**	FY 2021: Promoted training, etc. at each Group company worldwide to enhance employees' understanding of DEI		
	10 -4.5.Development of corporate policies, practices and benefits for LBGTQ+ community	**DEI**	**Social**	**People**	FY 2021: Scored 100 at Human Rights Campaign's Corporate Equality Index	Rainbow connections	
		DEI	**Social**	**People**		LGBTQ+ health care concierge services	
	10 - 4.6. Providing opportunities to more individuals from different nationalities to progress in leadership	**DEI**	**Social**	**People**		Diversity Month initiative to highlight a cultural diversity	
	10 - 4.7. Celebration of diversity in the workplace	**DEI**	**Social**	**People**		Spotlight months to share stories of people heritage and culture. Religion and holidays.	
	10 - 4.8. Providing inclusing working places	**DEI**	**Social**	**People**			
	10 - 4.9. Promotion of people with disabilities	**DEI**	**Social**	**People**	FY 2021: Employment ratio of people with disabilities 2, 51%	Joined The Valuable 500 movement	Recruiting fairs, special subsidiaries(Hitachi You and I") to provide people with disabilities
	10 - 4.10. Launching on-line course introducing non-discriminative policies and accommodations designed for people with disabilities	**DEI**	**Social**	**People**	FY 2021: Attendance 168 000 employees.	"Working Together with People with Disabilities	
	10 - 4.11. Equal employement opportunity policies	**HR strategy**	**Social**	**People**			
	Company code 5						
	10 - 5.1. Increase the diversity of the teams	**DEI**	**Social**	**People**	FY 2021: 43% hired were women, 74% of new hires were diverse	Diverse talent attaction program	Partnership with diverse professional organization
	10 - 5.2. D+I talent platform	**DEI**	**Social**	**People**	Global women FY 2019-2025; US people of color FY 2019 - 2025		

10 - 5.3. Creation of a strong sence of beonging and realization of employees potential	**Working environment**	**Health & Wellbeing**	**People**	FY 2022: Team age group. 32% 21-40; 25% 41-50; 19% 51-60; 4% 61-65		
10 - 5.4. Adopting DEI policy	**DEI**	**Social**	**People**		DEI Commitment	
10 - 5.5. Setting requirements to each people leader to have a D+I-related personal performance or development objective as part of annual review process	**DEI**	**Social**	**People**			
10 - 5.6. Est. day of Understanding (DoU) to stimulate opportunities for addressing potential bias in the workplace and fostering a culture of inclusion and understanding.	**DEI**	**Social**	**People**	FY 2021: 93% people leaders hosted sessions with their teams on topics: Micro-Behaviors & Bias and Examining Identities and Intersectionality.		
10 - 5.7. Est. Associate Resource Group as a tool promoting inclusion and diversity	**DEI**	**Social**	**People**		Mentoring and coaching programs on inclusion at workplace and diversity	
10 - 5.8. Creating +Friends community for ones who actively supports and defends the rights, interests and wellbeing of another person or group	**DEI**	**Social**	**People**	FY 2021: ARG membership: Asian Decent+Friends +130$; Black+Friends +130%; Latinx + Friends +170%; LGBTQ + Friends +50%; Women + Friends U.S. & Canada +110%. FY 2022:Black + Friends ARG celebrated Black History Month with the theme For the Culture, FY 2022: Women + FriendsARGs from across the globe recognized International Women's Day to reak the bias. FY 2022: The LGBTQ + Friends ARG hosted their first in-person summit in Washington, FY 2022: Descent + Friends ARG celebrated the Lunar New Year with two virtual celebrations. FY 2022: Friends ARG hosted two programs to celebrate the diverse Latinx culture and support associates on their career development journey	ARG Groups: Women+Friends; BLACK + FRIENDS; LGBTQ + FRIENDS; LATINX + FRIENDS; ASIAN DESCENT + FRIENDS Cultural celebration programs	
Company code 6						
10 - 6.1. Providing Demographic and gender diversity	**DEI**	**Social**	**People**	FY 2022: Indicators for demographic, gender diversity in the overall group and US		
10 - 6.2. Welcoming and supporting minorities and the LGBTQ+ community	**DEI**	**Social**	**People**			
10 - 6.3. Women empowerment	**DEI**	**Social**	**People**		Teaching degree program for women at ETH Zurich,	Society for Women in Natural Sciences (WiNS).
11	**Company code 2**					
11 - 2.1. provide charging solutions for electric vehicles and power solutions for mass transport, such as trains and e-buse	**Mass transport solutions**	**Industry oriented products**	**Product**			
11 -2.2. magnetics products for distribution of renewable energy	**Renewable energy**	**Environment oriented products**	**Product**			
11 - 2.3. Connectivity solutions enable people to connect with one another, building communities and making them more inclusive.	**Community engagement**	**Social**	**People**			
11 - 2.4. Creation of jobs and contribute to the social and economic well-being of the communities through tax revenues, donations and volunteering.	**Community engagement**	**Social**	**People**			
Company code 3						
11 - 3.1.Technologies for developing powered flight control systems to reduce the environmental impact	**Aircraft industry**	**Industry oriented products**	**Product**	FY 2021: Net sales increased by 0.5%		
Company code 4						
11 - 4.1. Promoting digital solutions finance and public oriented	**Digital solutions**	**Science development**	**Product**		Digital systems and Services program	

