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Value Creation Reporting for Sustainable Development – Is Sustainability Information Integrated with Financial Information?

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Abstract: The transition to more sustainable economic development is at the heart of the Agenda 2030 for Sustainable Development by the United Nations. This leads to a broader definition of value that integrates social and environmental aspects alongside economic value. In this paper, we derive a structure for the analysis of reporting on sustainable value creation based on actual reporting decisions. Structuring the disclosures on sustainable value creation focuses on presentation, integration, measurement and aggregation. We further provide descriptive evidence on firms' reporting decisions on sustainable value creation by manually analysing the reports of the 20 largest Swiss companies from 2013–2022 and the 2022 reports of the 50 largest EU listed companies. The analysis suggests a substantial increase in reporting on sustainable value creation over time with slightly more than 50% of firms reporting on sustainable value creation in 2022. Firms tend to report in visual form and focus on prior year realizations of measures in the environmental and social areas. Firms' impacts and dependencies on people and planet are vaguely integrated with financial considerations and dependencies are rarely addressed. Aggregated or forward-looking measures are largely missing.

Keywords: Sustainable development, sustainable value creation, integration, measurement, aggregation, presentation

Nachhaltige Wertgenerierungsberichterstattung – Werden Nachhaltigkeitsinformationen und finanzielle Informationen integriert?

Zusammenfassung: Im Zentrum der Agenda 2030 für Nachhaltige Entwicklung der Vereinten Nationen steht der Übergang zu einer nachhaltigeren wirtschaftlichen Entwicklung. Dies führt zu einem umfassenderen Wertbegriff, der ökonomische, soziale und umweltbezogene Aspekte integriert. Im vorliegenden Beitrag entwickeln wir eine Struktur für die

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Analyse der Berichterstattung zur nachhaltigen Wertgenerierung, die auf der tatsächlichen Berichterstattung basiert. Die Strukturierung der Berichterstattung orientiert sich an den Aspekten Darstellung, Integration, Messung und Aggregation von Informationen. Darüber hinaus liefern wir deskriptive Ergebnisse zur Berichterstattung über nachhaltige Wertgenerierung, indem wir die Berichte der 20 grössten Schweizer Unternehmen im Zeitraum 2013–2022, sowie die Berichte des Jahres 2022 der 50 grössten börsennotierten EU-Unternehmen manuell analysieren. Die Ergebnisse zeigen einen deutlichen Anstieg der Berichterstattung zur nachhaltigen Wertgenerierung im Zeitverlauf. Im Jahr 2022 berichten etwas mehr als 50 % der Unternehmen über nachhaltige Wertgenerierung. Die Unternehmen berichten eher in einem visuellen Format und fokussieren auf soziale und umweltbezogene Informationen aus dem vorangegangenen Geschäftsjahr. Auswirkungen auf Gesellschaft und Umwelt und die entsprechenden Abhängigkeiten der Unternehmen sind nur vage in finanzielle Aspekte integriert, wobei insbesondere Abhängigkeiten kaum adressiert werden. Aggregierte oder zukunftsorientierte Informationen fehlen weitgehend.

Stichwörter: Nachhaltige Entwicklung, Nachhaltige Wertgenerierung, Integration, Messung, Aggregation, Darstellung

1. Introduction

Sustainable development is at the heart of international attempts to address both environmental and societal challenges around the world. In 2015, the General Assembly of the United Nations adopted the 2030 Agenda for Sustainable Development, which contains 17 sustainable development goals (SDGs) in the environmental, social and economic areas. Achieving the ambitious goal of sustainable development by 2030 requires actions by all players in the economy to reduce their impact on people and planet while ensuring economic stability.

With the overarching goal of sustainable development in mind, the notion of corporate value shifts from a mere focus on the cash flow potential of firms to a broader concept that additionally considers environmental and social value (see for instance Schoenmaker and Schamrade, 2019 or WEF, 2019). This concept of value focuses on the needs of all stakeholders and the value created or eroded for them through economic activities (Business Roundtable, 2019; WEF, 2019). To determine this value, stakeholders require considerable information in all areas of sustainable development and the respective valuation techniques for environmental and social value (IFVI, 2024; Schoenmaker, 2021; VBA, 2024). It also requires a new paradigm in reporting on value.

We understand sustainable value creation along the lines of prior literature and initiatives (Adams, 2017; IIRC, 2021; Schoenmaker and Schamrade, 2019; WEF, 2019) as any positive or negative value created or destroyed in economic, social or environmental areas. This definition of sustainable value creation translates into value created for all stakeholders (Freeman, 1984) and covers externalities and their internalization as part of the value creation or erosion process. Effectively communicating and reporting such a concept of value to outside stakeholders requires strong linkages across reporting elements.

Sustainability reporting standards such as the Global Reporting Initiative (GRI) standards, the International Financial Reporting Standards (IFRS) Sustainability Disclosure Standards (IFRS S) or the European Sustainability Reporting Standards (ESRS) provide useful information on material topics and firm activities in the environmental and social

domains. However, to date, few initiatives exist that discuss how this information can be integrated with financial information to develop a holistic view of the value created for sustainable development. In this paper, we analyse how firms report on sustainable value creation and derive a structure for the analysis of sustainable value creation reporting decisions. This structure focuses on key issues that are typically identified as challenges to improve the usefulness of sustainability reporting. They include presentation, integration, measurement and aggregation.

We analyse the reporting decisions of the 20 largest Swiss public firms (Swiss Market Index (SMI)) from 2013–2022. The focus on large firms rests on the assumption that they are subject to increased public scrutiny and therefore have stronger incentives to publicly disclose information on sustainable value creation. The Swiss setting is appealing because sustainability reporting as the informational basis for sustainable value creation reporting, was largely voluntary during that time. Voluntary disclosure settings offer firms a variety of reporting options and we exploit this fact for reporting decisions on sustainable value creation.[1] We also compare the most recent findings for Switzerland to the 2022 reports of the largest public European Union (EU) firms (Euro Stoxx 50 index) to assess systematic differences resulting from EU firms being subject to much stricter and mandatory sustainability reporting requirements.[2] However, reporting on sustainable value creation was neither mandatory in Switzerland nor in the EU during our sample period.

We structure the content analysis around two main steps. First, we assess which firms report on sustainable value creation and their presentation format. We allow for alternative ways to report on the integration of financial and sustainability aspects. Second, we focus on direct disclosures on sustainable value creation and analyse different reporting formats as well as measurement and aggregation. Our findings show that sustainable value creation reporting is increasing among SMI firms. By 2022 55% of Swiss firms (54% of Euro Stoxx 50 firms) report how they create value in economic, environmental and social terms. Firms mostly provide extensive visual illustrations that help in understanding the inputs and outputs to their value creation process. Our findings also highlight that firms reporting on sustainable value creation tend to align their purpose with sustainability and are more likely to have a separate sustainability strategy aligned with the overall strategy. In essence, the results suggest that the decision to report on sustainable value creation is strongly related to the integration of sustainability aspects into reporting on the financial considerations of companies. In terms of measurement and aggregation, the disclosures on sustainable value creation are merely qualitative in nature, and quantifications strongly focus on historical realizations of the data. Target setting and relations to SDGs or other wider goals rarely exist and, if so, only on a qualitative basis without any indication of whether current achievements are sufficient to reach broader goals. Although material topics are a core element of current sustainability reporting frameworks, our study shows that they are rarely used to link the business model with sustainability aspects as part of sustainable value creation reporting.

1 See Beyer *et al.* (2010) and Leuz and Wysocki (2016) for overviews on voluntary disclosure decisions in the financial reporting domain. Christensen *et al.* (2021) and Friedman and Ormazabal (2024) augment the literature with overviews on voluntary disclosure decisions in sustainability reporting.

2 See Hummel and Jobst (2024) for an overview of corporate sustainability reporting regulations in the EU.

To the best of our knowledge, this is the first study to propose a structure for the analysis of reporting on sustainable value creation and to provide evidence on reporting decisions on sustainable value creation. This allows academics to capture the concept of sustainable value creation empirically based on existing guidance and effective reporting decisions. It is also important for corporate management wishing to understand how their firm contributes to sustainable development by equipping them with an analytical framework to guide information provision on sustainable value creation and respective disclosure decisions. Capital market participants and other stakeholders learn from this study how sustainable value creation can be described in corporate reports. The results further provide insights into the state of the art of disclosing information on sustainable value creation in Switzerland.

This paper contributes to various strands of literature. First, a true understanding of the value created for sustainable development is only possible if reporting integrates the impacts and dependencies of firms' activities on people and planet. In this respect, our paper expands the literature on integrated reporting and integrated thinking.[3] The literature in this area has largely focused on firms using the Integrated Reporting Framework (Barth *et al.*, 2017; Dimes *et al.*, 2023; Dimes and de Villiers, 2024; Lee and Yeo, 2016; Zhou *et al.*, 2017). Only a few papers rely on measures for integrated reporting and integrated thinking that are independent of firms actually using the Integrated Reporting Framework but are instead provided by international financial databases (Busco *et al.*, 2019; Malafronte and Pereira, 2020; Serafeim, 2015). Our approach is an alternative to measuring the integration of financial and sustainability aspects irrespective of the firms applying the Integrated Reporting Framework and allows us to assess key elements of integration within any corporate report.