	11 - 4.2. Designing smart app for public transport	**Digital solutions**	**Science development**	**Product**			
12	*Company code 1*						
	12 - 1.1. Quality control while manufacturing process	**Quality control**	**Management**	**Governance**			
	Company code 3						
	12 - 3.1. Quality control throughout the entire manufacturing and service value chain to ensure safety	**Quality control**	**Management**	**Governance**			
	Company code 4						
	12 - 4.1. Engaging in quality assurance activities	**Quality control**	**Management**	**Governance**	FY 2021: Ensured technical law compliance FY 2021: Pursued thorough safety design and safety monitoring for products and services	Quality assurance activities	
	12 - 4.2. External audits concerning product quality assurance	**Quality control**	**Management**	**Governance**	FY 2021: Commissioned regular external audits concerning product safety		
	12 - 4.3. International standards certification for our quality management system	**Complying standards**	**Management**	**Governance**	FY 2021: Surveyed the number of certified business sites		
	12 - 4.4. Implementing initiatives to improve communication with customers	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2021: Held seminars and forums to improve CS	Executive seminars, Hitachi Social Innovation Forum, Technology Community program	
	12 - 4.5. Conducting digital marketing	**Value Chain management**	**Stakeholders**	**Governance**			
	12 - 4.6. Engaging in advertising activities	**Value Chain management**	**Stakeholders**	**Governance**	FY 2021: Promoted communication activities based on our Advertisement Guidelines and Social Media Policy		
	12 - 4.7. Providing comprehensive customer support online	**Value Chain management**	**Stakeholders**	**Governance**	FY 2021: Web Inquiry Responsiveness Improvement Course attendees - Not held in fiscal 2021 due to the pandemic (858 attendees in total since fiscal 2009)		
	12 - 4.8. Engaging in activities to improve customer satisfaction (CS) regarding home appliances	**Value Chain management**	**Stakeholders**	**Governance**	FY 2021: Conducted a CS survey using the evaluation survey for customer repair services (Satisfaction rate: 95.4%)	these initiatives are carried out under the slogan, "360° Happiness: More smiles to life for one and all."	
	Company code 5						
	12 - 5.1. Package optimization design reducing storage and transportation needs and ultimately reducing their environmental impact.	**Onsite optimization**	**Environmental impact**	**Planet**	FY 2021: eliminated the need for 18,100 trucks on the road, 10,000 gallons of gasoline and 909,000 trucking miles—equivalent to two round trips to the moon—and saved 3.4 million pounds of CO_2.	Reducing Waste Through Packaging and Pallet Optimization	
	12 - 5.2. Replacement of shipping cases with trays	**Onsite optimization**	**Environmental impact**	**Planet**	FY 2021: Reduction of the customer's paper consumption by over 23 tons.		
	12 - 5.3. Extending product life span to minimize waste by chromatography columns	**Analytical & Screening instruments**	**Environment oriented products**	**Product**			
13	*Company code 1*						
	Evaluating their future efforts towards net zero CO2 in 2023 - > Outlining related section to separate TCFD report						
	Company code 2						
	13 - 2.1.Design products that are more energy efficient and less harmful to the environment than the ones they replace.	**Eco-products**	**Environment oriented products**	**Product**			
	13 - 2.2. products that reduce carbon emissions, aiding electrification, automation and improving efficiency, assists in combating climate change.	**Eco-products**	**Environment oriented products**	**Product**			

13 - 2.3. Setting net-zero CO2 plans till 2030 within group (Scope 1, 2)	**Emissions**	**Environmental impact**	**Planet**	FY 2021: REDUCTION IN SCOPE 1 & 2 EMISSIONS 35%	
13 - 2.4. Setting net-zero CO2 plans till 2040 within value chain (Scope 3)	**Emissions**	**Environmental impact**	**Planet**	FY 2021: REDUCTION IN SCOPE 1 & 2 EMISSIONS IN-TENSITY VS CY2019	
13 - 2.5. Reducing resource consumption, such as energy and water, and recycling	**Resource control**	**Environmental impact**	**Planet**	FY 2022: Energy consumption during 2022 was 4% lower	
13 - 2.6. focus on reducing greenhouse gas emissions and energy intensity.	**Emissions**	**Environmental impact**	**Planet**		
13 - 2.7. ISO 450001 certification of working sites	**Standards & Guidelines**	**Environmental management**	**Planet**	FY 2021: 48% OF GLOBAL WORKFORCE NOW WORK-ING AT SITES WITH ISO 45001 CERTIFICATION	
13 - 2.8. Conducted further analysis and detailed financial modelling for the cli-mate-related risks and opportunities identified in risk management processes.	**Risk management**	**Management**	**Governance**		
13 - 2.9. Adopting TCFD reporting	**Standards & Guidelines**	**Environmental management**	**Planet**		
13 - 2.10. Conducting energy audit	**Energy control**	**Resource control**	**Planet**		
13 - 2.11. use recycling options where available and reduce packaging.	**Zero waste**	**Environmental impact**	**Planet**		
13 - 2.12. Follow all relevant laws and regulations governing electronic waste han-dling, storage and disposal	**Complying legislations**	**Environmental management**	**Planet**		Restriction of the Use of Hazardous Sub-stances in Electrical and Electronic Equip-ment Regulations 2004 ("RoHS"); ■ Waste Electrical and Electronic Equipment Regu-lations 2006 ("WEEE") ■ Producer Responsibility Obligations (Packaging Waste) Regulations 2005 ■ Waste Batteries and Accumulators Reg-ulations 2009
13 - 2.13. Responsible and sustainable use of plastic	**Plastic**	**Resource control**	**Planet**		
13 - 2.14. Replace foam packaging with more environmentally friendly and recycla-ble options.	**Onsite optimization**	**Environmental impact**	**Planet**		
13 - 2.15. Reduce use of non-recyclable materials to low down environmental footprint	**Zero waste**	**Environmental impact**	**Planet**		
13 - 2.16. Accreditation of ISO 14001 (Environmental Management System)	**Standards & Guidelines**	**Environmental management**	**Planet**	FY 2022: Two more sites got ISO 14001 accreditation	Group-wide supplier audit programme, focusing on the Group's largest suppliers during the year.
13 - 2.17. ensure raw materials used are from responsible sources	**Complying legislations**	**Environmental management**	**Planet**		Supplier Code of Conduct, Modern Slav-ery Statement and Conflict Minerals Policy
13 - 2.18. moving from a linear to a circular value chain	**Circular manufacturing**	**Environmental impact**	**Planet**		
13 - 2.19. Sharing a key metrics of carbon emissions	**Complying legislations**	**Environmental management**	**Planet**	FY 2022: Over 2020-2022 for Scope 1, 2, 1+2; Scope 3, total	
Company code 3					
13 - 3.1. Switch to using electricity from renewable energy sources	**Energy control**	**Resource control**	**Planet**	Decrease of CO2 emission by 47,8%	Achieve a net zero CO2 emission by 2050	Reduce Co2 emission from customers
13 - 3.2.Installation of solar power equipment	**Energy control**	**Resource control**	**Planet**		
13 - 3.3 Efficiency improvement measures: installing smart meters, diagnosing en-ergy usage.	**Onsite optimization**	**Environmental impact**	**Planet**	86% of electricity used - renewable energy	
13 - 3.4. Become a member of RE100 Initiative	**Standards & Guidelines**	**Environmental management**	**Planet**		

13 - 3.5. Twice annually environmental meetings to measure climate related risks on business	Risk management	Management	Governance		Considering two global scenarios: carbon reduction efforts result 1.5C hotter and 4C hotter.	Risk are assessed based on climate change scenarios by Energy Agency (IEA)
13 - 3.6. Development of fully solid-state batteries, equipment to analyze gasses emitted from batteries	Scientific research	Science development	Product	FY 2050: Net zero CO2, 100% of renewable energy usage	Build carbon free society	
13 - 3.7. Release an electric motor balancers	Mass transport solutions	Industry oriented products	Product	FY 2040: Reduce CO2 Emissions by 90%		
13 - 3.8. Contribution to wood biomass-based electricity generation	Renewable energy	Environment oriented products	Product	FY 2030: Reduce CO2 Emissions by 85%		
13 - 3.9. Support for achieving stronger and lighter materials	Machinery industry	Industry oriented products	Product	FY 2030: Reduce CO2 Emissions from customers by 30%		
13 - 3.10. Carbon capturing and storage applications	Renewable energy	Environment oriented products	Product			
13 - 3.11. Reducing waste from PCR testing	Circular manufacturing	Environmental impact	Planet	Recycling rate 99%	Achieve a circular-economy	
13 - 3.12. Reuse of packaging materials	Circular manufacturing	Environmental impact	Planet			
13 - 3.13. IoT- Based Plastic Waste collection systems	Circular manufacturing	Environmental impact	Planet			
13 - 3.14. Watering green areas by rainwater,	Green areas	Resource control	Planet	FY 2021: Indicator rate for water usage increased 5,3%	Sustainable usage of resources	
13 - 3.15. Installation of water efficient fixtures	Water use	Resource control	Planet			
13 - 3.15. Development of Eco-products	Eco-products	Environment oriented products	Product	FY 2021: 25% higher energy efficiency 25% smaller size 25% lower consumption rate of gasses	Environmental friendliness of products	
Company code 4						
13 - 4.1. Enhancing environmental government and management system	Business strategy	Management	Governance	FY 2022: Registered data from about 1,500 business sites in 67 countries in the Environmental Data Collection System (Eco-DS) to estimate environmental load FY 2022: A total score of 269 GPs in the GREEN 21 evaluation of Environmental Action Plan		
13 - 4.2. Reduction environmental burdens	Standards & Guidelines	Environmental management	Planet	Total certified facilities 50	"Eco-Factories & Offices Select" certification	
13 - 4.3. Environmental human capital development	Education	Social	People	FY 2022: 132 773 people attended	Global climate change e-learning materials	
13 - 4.4. Ensuring environmental compliance	Standards & Guidelines	Environmental management	Planet	FY:2022 Implementation rate of voluntary environment business audits 56%	Voluntary environmental audit	
13 - 4.5. Reduction of CO2 emissions throughout the value chain	Emissions	Environmental impact	Planet	FY:2021 Reduction of CO2 emissions of products and services 37% FY 2021: A roadmap achieving carbon neutrality at business sites by 2030 FY 2021: Reduction rate of CO2 of business sites by 9%	Carbon neutrality by fiscal 2050 through the value chain and reduce CO2 emissions 50% by fiscal 2030 (compared to fiscal 2010) Achieve carbon neutrality at business sites (factories and offices) by fiscal 2030	
13 - 4.6. Reduction of water-use per unit	Water use	Resource control	Planet	FY 2021: reduction rate 36%		