Second, we contribute to the literature on the aggregation and measurement of sustainability information (Friedman and Ormazabal, 2024; Grewal and Serafeim, 2020; Wagenhofer, 2024). The literature stresses different informational needs for different stakeholders (Beyer *et al.*, 2023; Colonnelli *et al.*, 2024; Leonelli *et al.*, 2025; Roslender and Nielsen, 2021) and the role of comparability of sustainability information in decision-making (Greenstone *et al.*, 2023). Our findings show that disclosure by firms is highly diverse, most likely because firms have discretion in reporting on sustainable value creation. Furthermore, the measurement of information is sparse, and aggregation rarely occurs. Considering that we only analyse very large multinational companies, this result underscores the need for better measurement and aggregation to provide more comparable and decision-useful information.

Third, we also contribute to the debate on the presentation of accounting information (Beattie and Jones, 1992; Chen *et al.*, 2016; Christensen *et al.*, 2024; Davison, 2015; Friedman and Ormazabal, 2024). Our findings show that visual representations are commonly used for disclosing sustainable value creation. In this respect, we add to the findings of Busco *et al.* (2023), who show that managers may benefit from visual representations of sustainable value creation by highlighting that this may also apply to the case of external reporting. Therefore, we also confirm the findings of Lin *et al.* (2024) that sustainability information is often disclosed in a visual format. Other stakeholders, such as consumers, profit from easily accessible information regarding their consumption deci-

3 Integrated thinking is the management concept related to integrated reporting (IIRC, 2021).

sions (Beyer et al, 2023, Jin and Leslie, 2003). Whether the representation in visual form is indeed more accessible rather than being used as an impression management device is left for future research (Cardinaels, 2008; Elliott *et al.*, 2017; Ronzani and Gatzweiler, 2022).

Finally, this study contributes to stakeholder-oriented views of the firm by showing how voluntary sustainability disclosures act as mechanisms for articulating value creation amid informational ambiguity and regulatory discretion.[4] About 50% of firms decide to prominently disclose key value drivers in their reports that provide insights into sustainable value creation and inform stakeholders.

2. Value creation for sustainable development

2.1 The concept of sustainable value creation

To address the world's environmental and societal challenges, countries have agreed on a global agenda to advance the transition to sustainable development. In 2015 the General Assembly of the United Nations adopted the 2030 Agenda for Sustainable Development (United Nations, 2015) that supports the worldwide transition to sustainable development and includes seventeen sustainable development goals – SDGs (United Nations, 2015). The SDGs cover environmental, societal and economic goals[5] and support a notion of value that places environmental and social considerations at the basis of any economic success (Laine *et al.*, 2022; Schoenmaker, 2020, 2021).

Alongside the political agenda for sustainable development, the role of businesses in society has changed. For instance, the Business Roundtable – an association of chief executive officers in the United States (U.S.) – changed its statement on the purpose of the firm to one that considers the needs of all stakeholders instead of only shareholders (Business Roundtable, 2019). Around the same time, the World Economic Forum (WEF) newly defined the purpose of a company as follows: „The purpose of a company is to engage all its stakeholders in shared and sustained value creation" (WEF, 2019). Hence, businesses are required to act as partners in society and to consider the needs of all stakeholders when doing business. This closely aligns with the triple bottom line approach (Elkington, 1997) or Freeman's stakeholder theory (Freeman, 1984) and contrasts with the longstanding focus on shareholder value maximization (see the discussions in Christensen *et al.* (2021) and in Laine *et al.* (2021)).

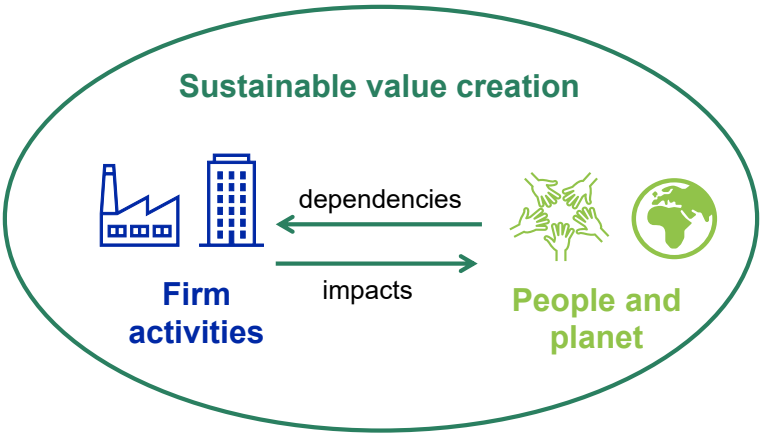
The definition of sustainable value creation in this paper, builds on the SDGs and stakeholder theory. We understand sustainable value creation as any positive or negative value created or destroyed in economic, social or environmental areas. This three-layer conception builds on existing approaches in Adams, (2017), Schoenmaker and Schamrade (2019) and WEF (2019). It also aligns with the concept of Accounting for Sustainability and Stakeholders that assumes the informational demands of stakeholders as the basis for corporate information provision (Hörisch et al., 2020). Our definition of sustainable value creation is broad and includes the impacts of firms on people and planet and the dependencies of firms on people and planet in line with the double-materiality approach. We emphasize in our definition that firms' impacts may fold back to financial performance

4 We thank an anonymous reviewer for suggesting this valuable sentence.

5 The Stockholm Resilience Center created an SDG wedding cake model with these three areas: https://www.stockholmresilience.org/research/research-news/2016-06-14-the-sdgs-wedding-cake.html.

at some point in time because firms are dependent on people and planet. Hence, even small impacts by many firms may have large financial impacts due to firms' dependencies on natural resources or society (Schoenmaker, 2020, 2021; Schoenmaker and Schamrade, 2019, for similar arguments). Our definition of sustainable value creation is outlined in Figure 1.

Figure 1: Sustainable value creation



Own illustration of the concept of sustainable value creation. The Natural Capital Protocol contains a similar figure (Capitals Coalition, 2016, p. 15). The double materiality concept described in Article 29 of the CSRD (European Parliament and the Council, 2022) forms the basis for this illustration.

2.2 Academic literature on the role of sustainable value creation

From a theoretical perspective sustainable value creation considers the cash flow potential of firms and the internalization of externalities resulting from firms' activities (see Schoenmaker and Schamrade (2019) for similar arguments). In 1970 Friedman famously argued in the New York Times that externalities should be left to government, whereas companies should focus on maximizing shareholder value (Friedman 1970). However, the mounting pressure on the environment shows that leaving externalities to government is unlikely to result in ideal solutions (Hart and Zingales, 2017). Furthermore, externalities or ethical considerations are often not separate elements of firms' activities (Hart and Zingales, 2017). To account for such externalities, theoretical models in accounting, finance and economics change the objective functions for shareholders to consider aspects of social welfare (Friedman and Heinle, 2016; Hart and Zingales, 2017; Morgan and Tumlinson, 2019; Pástor *et al.*, 2021) or alternatively consider the needs of stakeholders in addition to those of shareholders (Magill *et al.*, 2015).

The empirical literature in this space shows that investors and other stakeholders increasingly require firms to act on environmental and social challenges and demand information (Dechow, 2023; Friedman and Ormazabal, 2024; Starks, 2023). Investors, for example, require disclosures and information on environmental and social issues (Chalmers and Picard, 2023; Ilhan *et al.*, 2023; Krueger *et al.*, 2020), and they appear to assign value to sustainability (Hartzmark and Sussman, 2019; Lins *et al.*, 2017). In some circumstances, investors may even drive sustainability within firms (Dyck *et al.*, 2019),

although this may not translate to all types of investment strategies (Heath *et al.*, 2023). An important driver of changes in firm behaviour related to specific environmental or social considerations is engagement by large or active investors (Azar *et al.*, 2021; Dimson *et al.*, 2015). Other stakeholders such as customers, also use sustainability information on firms' activities but may rely on information sources other than annual or sustainability reports (Beyer *et al.*, 2023; Bradford *et al.*, 2017; Leonelli *et al.*, 2025). More importantly, these other stakeholders shape the demand for sustainable activities that in turn affect the sustainable value creation of firms and related reporting decisions.

However, existing literature largely neglects how cashflows and externalities relate to each other to form an interdependent system that cannot be considered in isolation. The case of natural resource depletion is an example of an externality that effectively emphasizes how corporate impacts and dependencies interact when firms extract resources that form the basis of future cashflows but simultaneously exploit the resources such that long-term cashflow potential is eroded. Hence, understanding impacts and dependencies on people and planet is a crucial aspect of sustainable decision-making. Providing such information is a demanding exercise and tools for reporting have only recently emerged. Most commonly, firms rely on sustainability reporting that may be complemented by approaches from organizations that cover sustainable value creation and its reporting more comprehensively.