13 - 4.6. Respond to water risks	Water use	Resource control	Planet		Promoted measures based on water risk survey results	
13 - 4.7. Promote eco-design to products	Eco-products	Environment oriented products	Product			
13 - 4.8. Reduction of waste and valuables generation per unit	Circular manufacturing	Environmental impact	Planet	FY 2021: Reduction rate in waste 18%		
13 - 4.9. Promote ecosystem preservation efforts	Minerals	Resource control	Planet	FY 2021: Joined the 30by30 Alliance for Biodiversity		
13 - 4.10. Enhancing efficiency of transformers, high voltage products, and power transmission/ distribution	Onsite optimization	Environmental impact	Planet			
13 - 4.10. Advancing smart grid control	Onsite optimization	Environmental impact	Planet			
13 - 4.10. Promoting electrification through electric powertrain systems	Urban development	Environmental impact	Planet			
13 - 4.10. Reducing CO2 by improving operational efficiency through AD/ADAS solutions	Emissions	Environmental impact	Planet			
13 - 4.11. IP activities to create environmental value: Established the new Environmental IP Enhancement Center	Standards & Guidelines	Environmental management	Planet	FY 2021: Awarded for inclusion in Clarivate Plc's Derwent Top 100 Global Innovators (2021) list for the 11th consecutive year		
13 - 4.12. registered a wind-generation technology that contributes to resolving climate change issues	Renewable energy	Environment oriented products	Product			with WIPO Green
13 - 4.13. Constructing IP libraries with solutions for green energy, High-speed battery deterioration diagnostics.	Digital solutions	Science development	Product			
13 - 4.14. Responding to the conflict mineral Issue	Minerals	Resource control	Planet	FY 2021: Revised the Hitachi Group's Conflict Minerals Procurement Policy to formulate the Hitachi Group's Policy for Responsible Supply Chain of Minerals in response to the expanded scope of responsibilities expected of companies in their procurement of minerals		
				Held the Hitachi Group Conflict Minerals Seminar for the sales, procurement, and sustainability divisions of business units and Group companies (Number of participants: 270 people)		
Company code 5						
13 - 5.1. Development of environmental and applied solutions that reduce environmental footprint	RnD	Investment	Governance	FY 2022: Esko's Cape Pack package design software helps customers optimize the number of boxes per pallet and truckload, reducing torage and transportation needs and ultimately their environmental footprint		
13 - 5.2. Transformation of environmental, health and safety challenges into a vision through policies: code of conduct, EHS policy, sustainability policy, supplier code of conduct and sustainability policy.	Code of Conduct & Ethics	Management	Governance		EHS program (environment, health and safety)	
13 - 5.3. Motivation on commitment of EHS policies	Standards & Guidelines	Environmental management	Planet		Ecovadis ratings among operating companies demonstrating the depth of our sustainability leadership and commitment	
13 - 5.4. Est. goals designed to achieve meaningful improvement in EHS performance and reduce impact on the environment.	Standards & Guidelines	Environmental management	Planet	FY 2021: 50,4% reduction in Scope 1 and 2 GHG Emissions		
13 - 5.5. Development of special toolkits for reduction of wastes	Standards & Guidelines	Environmental management	Planet	FY 2020: Announcement of 5years plan to reduce the percentage of non-hazardous/non-regulated waste sent to landfill or incineration by 15%	EHS management programs: DBS Energy management Toolkit	