2.3 Reporting concepts for sustainable value creation

Sustainability reporting

The largest amount of information on sustainability considerations is provided by sustainability reporting. In line with traditional valuation approaches that start with a thorough analysis of financial statements and derive cash flow projections from this analysis, sustainability reporting forms the basis for similar analyses of firms' activities in the environmental and social areas. Typically, sustainability information is based on a materiality assessment and includes a list of disclosures per material topic. Hence, sustainability reporting includes information on future externalities, and the risks and opportunities arising from the impact and dependencies of a firm on people and planet for each material topic. Sustainability reporting standards differ in the way material topics are assessed

The most widely used sustainability reporting standards are those of the Global Reporting Initiative (GRI) (McCalla-Leacy *et al.*, 2022). The GRI has chosen a stakeholder-oriented approach that targets disclosure of firms' impacts on people and planet (GSSB, 2022a). This focus on impact materiality provides accountability for firms' activities towards a diverse set of stakeholders. The IFRS Sustainability Disclosure Standards issued by the International Sustainability Standards Board (ISSB) take a financial materiality perspective that focuses on the informational needs of investors, whereas the EU considers double materiality. As neither the ESRS nor the IFRS Sustainability Disclosure Standards were mandatory when firms' disclosure decisions were taken in our sample period, they will be important guiding principles in the future.

For sustainability disclosure to provide information on value creation to all stakeholders, it needs to be related to financial information and integrated across material topics. Stakeholders who are interested in the sustainable value of the firm need to understand the impacts of the firm on people and planet as well as the risks and opportunities arising

from the interrelation of all sustainability aspects with the business model and the firm's strategy. Recently, sustainability reporting standards have included requirements on the links among business models, strategies and sustainability aspects. The most recent version of the GRI standards includes a disclosure statement on the relevance of sustainable development and the firm's strategy for contributing to sustainable development by the highest governing body or the most senior executive (GSSB, 2022b, 2-22). The ESRS and IFRS S1 and S2 also require reporting on how sustainability issues are linked to business models and strategies. However, these requirements rest on strategic levels without requiring firms to integrate key performance indicators across various sustainability aspects. Furthermore, they were not mandatory when reporting decisions in this sample were taken.

Other initiatives

To address the integration of various value drivers and the rising demand for information on sustainable value creation, several attempts have been made to support firms in disclosing and measuring their sustainable value creation. One of the first attempts to disclose information on a broader concept of value has been made by the International Integrated Reporting Council (IIRC) with its Integrated Reporting Framework. The approach of the Integrated Reporting Framework requires an assessment of different capitals as inputs to and outputs of the value creation process (IIRC, 2021). The capitals in the Integrated Reporting Framework include traditional inputs to a firm's business activities, such as financial capital, manufactured capital, and intellectual and human capital. However, social capital, relationship capital and natural capital are also considered elements of the value creation process within firms (IIRC, 2021). Although it is primarily targeted towards investors, the Integrated Reporting Framework prominently considers sustainability aspects and their integration into the value creation process of the firm (Laine *et al.*, 2021). Today, the Integrated Reporting Framework has been consolidated within the ISSB but forms no part of the sustainability reporting standards issued by the ISSB.

While the Integrated Reporting Framework fosters integration, recent regulatory developments at the EFRAG and the ISSB have instead turned to the term connectivity (https://www.efrag.org/en/financial-reporting/about-connectivity and https://www.ifrs.org/connectivity/#about). Connectivity „supports the provision of a holistic and coherent set of information within and across the different AR [annual report] sections" (EFRAG, 2024, p. 11), but does not entail the strategic focus of value creation across different reports, which is the basis of integration (EFRAG, 2024). The ISSB described integration in its 2023 request for information as including „interdependencies, synergies and trade-offs between: a) the various resources and relationships reported on in general purpose financial reports, and b) how the value that an entity creates for itself and for its investors is inextricably linked to the value the entity creates for other stakeholders, society and the natural environment" (ISSB, 2023, A40). This definition resembles the approach taken in this paper although the project on integration has not been set as a strategic priority of the ISSB for the next two years as a response to market feedback (ISSB, 2024). Connectivity is likely to fall short in providing information on sustainable value creation. We therefore stick to the term integration in our analyses.

Apart from the Integrated Reporting Framework, other initiatives have started to consider the integration of financial and sustainability considerations for assessing firms' contributions to sustainable development. The focus of these initiatives is the provision of

informative disclosures on sustainable development. One of these is the Capitals Coalition which also builds on a capitals approach within an input-output framework to support better decisions within companies on the interaction of businesses with natural, social and human capital (Capitals Coalition, 2016, 2019). Their protocols from 2016 and 2019 explicitly target decision-making within firms and highlight how value can be derived from interactions with natural, social and human capital. Essentially, they also build on input-output models that consider various capitals.

The World Economic Forum has proposed various metrics for reporting on sustainable value creation in their 2019 white paper on measuring stakeholder capitalism (WEF, 2020). The metrics build on existing frameworks and are newly arranged by the WEF into four core areas: governance, planet, people and prosperity. However, the metrics are not integrated.

The Value Balancing Alliance (VBA) provides one of the most recent approaches that aims at rethinking value creation by including not only economic aspects but also firms' impacts on nature and society (VBA, 2024).[6] Therefore, the VBA takes a double materiality approach and provides impact and dependency pathways that shall allow for monetarization of impacts. The International Foundation for Valuing Impacts (IFVI) operates in a similar domain but focuses on monetarised impact accounting to improve decision-making (IFVI, 2024). The IFVI and the VBA work closely together and have already released a conceptual framework for impact accounting (IFVI and VBA, 2024a) and a topic methodology on greenhouse gas emissions (IFVI and VBA, 2024b) with more topic methodologies to follow. We consider these approaches when developing the structure for our content analysis.

3. Empirical results

3.1 Research approach

Firms disclose information voluntarily once they perceive a benefit from providing this information to the public (Beyer *et al.*, 2010; Grossman, 1981; Grossman and Hart, 1980; Leuz and Wysocki, 2016; Milgrom, 1981). At the same time, disclosure may entail direct and indirect costs to firms such that they may decide to refrain from disclosure (Beyer et al., 2010; Leuz and Wysocki, 2016; Verrecchia, 1983; Wagenhofer, 1990). With this in mind, we analyse the reporting decisions of firms on sustainable value creation and describe the information that firms provide voluntarily. Any missing information may be an indicator for costs of disclosure exceeding their private benefits.

We structure our content analysis around two steps and use an inductive approach to assess the information. The main advantage of inductive approaches, as compared to deductive approaches, is the possibility to adjust the content analysis scheme according to decisions taken by firms such that we do not neglect important elements (Rimmel and Cordazzo, 2021). Our structural approach to the analysis is important because the information provided by firms is spread across different reports and not standardized. Hence, our structure supports a better understanding of how firms report on sustainable value creation. Future studies could use our approach as a basis for sophisticated automated textual analysis. However, in this study automated textual analysis could lead to blind

6 An early attempt in this respect was made in 2014 by KPMG with its True Value Concept (KPMG, 2014).

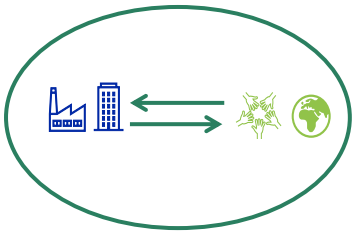
spots on issues in the main interest of the analysis. Hence, we do not rely on automated textual analysis here.

To develop a structure for our analysis, we first screened reports for information on sustainable value creation. In the pilot phase, we focused on the 2022 reports of Swiss firms and resolved any ambiguous items to come up with our final content analysis scheme with detailed coding guidelines (see Appendix). We classify elements of the content analysis scheme as existing (assigned a 1) or not existing (assigned a 0) and refrain from qualitative assessments. During the pilot and the main coding phase, all firms were double checked by the team of authors or by one researcher of the team of authors and a junior researcher. The focus of the analysis is on easily accessible information that is typically provided at the outset of annual and sustainability reports because of the holistic nature of the sustainable value creation concept. Hence, missing information is not an unambiguous sign of informational absence. In sum, this approach gauges the reliability of the results as they are easily reproducible by any reader of the annual report.

This first step of our analysis was guided by the concept of sustainable value creation in Figure 1, that centres on the integration of firms' activities with people and planet. The content analysis was further informed by existing approaches to integrated reporting outlined in the previous section. Figure 1 shows that information may either be disclosed directly as sustainable value creation or indirectly by connecting firms' activities and people and planet. If we observe direct disclosures on sustainable value creation, we assess its presentation format, i.e. in tabular, visual or textual form. The indirect way of disclosing sustainable value creation involves information on firms' activities and their link to the business environment of the firm. We rely on purpose, strategy and sustainability strategy as proxies for firms' activities and on SDGs and the business environment as proxies for people and planet. The indirect link then results from an alignment of purpose with strategy, sustainability strategy with business strategy or any other link between the elements through material topics. The structure of this first part of our content analysis is summarized in Figure 2 Panel A.

In the second step, we focus on firms that prominently disclose sustainable value creation in their reports and seek to further describe their disclosures. The structure of this second part of the content analysis scheme in Figure 2, Panel B heavily focuses on input-output models that are commonly used by firms for disclosing sustainable value creation. Input-output models are a suitable way to integrate financial and sustainability aspects by focusing on capitals as inputs and outputs of the value creation process (PTF-RNFRO, 2021a, 2021b). In these models, inputs and outputs of the value creation cycle are often described as different capitals as in the International Integrated Reporting Framework (IIRC, 2021, p. 41) or the suggestions of the Capitals Coalition (Capitals Coalition, 2021). The value creation cycle is often described by a visual representation that illustrates how inputs are processed to create an output. For some firms this part corresponds to the business model. Input-output models may be augmented by impacts that clearly indicate how the environment, society and economy are impacted by the output generated by firms.

Figure 2: Main structure of the content analysis
Panel A: Direct vs. indirect approach to sustainable value creation disclosure



Direct sustainable value creation disclosure

- Separate chapter or section
- Table
- Graph

Indirect sustainable value creation disclosure

- Alignment of purpose and strategy
- Alignment of sustainability and business strategy
- Direct/indirect link via material topics

Panel B: Elements of the direct approach to sustainable value creation disclosure

Input	• Description • Measurement
Value creation cycle	• Description
Output	• Description • Measurement
Impact	• Description • Measurement
Links	• Material topics • SDGs • Business Environment
Aggregation	• ESG areas • Monetarization • Overall impact number

This figure describes the content analysis scheme for our main analysis. This scheme was established based on prior expectations on reporting on the double materiality concept for sustainability reporting and adjusted to observations from real-world data. For each element in our scheme, we assign a value of 1 if the item exists and 0 otherwise. The scheme in Panel A is applied to all firms in our sample. The scheme in Panel B is only applied to those firms directly reporting on sustainable value creation.

To gauge decision-usefulness, information on inputs and outputs needs to be assessed both in historical terms and in a forward-looking manner. Therefore, we also focus on measurement and analyse the time horizon of the information as well as the qualitative or quantitative nature of the information. In this respect, we build on classical approaches to the analysis of narrative reporting summarised in Michelon *et al.* (2022) and, in particular, on the classification of information developed in Beattie *et al.* (2004). We further determine whether firms set targets and report their achievements towards these targets.

Finally, we also assess whether information is aggregated. Typically, this applies to firms disclosing information on sustainable value creation in a tabular format. The structure of the second part of our content analysis is summarized in Figure 2, Panel B.

For each item in our content analysis, we assign a 0 if the information is not available and a 1 if the information is available. We neither rank disclosures nor provide a summarized disclosure score, as the information in our content analysis scheme is often complementary and aggregating it would not indicate more decision-useful disclosures on sustainable value creation. The main aim of this paper is instead to come up with a suitable structure to guide content analysis of such disclosures. In Section 3.5, we relate our findings to common challenges identified concerning the usefulness of sustainability reporting.

3.2 Data

In our main analysis, we focus on the 20 largest public firms in Switzerland in terms of their market value – the SMI firms. The Swiss setting is particularly appealing, as the Swiss Code of Obligations (in German: Obligationenrecht (OR)) did not require formal sustainability reporting until 2022, with the first application for the reporting year 2023 (OR, 2024). During our sample period 2013–2022 firms were not subject to mandatory sustainability reporting requirements giving them more discretion to tailor disclosures to the specific needs of their stakeholders. This offers us the unique opportunity to analyse discretionary disclosures and inductively derive a content analysis scheme from observed disclosure decisions. However, SMI firms are large institutions with global operations that are under increased public scrutiny and subject to peer pressure with respect to sustainability reporting. Hence, we expect the reporting discretion with respect to sustainability reporting to decrease over the sample period – particularly because of the increasing tightness of EU sustainability reporting standards. Going back in time for ten years provides insights into the evolution of reporting decisions across time.

While reporting on sustainable value creation has not been mandatory in Switzerland nor in the EU, the EU has implemented mandatory sustainability reporting. We extend our analysis to Euro Stoxx 50 firms as the largest public EU firms that are comparable to SMI firms to assess whether mandatory reporting leads to different outcomes in terms of sustainable value creation reporting. We focus on their reporting decisions in the year 2022 to determine whether the outcome of the process on reporting on sustainable value creation differs to that of SMI firms. Any differences across these two types of firms could be an indicator of EU mandatory sustainability reporting also shaping reporting decisions for discretionary sustainability-related reporting items such as sustainable value creation.

We focus on the SMI composition as of January 2023 and consider their reporting over the last ten reporting years, starting in 2022.[7] Our focus on SMI firms as of January 2023 reduces our yearly sample size in the years prior to the reporting year 2022. This is due to Alcon being a spin-off of Novartis and the merger of Holcim and Lafarge. In addition, one firm did not have a sustainability report in 2015 but in all other years, such that we only excluded this single 2015 observation. Our SMI sample consists of 18 firms from

7 A firm with a fiscal year end on 31st of March was assigned to the previous reporting year for the analysis.

2013–2015, 19 firms from 2016–2018 and 20 firms since 2019. We further include 50 observations from the Euro Stoxx 50 in 2022.

The firms in our sample primarily rely on the classic reporting format with separate annual and sustainability reports. Although the disclosure of explicitly labelled integrated reports has increased from no firm in 2013 to three firms in 2022 for the SMI (see Table 1, Panel A), the number of firms choosing the integrated reporting format is low. Most firms providing an integrated report offer an additional sustainability report, which contains more in-depth descriptions of sustainability-related topics. The data for the Euro Stoxx 50 firms in 2022 (table 1, panel B) are comparable to the 2022 SMI results.

Table 1: Report type and report length
Panel A: SMI time series analysis

SMI	N	Annual Report	Integrated Report	Mean Pages of Annual & Sustainability Report	Mean Pages of Integrated Report	Firms with More than 500 Pages
2013	18	18	0	228	0	1
2014	18	17	1	224	187	1
2015	18	17	1	234	200	1
2016	19	18	1	230	201	0
2017	19	18	1	228	199	1
2018	19	17	2	245	210	2
2019	20	17	3	241	192	2
2020	20	18	2	238	207	2
2021	20	18	2	259	363	3
2022	20	17	3	261	223	3

Panel B: Year 2022 cross-sectional analysis of SMI and Euro Stoxx 50 firms

2022	N	Annual Report	Integrated Report	Mean Pages of Annual & Sustainability Report	Mean Pages of Integrated Report	Firms with More than 500 Pages
SMI	20	17	3	261	223	3
Euro Stoxx	50	44	9	360	178	18
Total	70	61	12	333	189	21

The table presents information on the use of different types of reports and their length. The sample includes SMI and Euro Stoxx 50 firms. The SMI sample size increases from 18 firms in 2013 to 19 in

2016 and 20 from 2019 onwards. The 2022 sample size is 20 for SMI firms and 50 for Euro Stoxx 50 firms. Panel A reports the results for the SMI time series analysis, and Panel B reports the results for the SMI and Euro Stoxx 50 cross-sections in 2022.

Over the years, the report length increased by approximately 30 pages on average from 2013 to 2022.[8] A comparison of the SMI and Euro Stoxx 50 shows that reports from EU firms are roughly 100 pages longer than the average SMI report. A potential reason for this effect could be tight regulations in the EU. The Euro Stoxx 50 sample also has more outliers than the SMI sample does (36 % vs. 15 % of firms have more than 500 pages). Among the Euro Stoxx 50 firms with long reports, the report length of four firms exceeds 900 pages. In essence, we observe a rather lengthy reporting format for all firms in our sample, with only a limited explicit use of the integrated reporting format.

Some firms offer a substantial amount of supplemental nonfinancial information on their webpages. As our definition of sustainable value creation includes value generated in the financial, environmental and social dimensions, this information is typically material to investors and needs to be included in corporate reports. Therefore, we do not consider information on webpages in our analyses. Still, we acknowledge that singular elements on sustainable value creation may be disclosed on webpages, in particular such pieces of information that are specifically targeted towards non-investor stakeholder groups (Boulland, et al., 2025). However, the holistic perspective of sustainable value creation includes financially material aspects that require the provision of the information in annual or sustainability reports if considered relevant by the firm. Furthermore, information on webpages is difficult to assign to each reporting year as information on prior years may not be available.

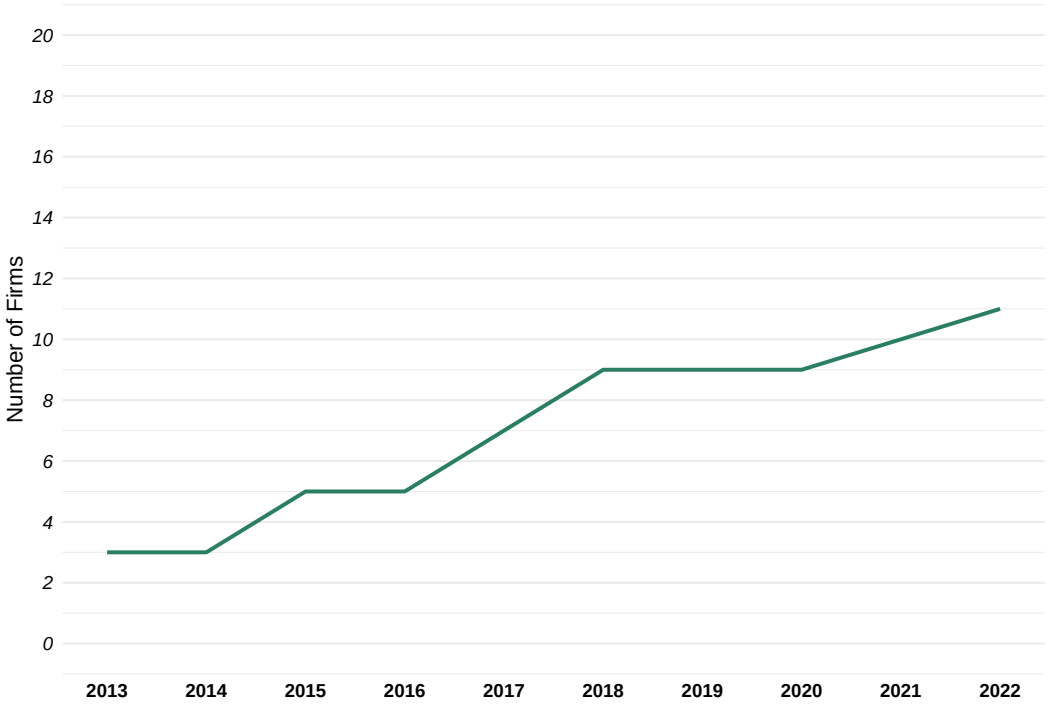
3.3 Status quo of reporting on sustainable value creation