13 - 5.6. Tracking a range of EHS-related KPIs to measure the effectiveness of programs and quantify the progress.	**Standards & Guidelines**	**Environmental management**	**Planet**		EHS management programs: DBS Waste Minimization Toolkit; Water Stewardship Toolkit,	
13 - 5.7. Adhering to ISO standards environmental ISO 14001, ISO 45001 (health and safety) and ISO 50001 (energy management)	**Standards & Guidelines**	**Environmental management**	**Planet**	FY 2021: Number of sites adhering to EHS ISO Standards: ISO 14001- 56; ISO 45001 - 19; ISO 50001 - 5	Adhering to globally recognized EHS management systems.	
13 - 5.8. EHS Risk Assessment	**Risk management**	**Management**	**Governance**		Global "Best" EHS program within the company; EHS Audit Program	
13 - 5.9. Annual awareness trainings to cover a wider variety of EHS topics and target a broader audience of associates.	**Standards & Guidelines**	**Environmental management**	**Planet**		EHS Training, Education and Best Practice Sharing	
13 - 5.8. Adopting a system, Benchmark ESG, to collect and manage EHS information globally	**Risk management**	**Management**	**Governance**			
13 - 5.9. Reduction of CO2 by deploying automated building management systems, converting to LED lighting and investing in high-efficiency HVAC systems.	**Onsite optimization**	**Environmental impact**	**Planet**	FY 2021: Reduction of CO2 over 25%	Driving Energy Efficiency program	
13 - 5.1. Combination of energy kaizens and procuring renewable electricity from the suppliers	**Energy control**	**Resource control**	**Planet**	FY 2021: Reduced absolute CO2 emissions by more than 30% in 2021 vs. 2019.		
13 - 5.11. Generating Energy On-Site	**Energy control**	**Resource control**	**Planet**			
13 - 5.12. Reducing Waste sent to landfill	**Circular manufacturing**	**Environmental impact**	**Planet**	FY 2021: Leica Microsystems became the first Danaher operating company to be 100% "landfill free"— reaching zero waste to landfill in non-hazardous waste operations. FY 2021: reduced the percentage of non-hazardous/non-regulated waste sent to landfill from 43% in 2019 to 31% in 2021.	DBS Waste Minimization toolkit Waste reduction programs	Pall Life Sciences' to reduce the percentage of non-hazardous/non-regulated waste sent to landfill
13 - 5.13. Introduction of climate risks and opportunities program	**Risk management**	**Management**	**Governance**	FY 2022: Start of the program. Test mode	Management program to identify, assess and manage climate risks and opportunities based on elements of the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD).	
Company code 6						
13 - 6.1. Precise quantitative measurements to determine the concentration of various Greenhouse Gases in the atmosphere	**Analytical & Screening instruments**	**Environment oriented products**	**Product**			
13 - 6.2. Equipment for Screening and characterization of microplastics	**Analytical & Screening instruments**	**Environment oriented products**	**Product**		Application for Microplastics Analysis	
13 - 6.3. Equipment to perform chemical analysis of polymers and plastics.	**Analytical & Screening instruments**	**Environment oriented products**	**Product**		Application for Recycling of Polymers and Plastics.	
13 - 6.4. Equipment for sorting valuable ferrous and non-ferrous metal scrap.	**Analytical & Screening instruments**	**Environment oriented products**	**Product**		Application for Scrap Metal Recycling.	
13 - 6.5. Enhancing landfill mining by supporting researchers to study the composition of the secondary products	**Analytical & Screening instruments**	**Environment oriented products**	**Product**		Application for Recycling Waste Plastics Recovered from Landfills	
13 - 6.6. Presenting an End-of-life cycle of products	**Circular manufacturing**	**Environmental impact**	**Planet**		program to discontinue sales of the product to new customers.	
13 - 6.7. Tacking CO2 emissions and energy consumption	**Emissions**	**Environmental impact**	**Planet**	FY 2022: CO2 emissions scope 1,2 FY 2022: energy consumption index		
13 - 6.8. Switching to renewable energy	**Energy control**	**Resource control**	**Planet**	FY 2022: 39% of energy is renewable		

	13 - 6.9. Tracking of waste generation	**Zero waste**	**Environmental impact**	**Planet**	FY 2022: 2,896 tons of waste generated, 0 number of reportable spills		
	13 - 6.10. Tracking a waste generated from the handling of cooling liquids	**Zero waste**	**Environmental impact**	**Planet**	FY 2022: 317 of hazard tons waste generated		
	13 - 6.11. reduce the amount of cooling liquids used in our manufacturing process	**Quality control**	**Management**	**Governance**			
	13 - 6.12. Recovering and recycling cooling liquids wherever possible.	**Quality control**	**Management**	**Governance**			
	Company code 3						
	14 - 3.1. Underwater magnetic technologies	**Marine industry**	**Industry oriented products**	**Product**			
	Company code 5						
	14 - 5.1. Creation of aquatic informatics a real-time data management and analytics platform to efficiently manage water data from more than 22,000 stream gauging, groundwater, water quality and precipitation sites.	**Water quality**	**Health oriented products**	**Product**	FY 2021: over 58 billion historical data points and robust analytical capabilities, the USGS has increased data consistency, comparability and reliability to help agencies and scientists around the world reduce operating expenditures, protect infrastructure investments and preserve the health of ecosystems and communities.	Managing the world water data	
	Company code 6						
	14 - 6.1. Equipment for Analyzing oil and grease contamination	**Water quality**	**Health oriented products**	**Product**			
	14 - 6.2. Complying ASTM D 7575 (American Society for Testing and Materials)	**Complying Standards**	**Management**	**Governance**		Applicatoin for water and soil analysis	
	14 - 6.3. Measuring water contamination with heavy metals and hazardous elements	**Water quality**	**Health oriented products**	**Product**		Application for Critical Zone and Environmental Science	
15	**Company code 3**						
	15 - 3.1. Creation of company's forest	**Environmental conservation**	**Environmental impact**	**Planet**	FY 2021: 8000m2 square	Volunteers for cultivation activities	Kyoto Model Forest Association
	15 - 3.2. Removing old leaves	**Environmental conservation**	**Environmental impact**	**Planet**	FY 2021: 14 000 Futaba leaves were used	Annual environmental festivals	
	15 - 3.3. High-efficiency seawater desalination system	**Water quality**	**Health oriented products**	**Product**		Callaboration with WIPO Green	with WIPO Green
	15 - 3.4. Planting trees, remove weeds to help honeybees.	**Environmental conservation**	**Environmental impact**	**Planet**			
	Company code 6						
	15 - 6.1. Real time methods to identify illegal logging and timber trafficking	**Environmental conservation**	**Environmental impact**	**Planet**		Application DART-MS	
16	**Company code 1**						
	16 - 1.1. Conducting our business in an ethical manner	**Code of Conduct & Ethics**	**Management**	**Governance**			
	16 - 1.2. Anti-bribery and anti-corruption policies	**Code of Conduct & Ethics**	**Management**	**Governance**			
	16 - 1.3. Review of export and sanction policies	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2022: Internal compliance programme for export controls and customs in the year		