As our first step of analysis, we search for information in companies' reports on how they create value in a sustainable way. Some firms label a chapter with terms that are related to sustainable value creation, such as „our value creation", „how we create value", or similar. Sustainable value creation may be communicated visually or in tabular or text formats. We differentiate across communication formats because presentation is a key issue with any emergent disclosure aspect. In line with existing research on the use of visual communications – in particular with respect to uncertainties – we deem visual representations more accessible than narrative formats (PTF-RNFRO, 2021a; Spiegelhalter *et al.*, 2011).

In our Swiss sample 11 firms (55%) report on sustainable value creation in 2022. This finding is the result of a positive trend among SMI firms, as outlined in Figure 3. In the Euro Stoxx 50 sample, 27 firms reported on sustainable value creation in 2022 (54% of the sample).

8 Untabulated results for the median show a similar pattern.

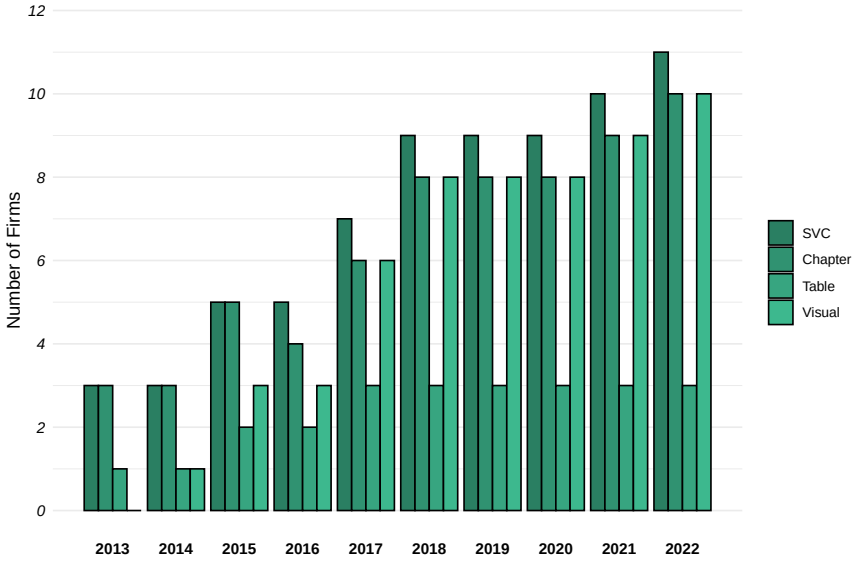
Figure 3: Sustainable value creation reporting by SMI firms



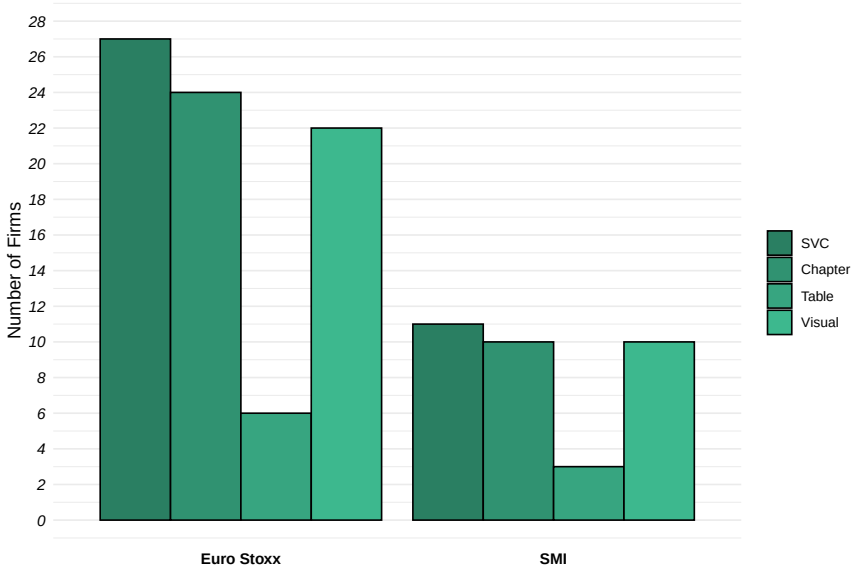
The figure displays the number of firms that explicitly disclose how they create sustainable value. The sample includes SMI firms. The sample size increases from 18 firms in 2013 to 19 in 2016 and 20 from 2019 onwards. Data is hand-collected from annual, sustainability and integrated reports.

In terms of communication, all but one firm disclose their sustainable value creation in a separate chapter. The provision of the information in a separate chapter is helpful for the readers, as the information can be easily found and accessed. Firms typically illustrate their sustainable value creation either visually or tabularly or sometimes in both ways. As Figure 4, Panel A and B show, Swiss and EU firms prefer reporting their sustainable value creation in a visual way – mostly relying on some form of input-output model. Disclosure in tabular form is less prevalent but still used by several firms. Tabular formats include quantitative or qualitative indicators grouped across material topics or sustainability aspects.

Figure 4: Reporting Format of Sustainable Value Creation
Panel A: SMI time series analysis



Panel B: Year 2022 cross-sectional analysis of SMI and Euro Stoxx 50 firms



The figure displays the reporting format chosen by firms that explicitly report on sustainable value creation (SVC). The sample includes SMI and Euro Stoxx 50 firms. The SMI sample size increases from 18 firms in 2013 to 19 in 2016 and 20 from 2019 onwards. The 2022 sample size is 20 for SMI firms and 50 for Euro Stoxx 50 firms. Data is hand-collected from annual, sustainability and integrated reports. Chapter, table and visual refer to those firms that disclose information on sustainable value creation in a chapter, table or visual format. Panel A reports the results for the SMI time series analysis, and Panel B reports the results for the SMI and Euro Stoxx 50 cross-sections in 2022.

Table 2: Implicit reporting about sustainable value creation
Panel A: SMI time series analysis

		Business			Environment		Materiality	
Year	N	Strategy	Sustainability Strategy	Purpose	SDG	Business Environment	Materiality Assessment	Material Topics Disclosure
2013	18	14	3	1	0	11	13	12
2014	18	13	5	1	0	11	13	13
2015	18	15	6	2	4	13	14	14
2016	19	17	6	3	8	14	16	15
2017	19	17	8	4	14	16	17	16
2018	19	17	7	6	15	13	19	19
2019	20	18	10	9	17	11	20	20
2020	20	18	11	13	18	12	20	18
2021	20	18	13	18	19	12	20	17
2022	20	18	11	17	18	12	20	19

Panel B: Year 2022 cross-sectional analysis of SMI and Euro Stoxx 50 firms

		Business			Environment		Materiality	
2022	N	Strategy	Sustainability Strategy	Purpose	SDG	Business Environment	Materiality Assessment	Material Topics Disclosure
SMI	20	18	11	17	18	12	20	19
Euro Stoxx	50	45	29	30	43	29	50	47
Total	70	63	40	47	61	41	70	66