16 - 1.4. Dissemination of inside information to the market and share dealing policies	**Code of Conduct & Ethics**	**Management**	**Governance**		
16 - 1.5. Supply chain responsible sourcing strategy	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2022: 5% reduction in our direct supplier base; a reduction of 55% since we started this strategy.	
16 - 1.6. Respect of Human rights and not support modern slavery	**Code of Conduct & Ethics**	**Management**	**Governance**		Global Human Rights Policy
16 - 1.7. publicly available global Code of Business Conduct and Ethics,	**Complying standards**	**Management**	**Governance**		
16 - 1.8. Introduction of Anti-Slavery and Human Trafficking Statement	**Code of Conduct & Ethics**	**Management**	**Governance**		
16 - 1.9. Protection of Intellectual property and confidentiality	**Code of Conduct & Ethics**	**Management**	**Governance**		
16 - 1.10. Data protection, data privacy and data security policies	**Risk management**	**Management**	**Governance**		
16 - 1.11. Sharing Financial sustainability and tax transparency	**Code of Conduct & Ethics**	**Management**	**Governance**		
Company code 4					
16 - 4.1. Group structure for promoting human rights. GRI 406-1	**Risk management**	**Management**	**Governance**	FY 2021: Investigated the actual situation concerning potential forced labor and violations of migrant workers' rights, which were identified as common priority risks for the Hitachi Group FY 2021: Provided guidance to operational sites where there were issues to be improved based on the results of investigation of the actual situation and implemented appropriate measures there	HRDD initiatives (Human rights due diligence - a risk management tool for organisations.) Initiatives to Promote Broad-Based Black Economic Empowerment (B-BBEE) in South Africa
16 - 4.2. Raise human rights awareness among executives and employees and education. GRI 103-2	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2021: Continuously worked to raise human rights awareness among all Hitachi Group employees through opportunities such as trainings, and message from the President & CEO on Human Rights Day FY 2021: Carried out executive human rights training taught by an external lecturer	
16 - 4.3. Global Group grievance mechanisms	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2021: The facts related to all reports, including those concerning harassment and human rights issues, are subject to thorough investigation. Reporters are informed of the investigation results, and remedial action is taken when necessary.	Handle various human rights issues, including problems concerning the work environment of foreign technical interns in Japan, and global supply chain issues related to Uighurs.
16 - 4.4. Donations for humanitarian aid to Ukraine	**Charity & Voluntarism**	**Social**	**People**	FY 2021: Donated 360 million yen to the Japanese Red Cross Society and the Japan Committee for UNICEF	
16 - 4.5.Implementing all of the principles of the Corporate Governance Code	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2021: A restricted stock compensation unit system was introduced as compensation for non-Japanese executive officers and corporate officers, and the scope of the system was applied to executives at some Group companies.	
16 - 4.6. CEO appointment, dismissal, and succession plan	**Code of Conduct & Ethics**	**Management**	**Governance**		
16 - 4.7. Determining appropriate compensation for directors and executive officers	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2021: In addition to environmental targets such as decarbonization and resource efficiency, we introduced quantitative and qualitative target setting for occupational health and safety and product quality in the compensation evaluation of all executive officers.	Reviewing executive compensation systems
16 - 4.8. Reflecting sustainability targets in the executive compensation evaluation	**Code of Conduct & Ethics**	**Management**	**Governance**		

	16 - 4.9. Implementing internal controls over financial reporting	**Code of Conduct & Ethics**	**Management**	**Governance**			
	16 - 4.10. Building a more effective and efficient auditing system	**Value chain management**	**Stakeholders**	**Governance**			
	16 - 4.11. Complying with company's Codes of Conduct. GRI 103-2	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2021: Translated into multiple languages and shared with Hitachi Group executive officers and employees around the world.		
	16 - 4.12. Cultivating a Culture of Ethics and Compliance	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2021: Set a global target to measure and improve Hitachi's ethical culture. FY 2021: Conducted ethics and compliance training for all executive officers and employees. (Participation rate: 99.1% in the Hitachi Group globally) FY 2021: 100:105 (women men)	Ethics and Compliance Risk Assessments Strengthening our Speak-up Culture	
	16 - 4.13. Implement prevention of bribery and corrupt practices and compliance with competition law	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2021: Established Standards for the Value Limits and Frequency of Entertainment and Gifts Applicable to Commercial Parties and revised the Approval Procedures on Donation Expenditures. FY 2021: Revised guidelines for preventing cartel activity.	Preventing bribery and corrupt practices Complying with competition laws	
	16 - 4.14. Carrying out strict export controls	**Value chain management**	**Stakeholders**	**Governance**			
	16 - 4.15. Implementing thorough tax compliance	**Code of Conduct & Ethics**	**Management**	**Governance**			
17	Company code 3						
	17 - 3.1. Partnership with public research institutions	**Partnership**	**Stakeholders**	**Governance**			
	17 - 3.2.Partnership with companies	**Partnership**	**Stakeholders**	**Governance**			
	17 - 3.3. Partnership with local governments	**Partnership**	**Stakeholders**	**Governance**			
	17 - 3.4. Partnership with organizatons NARO	**Partnership**	**Stakeholders**	**Governance**			
	Company code 4						
	17- 4.1. Partnership with WIPO Green (World Intellectual Property Organization)	**Partnership**	**Stakeholders**	**Governance**			
	17 - 4.2. Partners with diverse suppliers with minority, women, LGBTQ+ or person-with-disability owners.	**Partnership**	**Stakeholders**	**Governance**			
	17 - 4.3. Working with procurement partners	**Partnership**	**Stakeholders**	**Governance**	FY 2021: Conducted investigations of the actual situation concerning potential forced labor and violations of migrant workers' rights for procurement partners as well		

17 - 4.4. Encouraging procurement partners to reduce their environmental load	**Value Chain management**	**Stakeholders**	**Governance**	FY 2021: Assessed and analyzed the status of procurement partners' sustainability initiatives through surveys with a focus on human rights and environmental risk assessment FY 2021: Conducted sustainability audits of procurement partners in China and other Asian countries (Target: 25 companies) FY 2021: Held sustainable procurement seminars online on Hitachi Group sustainability initiatives for procurement partners (Target: 359 companies in China and the rest of Asia) FY 2021: To coincide with COP26, organized "Towards Net Zero—Hitachi Value Chain Innovators," an online event concerning value chains. FY 2021: Received the highest rating for CDP supplier engagement	Sustainability monitoring of procurement partners Conducting sustainability audits Holding sustainable procurement seminars for procurement partners	
17 - 4.5. Promoting social contribution activities in three areas of STEAM, the environment, and community support. GRI 103-2	**Community engagement**	**Social**	**People**	FY 2021: We provided 1,869.4 million yen in funding toward social contribution activities worldwide. Additionally, a total of 33,585 Hitachi Group employees (around 9.6% of the total) participated in social contribution activities.	Social contribution activity funding and number of participating employees	
17 - 4.6. Social contribution scheme enabling Hitachi and its employees to make donations together (matching funds)	**Charity & Voluntarism**	**Social**	**People**	FY 2021: introduced a social contribution scheme (matching funds) through which donations made by employees will be matched by the Group FY 2021: A total of approximately 77.2 million yen in matching fund donations		
17 - 4.7. Conducting board meetings in a way that sustainably enhances corporate value and shareholders' common interests	**Value Chain management**	**Stakeholders**	**Governance**	FY 2021: To formulate the Mid-term Management Plan 2024, the Board of Directors held numerous discussions between executive officers and directors on the plan's direction and priority issues.	Administrative performance of the Board of Directors	
17 - 4.8. Enhancing collaboration through tripartite audits	**Value Chain management**	**Stakeholders**	**Governance**			
17 - 4.9. Enhancing the Hitachi Global Compliance Hotline	**Code of Conduct & Ethics**	**Management**	**Governance**	FY 2021: Received 1,023 reports from all Group companies worldwide.	Whistleblower system	
17 - 4.10. Strengthening Business Continuity Plans (BCPs)	**Risk management**	**Management**	**Governance**	FY 2021: Under the COVID-19 task force's leadership, our regional headquarters around the world gathered local information as well as share information on the measures taken by Hitachi Group companies in their respective regions FY 2021: Conducted an earthquake drill on the assumption that there is a mix of those who come to the office and those who work from home	Continuously strengthening Pandemic and Natural Disaster BCPs	

Summary of codes, categories and clusters for case companies 1-6

Cluster	Category	n	Codes	1	2	3	4	5	6	total	SDGs
Product	Industry oriented products	1	Food industry	-	-	2	-	-	1	**3**	**2,6**
		2	Medical industry	-	1	1	1	10	-	**13**	**3**
		3	Marine industry	-	-	1	-	1	-	**2**	**6,14**
		4	Industrial manufacturing	1	3	1	1	-	1	**7**	**9**
		5	Aircraft industry	-	-	2	-	-	-	**2**	**9,11**
		6	Machinery industry	-	-	2	-	-	-	**2**	**3,13**
		7	Mass transport solutions	-	1	1	-	-	-	**2**	**11,13**
			total for category	*1*	*5*	*10*	*2*	*11*	*2*	*31*	
	Environment-oriented products	8	Water use reduction	-	-	-	-	2	1	**3**	**6**
		9	Eco-products	-	2	1	1	-	-	**4**	**13**
		10	Renewable energy	-	2	3	4	-	3	**12**	**7,11,13**
		11	Analytical & screening instruments	-	1	1	-	1	5	**8**	**3,6,12,13**
			total for category	*0*	*5*	*5*	*5*	*3*	*9*	*27*	
	Health oriented products	12	Safe drinking water	-	-	-	-	3	-	**3**	**3,6**
		13	Supporting health	-	-	-	-	-	7	**7**	**3**
		14	Water quality	-	-	1	-	1	2	**4**	**14,15**
			total for category	*0*	*0*	*1*	*0*	*4*	*9*	*14*	
	Science development	15	Digital solutions	-	-	-	5	3	-	**8**	**3,9,11**
		16	Life saving innovation	-	-	-	-	3	1	**4**	**9**
		17	Scientific research	-	-	3	1	3	2	**9**	**3,9,13**
			total for category	*0*	*0*	*3*	*6*	*9*	*3*	*21*	
			Total for cluster	*1*	*10*	*19*	*13*	*27*	*23*	*93*	