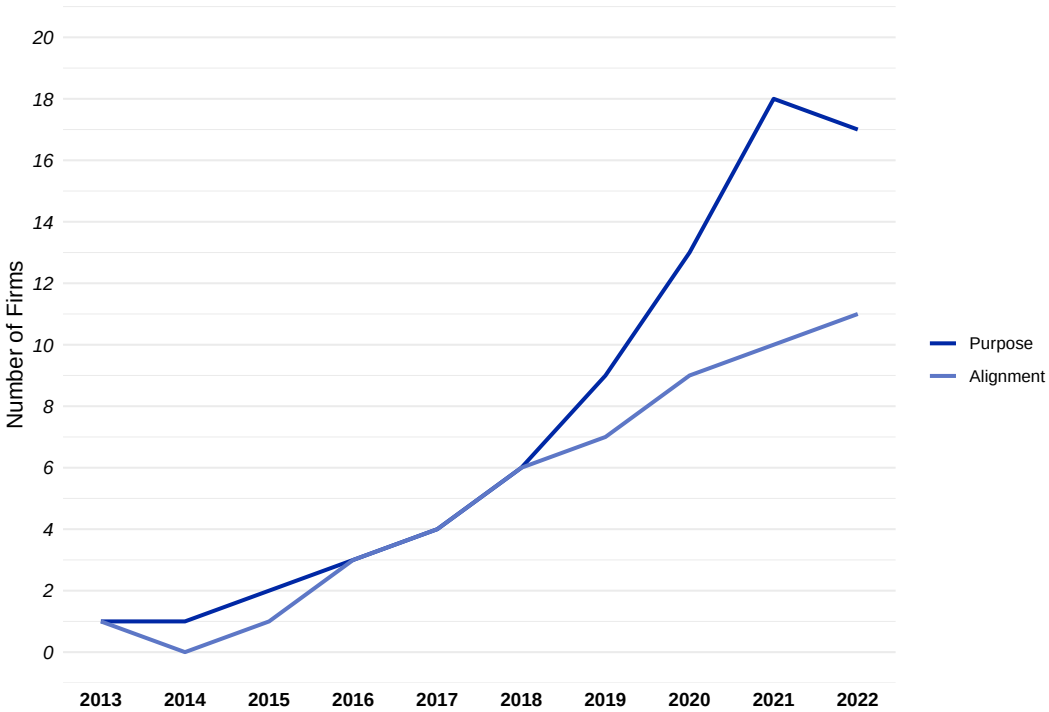
The table presents information on different elements for capturing reporting on business, the environment and materiality. These elements could form the basis for a linkage between financial and sustainability considerations. The sample includes SMI and Euro Stoxx 50 firms. The SMI sample size increases from 18 firms in 2013 to 19 in 2016 and 20 from 2019 onwards. The 2022 sample size is 20 for SMI firms and 50 for Euro Stoxx 50 firms. Panel A reports the results for the SMI time series analysis, and Panel B reports the results for the SMI and Euro Stoxx 50 cross-sections in 2022.

While around half of the firms choose the direct approach to reporting on sustainable value creation, we analyse whether the remaining firms choose a more indirect path of reporting on sustainable value creation. We observe a surge in firms reporting a purpose that starts in the years 2018 and 2019. In 2018, only 6 SMI firms reported a purpose,

and in 2022, 17 firms disclosed a purpose in their reports (Table 2, Panel A). Given that a firm's purpose is considered an important internal and external commitment to sustainability (George *et al.*, 2023; Henderson and Van den Steen, 2015), this trend underlines the importance that sustainability has gained recently. Firms have also reported on their strategy since 2016, except for holding companies that describe separate strategies for each division without describing an overall strategy. We also observe a positive trend for separate sustainability strategies, although this trend appears to slightly reverse in 2022. Comparing EU and Swiss firms in 2022 (Table 2, Panel B) shows that fewer Euro Stoxx 50 firms disclose a purpose than SMI firms do (60% vs. 85% of firms). Nevertheless, this difference might also arise from the small sample sizes in this study. Results on business and sustainability strategy are comparable.

In terms of business environment disclosures, the SDGs have evolved into a prevalent reporting item. Since their introduction in 2015, the SDGs have been considered in the reports of almost any firm by 2022. Interestingly, there is only a gradual adoption of the SDGs in reporting overtime, which aligns with the results of Hummel and Szekely (2022). The two Swiss firms that do not report on the SDGs report about the business environment instead. In line with sustainability reporting requirements, all SMI firms report on a materiality assessment since 2019. Reporting on materiality, the firms' environment and the SDGs is comparable across Euro Stoxx 50 and SMI firms in 2022.

Figure 5: Reporting on purpose and its alignment with business strategy

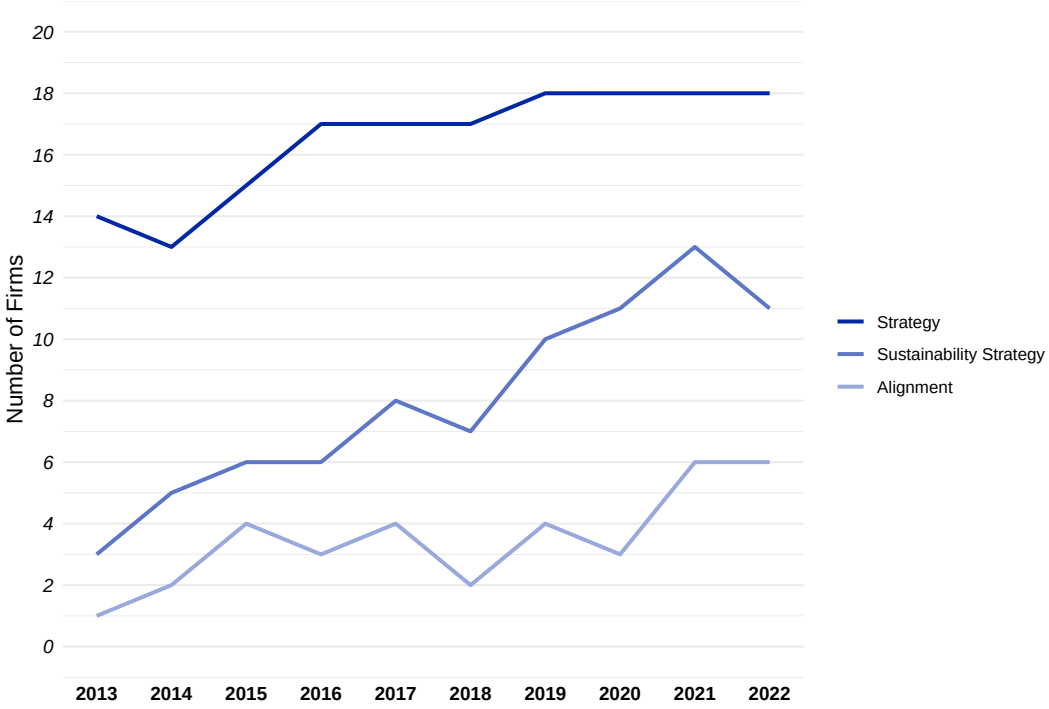


The figure displays the number of firms reporting on purpose and its alignment with business strategy. The sample includes SMI firms. The sample size increases from 18 firms in 2013 to 19 in 2016 and 20 from 2019 onwards. Data is hand-collected from annual, sustainability and integrated reports.

The results show that firms largely report both on their businesses and on sustainability. For the report readers interested in sustainable value creation, these elements require integration. One indicator of such an integration would be the alignment of the overall purposes of the firms with their business strategies. Figure 5 shows that 11 SMI firms (65%) align their purpose with their business strategy in 2022. A slightly lower degree of alignment is observable in the Euro Stoxx 50 sample, with 16 firms (53%) aligning purpose and business strategies. The time series analysis of the SMI firms reveals that the alignment between business strategy and purpose does not increase at the same rate as the number of firms disclosing a purpose. The differential increase starts in 2018, with some firms reporting a purpose but not aligning it with the business strategy. Hence, the gap between purpose reporting and alignment with the overall business strategy is driven by those firms that adopt a purpose in later reporting periods.

As a second indication of an integration of business and sustainability, we analyse whether a separate sustainability strategy is linked to the overall business strategy. Despite the increase in reporting separate sustainability strategies, no clear trend can be observed with respect to the integration of the two strategies (Figure 6). Instead, the integration of the two strategies is stable over time and applies to 6 SMI firms (55%) in 2022. The results for the Euro Stoxx 50 sample are similar, with 15 firms (52%) integrating the sustainability strategy with the business strategy. Finally, material topics could be used to

Figure 6: Reporting on sustainability strategy and its alignment with business strategy



The figure displays the number of firms reporting on their business and their sustainability strategies. It further highlights the number of firms that align the two strategies. The sample includes SMI firms. The sample size increases from 18 firms in 2013 to 19 in 2016 and 20 from 2019 onwards. Data is hand-collected from annual, sustainability and integrated reports.

integrate a firm's activities with people and planet. In 2022, only 4 SMI firms and 2 firms in the Euro Stoxx 50 sample provide this link (Table 6, Panel B).

The evidence presented so far shows that there are direct and indirect ways of integrating firms' activities and environmental and social aspects. We now assess whether these options are used individually or as complements to already existing disclosures on sustainable value creation reporting. Therefore, we run a correlation analysis and only display the results for the 2022 sample of SMI and Euro Stoxx 50 firms to reduce autocorrelation. Table 3 displays this Pearson's correlation matrix for the variables in our coding scheme with correlations greater than 0.3 highlighted in bold and italics. Only purpose and the alignment of purpose with business strategy as well as sustainability strategy and the integration of the sustainability strategy correlate. This is a correlation by design as firms need to have disclosures on purpose and sustainability strategy to be able to integrate this information. The results of the logistic regression analyses in Table 4 show a strong association between sustainable value reporting and the two indicators of integration (the alignment of purpose and business strategies and the alignment of business and sustainability strategies). This highlights that firms tend to disclose sustainable value creation both in a direct and an indirect way. If firms report on sustainable value creation, then

Table 3: Pearson correlations between reporting elements

	Business					
2022	**Purpose**	**Strategy**	**Sustainability Strategy**	**Alignment Purpose**	**Integration of Sustainability**	**SVC**
Purpose		0.07	0.07	***0.55***[1]	-0.01	0.09
Strategy			-0.1	0.26[2]	0.22[3]	-0.02
Sustainability Strategy				-0.14	***0.5***[1]	-0.04
Alignment Purpose					-0.01	0.14
Integration of Sustainability						0.04
SVC						

[1] Chi Square Test is statistically significant on a 1% niveau. A Fisher Test was conducted when there were less than 5 observations.

[2] Chi Square Test is statistically significant on a 5% niveau. A Fisher Test was conducted when there were less than 5 observations.

[3] Chi Square Test is statistically significant on a 10% niveau. A Fisher Test was conducted when there were less than 5 observations.

The table presents the Pearson correlation coefficients between the firm activities items of our main content analysis scheme (see Appendix) and sustainable value creation. The significance of the correlations is based on Chi Square tests or Fisher tests if there were fewer than five observations. The sample includes SMI and Euro Stoxx 50 firms in the reporting year 2022 to reduce autocorrelation concerns resulting from the SMI time series analysis.

they also tend to align their purpose with their strategies and sustainability strategies with business strategies. Hence, the different measures for integration that we introduce in our content analysis scheme tend to be complementary elements of reporting on sustainable value creation.

Table 4: Logistic regression output of sustainable value creation reporting and firm activities items of the main content analysis

	SVC			
	(1)	(2)	(3)	(4)
Purpose	-1.134*	-2.218***	35.285***	12.818***
	(0.687)	(0.640)	(2.309)	(1.307)
Sep. Sus. Strategy	-2.815***	-3.336***	1.770	0.575
	(0.679)	(0.668)	(1.804)	(1.382)
Align. Purpose & Strategy	4.174***	4.624***	20.123***	26.717***
	(0.844)	(0.617)	(0.000)	(1.155)
Align. Sus. Strategy & Strategy	4.727***	5.027***	-0.167	19.207***
	(0.812)	(0.793)	(1.818)	(1.722)
Firm fixed effects	No	No	Yes	Yes
Year fixed effects	No	Yes	No	Yes
#Obs.	191	191	88	88
Pseudo R^2	0.286	0.253	0.356	0.481
Log-Likelihood	-85.9	-81.2	-26.5	-10.1
AIC	181.9	190.4	79.1	64.2
BIC	198.2	235.9	111.3	118.7

The table shows the logistic regression results of the dependent variable sustainable value creation reporting and the firm activities items of the main content analysis. The results are based on logistic regressions with robust standard errors (1), standard errors clustered by year (2) and standard errors clustered by firm (3) and (4). The dataset consists of 191 firm-year observations of the SMI from 2013 - 2022. Standard errors are shown in parenthesis. To account for the panel structure of our data with only a maximum of 20 firms per year, firm and year fixed effects were included. Intercepts are not reported. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.

3.4 Design of sustainable value creation reporting

In this section, we focus exclusively on firms that report on sustainable value creation in a direct way. We differentiate between firms providing a visual or a tabular disclosure format.

Only a few firms provide their sustainable value creation in tabular format, as shown in Figure 5. Most of these firms choose to report a key performance indicator (KPI) table in a prominent place inside the report, which contains financial, environmental, and social results. In 2013, this approach was already used by one firm, but until today, only three firms have provided such a table. Two firms monetarised the KPIs, one from 2015 – 2018 and the other from 2015 – 2021. Neither of those two firms tried to aggregate the KPIs to a summary impact number. In the Euro Stoxx 50, the tabular format is again not the predominant choice, with only 6 firms using it in 2022. Among these, only one firm monetarises the KPIs but does not provide an overall impact number.

Table 5: Details on sustainable value creation reporting for visual reporters
Panel A: SMI time series analysis

		Input Reporting				Output Reporting			
Year	SVC	Inputs	Results	Targets	VCC	Outputs	Results	Targets	Imp. Results
2013	3	0	0	0	0	0	0	0	0
2014	3	0	0	0	1	0	0	0	0
2015	5	1	0	0	2	2	2	1	1
2016	5	2	1	0	2	3	2	1	1
2017	7	4	2	0	4	7	6	2	1
2018	9	6	4	1	5	7	6	1	1
2019	9	7	4	1	6	7	7	1	2
2020	9	7	5	1	5	7	7	1	2
2021	10	7	5	2	6	7	6	2	3
2022	11	7	6	2	7	8	7	0	4

Panel B: Year 2022 cross-sectional analysis of SMI and Euro Stoxx 50 firms

		Input Reporting				Output Reporting			
2022	SVC	Inputs	Results	Targets	VCC	Outputs	Results	Targets	Imp. Results
SMI	11	7	6	2	7	8	7	0	4
Euro Stoxx	27	21	15	2	25	25	22	3	2
Total	38	28	21	4	32	33	29	3	6

The table presents information on the disclosure of sustainable value creation (SVC) for firms via an input-output based model. The sample includes SMI and Euro Stoxx 50 firms. The SMI sample size increases from 18 firms in 2013 to 19 in 2016 and 20 from 2018 onwards. The 2022 sample size is 20 for SMI firms and 50 for Euro Stoxx 50 firms. Column SVC reports the number of firms reporting on sustainable value creation for a given year or subsample. Panel A reports the results for the SMI time series analysis, and Panel B reports the results for the SMI and Euro Stoxx 50 cross-sections in 2022. VCC refers to reporting on a value creation cycle and imp. abbreviates impact.

With respect to firms providing a comprehensive visual description of sustainable value creation, we find that most firms rely on the input-output based model for describing business models (PTF-RNFRO, 2021a, 2021b). This input-output approach is also suggested in the Integrated Reporting Framework (IIRC, 2021). These illustrations became more

granular over time (Table 5, Panel A). The value creation cycle and the output reporting were disclosed earlier than the input reporting. The inputs and outputs often contain quantitative results from the current reporting year, but targets are rarely included. Only recently firms started to include an impact component in their sustainable value creation visual illustrations.

The results in Table 5, Panel B, for Euro Stoxx 50 firms are less comparable than those in previous analyses. Euro Stoxx 50 firms tend to be more forthcoming than SMI firms in terms of disclosing inputs (78% vs. 64%), the value creation cycle (93% vs. 64%), outputs (93% vs. 73%), output prior year realizations (81% vs. 64%), and output targets (11% vs. 0%), whereas SMI firms more often report about input targets (18% vs. 7%) and impacts (36% vs. 7%). Targets and their achievements are currently not disclosed in the impact section of the input-output model.

Finally, we look into links from sustainable value creation reporting to the SDGs and the business environment. We deem the link via material topics, a direct link to different SDGs or to the overall business environment as potential ways for such a linkage. As outlined above, firms merely use material topics to link the business of the firm to its impacts (see Table 6, Panel A). Only four SMI firms in 2022 provide this link via material topics, and two of these firms provide this link only in an indirect way by linking to the respective chapters in the report. Considering the SDGs as a potential framework for the impact of the firm delivers comparable results. Again, only four firms connect their graphical illustration of the process of sustainable value creation to the SDGs. The results for the Euro Stoxx 50 firms are comparable, with a slight tendency to contain even fewer links (see Table 6, Panel B).

In sum, reporting on sustainable value creation strongly relies on presentations in visual formats that focus on some kind of input-output model. Some firms even include impacts but merely as singular numbers and not as clear impact pathways. Dependencies are missing from the disclosures on sustainable value creation. Although information on dependencies may be difficult to gather, it is highly important to truly understand sustainable value creation because it allows us to assess the feedback of impacts on firms' activities.

Table 6: Disclosure of sustainable value creation and its linkages to people and planet and material topics

Panel A: SMI time series analysis

		SDG Link			Business Environment Link			Materiality Link		
Year	SVC	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
2013	3	0	0	0	0	0	0	0	0	0
2014	3	0	0	0	0	0	0	0	0	0
2015	5	0	1	1	0	1	1	0	0	0
2016	5	2	0	2	0	0	0	0	0	0
2017	7	2	0	2	0	1	1	0	0	0
2018	9	2	0	2	0	2	2	0	1	1
2019	9	3	0	3	0	1	1	1	1	2
2020	9	4	0	4	0	2	2	1	1	2
2021	10	4	1	5	0	1	1	2	1	3
2022	11	4	0	4	0	1	1	2	2	4