Cluster	Category	n	Codes	1	2	3	4	5	6	total	SDGs
People	Social	18	Charity & Voluntarism	2	-	-	4	5	1	12	3,4,16,17
		19	HR strategy	6	3	-	16	3	2	30	3,4,5,8,10
		20	Education	1	1	1	8	1	1	13	3,4,8,13
		21	Community engagement	1	3	-	3	3	-	10	3,4,5,8,11,17
		22	DEI	2	-	-	13	11	3	29	5,8,9,10
			total for category	*12*	*7*	*1*	*44*	*23*	*7*	*94*	
	Health & Wellbeing	23	Mental health	6	1	2	2	-	-	11	3
		24	Physical health	2	-	6	4	-	1	13	3
		25	Working environment	2	2	-	-	1	-	5	3,5,10
		26	Work & Home balance	1	-	-	6	-	-	7	3,8
			total for category	*11*	*3*	*8*	*12*	*1*	*1*	*36*	
			Total for cluster	*23*	*10*	*9*	*56*	*24*	*8*	*130*	
Governance	Management	27	Risk management	2	1	1	7	3	1	15	3,8,13,16,17
		28	Complying standards	1	2	-	1	-	1	5	3,9,14,16
		29	Code of Conduct & Ethics	9	-	-	16	6	4	35	3,4,8,12,16,17
		30	Health & safety management system	-	-	-	7	-	1	8	3
		31	Information security	-	-	-	5	-	-	5	3,8,9
		32	Reporing (TCFD, SECR)	3	-	-	-	-	-	3	7
		33	Business strategy	-	-	-	2	1	-	3	3,9,13
		34	Quality control	1	-	1	1	-	2	5	12,13
			total for category	*16*	*3*	*2*	*39*	*10*	*9*	*79*	
	Investment	35	Digital innovation	-	-	1	4	1	-	6	9
		36	Outside-in innovation	-	-	-	3	-	-	3	9
		37	RnD	-	-	-	-	1	-	1	13
			total for category	*0*	*0*	*1*	*7*	*2*	*0*	*10*	
	Stakeholders	38	Value chain management	-	-	-	9	-	-	9	12,16,17
		39	Partnership	-	-	4	3	-	-	7	17
			total for category	*0*	*0*	*4*	*12*	*0*	*0*	*16*	
			Total for cluster	*16*	*3*	*7*	*58*	*12*	*9*	*105*	

Cluster	Category	n	Codes	1	2	3	4	5	6	total	SDGs
Planet	**Environmental impact**	40	Clean & safe water	-	-	-	-	1	-	**1**	**6**
		41	Zero waste	2	2	-	-	-	2	**6**	**7,13**
		42	Emissions	2	3	-	4	-	1	**10**	**6,7,9,13**
		43	Onsite optimization	-	1	1	2	3	-	**7**	**12,13**
		44	Circular manufacturing	-	1	3	1	1	1	**7**	**13**
		45	Environmental concervation	-	-	3	-	-	1	**4**	**15**
		46	Urban development	-	-	-	2	-	-	**2**	**6,13**
			total for category	**4**	**7**	**7**	**9**	**5**	**5**	**37**	
	Resource control	47	Water use	1		2	2	1	1	**7**	**6,13**
		48	Energy control	1	3	2	6	2	1	**15**	**7,9,13**
		49	Minerals	-	-	-	2	-	-	**2**	**13**
		50	Green areas	1	-	-	-	-	-	**1**	**13**
		51	Plastic	-	1	-	-	-	-	**1**	**13**
			total for category	**3**	**4**	**4**	**10**	**3**	**2**	**26**	
	Environmental management	52	Complying legislations	1	3	-	-	-	-	**4**	**8,13**
		53	Standards & Guidelines	-	3	1	3	6	1	**14**	**9,13**
			total for category	**1**	**6**	**1**	**3**	**6**	**1**	**18**	
			Total for cluster	***8***	***17***	***12***	***22***	***14***	***8***	***81***	

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Thesis material management plan
Attached to the **thesis plan**
1. General description of the material
What type of research material (e.g. interview, survey, observation) is collected or used in the thesis?

Raw data from reports

2. Documentation and quality of the material
How is the research data documented, for example, what kind of identification information is used? How is the quality of the material and its documentation ensured?

Research data was transmitted to Data Collection Matrix created by MC Excel tool. Each Case company name identified by company code name.
The quality of material is ensured by its origin from official sources.

3. Storage and backup
How is the material saved? How is data security ensured (e.g. access to the material) during the thesis process? Who can access the material?

All data material was saved at student's laptop and cloud server. Only student had access to the materials.

4. Ethical and legal issues related to storage
How are any possible ethical issues related to the material storage considered (e.g. sensitive personal information, access by others)? How are the ownership and user rights of the material managed?

All taken data didn't violate copyrights of its owners, as was obtained officially from open web resources.
Materials didn't include any personal data disclosures

5. Opening the material and long-term storage
Would it be possible to use the material later? How is any further use of the material enabled?

The material is applicable for further deepen research as initial findings on the topic.