Panel B: Year 2022 cross-sectional analysis of SMI and Euro Stoxx 50 firms

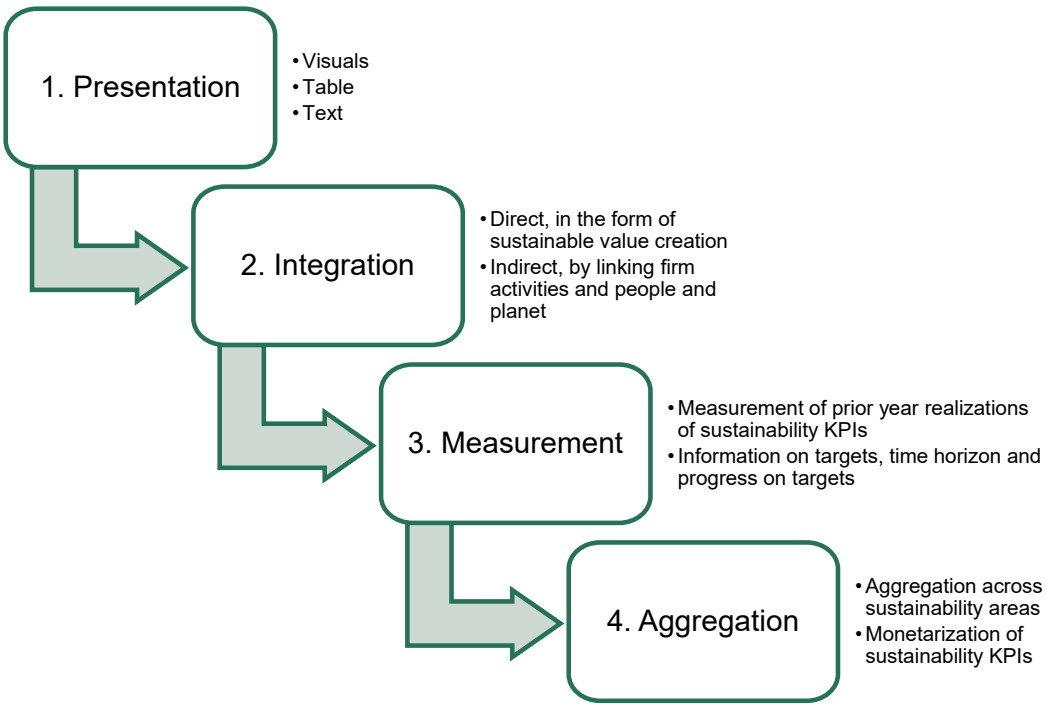
		SDG Link			Business Environment Link			Materiality Link		
2022	SVC	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
SMI	11	4	0	4	0	1	1	2	2	4
Euro Stoxx	27	6	0	6	1	0	1	2	0	2
Total	38	10	0	10	1	1	2	4	2	6

The table presents information on the disclosure of sustainable value creation and how these are linked to other disclosures on people and planet (SDGs and the business environment) and material topics. The sample includes SMI and Euro Stoxx 50 firms. The SMI sample size increases from 18 firms in 2013 to 19 in 2016 and 20 from 2019 onwards. The 2022 sample size is 20 for SMI firms and 50 for Euro Stoxx 50 firms. Panel A reports the results for the SMI time series analysis, and Panel B reports the results for the SMI and Euro Stoxx 50 cross-sections in 2022.

3.5 The usefulness of our structure for sustainable value creation reporting

Analysing and understanding disclosures on sustainable value creation requires a common structure. We have proposed such a common structure with our content analysis scheme. This structure links to issues that are typically raised with respect to the usefulness and comparability of sustainability reporting. These issues include the presentation of sustainability information, the integration of financial and sustainability considerations, and the measurement and aggregation of sustainability issues (Friedman and Ormazabal, 2024; Grewal and Serafeim, 2020; Wagenhofer, 2024). We discuss each of these issues in light of our analysis below.

Figure 7: Reporting on sustainable value creation and critical issues in sustainability reporting



The figure displays how our content analysis scheme for sustainable value creation reporting links to existing critical issues raised for sustainability reporting. It is based on our content analysis scheme in Figure 2 but adjusted for actual findings.

Presentation is a critical issue in sustainability reporting because there are no agreed-upon presentation formats, as in financial reporting with balance sheets, income statements etc. (Grewal and Serafeim, 2020; Wagenhofer, 1990). We also observe this presentation issue with respect to sustainable value creation reporting and find that firms tend to report in visual, tabular or textual format.

The most challenging part in this analysis is the integration of financial and sustainability considerations, and this information is crucial for stakeholders interested in the sustainable value created by a firm (Friedman and Ormazabal, 2024; Wagenhofer, 2024). Firms

that integrate financial and sustainability considerations are likely to consider both aspects within their management accounting such that decisions are not only made in terms of financial but also sustainability considerations (Adams, 2017; Dimes *et al.*, 2023; Dimes and de Villiers, 2024). Ideally, reporting provides insights into the risks and opportunities arising from the environmental or social considerations of firms' activities and, at the same time, describes their impacts on people and the planet. Having a clear understanding of risks, opportunities and impacts would allow readers to assess how impacts may become financially material in the long run. Our observation is that firms typically do not connect the individual impacts and dependencies and particularly neglect dependencies. Instead, they rely on disaggregated disclosures of inputs and outputs of the value creation process and provide information on impacts and dependencies in a disaggregated way across reporting section on material topics.

Another commonly raised issue in sustainability reporting is measurement in qualitative and quantitative terms. Quantitative measures mostly have different units of measurement and monetarization is rarely observable (Barker, 2019; Grewal and Serafeim, 2020; Wagenhofer, 2024). For sustainable value creation reporting, stakeholders need information from the reporting year for each dimension. In the environmental area, these include, for example, measures for GHG emissions, water usage, waste generation or biodiversity. Such measures can be enriched by targets, the time horizon per target and progress made on targets.

Finally, aggregation is a crucial issue in sustainability reporting and in sustainable value creation reporting in particular. In the financial domain, information is aggregated to a single earnings number. In the environmental and social domains, such aggregation is currently not widely achievable; therefore, sustainability disclosures often lack the necessary level of aggregation to consider them in decision frameworks (Grewal and Serafeim, 2020; Serafeim *et al.*, 2019; Wagenhofer, 2024). This is primarily due to ethical concerns when trading off sustainability aspects against each other (Schoenmaker and Schamrade, 2019). Although we agree with this claim, we strongly encourage firms and stakeholders to consider appropriate ways to aggregate information that is important for decision-making on sustainable value creation.

4. Conclusion

Today's firms are increasingly required to operate in a way that supports sustainable development. This shifts the notion of value to sustainable value creation that integrates financial, environmental and social aspects of value creation. Understanding and measuring such a sustainable value creation is critical to assessing progress on sustainable development. In this paper, we develop a structure for the analysis of disclosures on sustainable value creation and provide descriptive evidence on the reporting decisions of large public Swiss firms with respect to sustainable value creation. Our findings suggest an increase in disclosures on sustainable value creation over the last ten years. Nevertheless, only 55% of Swiss firms reported on sustainable value creation in 2022. The disclosures made on this topic are not easily comparable and mostly lack clear targets and information on the progress on targets. We further compare the results for the SMI firms in 2022 with those for Euro Stoxx 50 firms and find that the results are largely comparable. Our findings emphasize the role of the presentation of information in corporate reporting as an essential feature for understanding interrelated aspects. They further highlight the important role of

measuring and aggregating sustainability information to inform decision-makers. Finally, the integration of financial and sustainability information is crucial for understanding the dependencies of firms on people and planet and hence sustainable value creation. The aspects that we find important in structuring disclosures on sustainable value creation match with existing challenges raised with respect to the usefulness of sustainability reporting. Our paper highlights that reporting on sustainable value creation is only emerging and that clear guidelines and structures to this approach are needed to advance our understanding on how firms can contribute to sustainable development in a holistic way. Hence, we encourage all stakeholders to engage in the discussions and to support the development of solutions for this topic.

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Use of Artificial Intelligence

We used Springer Nature's Curie assistant, ChatGPT, and Microsoft Copilot for language editing purposes. We thoroughly checked results and assume full responsibility for the published paper.

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Appendix

Detailed documentation of our content analysis scheme

Sustainable value creation disclosure, content analysis step 1			
Direct integration	A clear description about the sustainable value creation process of the firm, including economic, social, and environmental value, is disclosed.		
	Presentation Format	Separate chapter or section	The description can be found in a separate chapter or section.
		Table	The description is in a tabular format.
		Visual	The description is visualized. A visualization that contains only tables is not sufficient. It is not sufficient to show a visualization that only helps to understand the table.
Indirect integration	Firm Activities	Purpose	The firm boldly reports a purpose.
		Strategy and/or strategic priorities/activities	The firm reports a business strategy for the whole firm and not just for its subsidiaries.
		Separate sustainability strategy or framework	The sustainability strategy is clearly highlighted. A strategy containing only environmental aspects is not sufficient. At least two different dimensions must be considered within the sustainability strategy.
	SDG/Business Environment	SDG	(Relevant) SDGs must be integrated into the report. Merely showing a list with all SDGs is not sufficient.
		Business Environment	Information about markets, mega trends or current business environment is disclosed.
	Materiality	Materiality Assessment	A materiality assessment was conducted by the firm.
		Material topics disclosure	The mere presence of a materiality assessment is not sufficient. Material topics must be disclosed in the report.
	Links	Alignment of purpose and strategy	The firm aligns purpose and business strategy clearly. There has to be an obvious connection between the two.
		Sustainability strategy is part of the overall strategy	The sustainability strategy is clearly connected to the overall strategy.
		Material topics link firm activities and business environment	Material topics are used to link firms' activities and their impact and dependencies on people and planet.

Sustainable value creation disclosure details, content analysis step 2			
Input-output models – Inputs	Inputs to the sustainable value creation process or the business model are described.		
	Measurement	Results of fiscal year	The inputs are quantified as results of fiscal year activities.
		Targets	The quantification of the inputs includes a target number that was to be achieved in the current fiscal year or is to be achieved in the future.
		Link to other sections for quantification	There is a link to other sections of the report where the inputs are further described and quantified. In case the quantification is already visualized this item might still apply if there are further refinements available in other sections of the report. Links need to be very explicit.
Input-output models – Value creation/business model	The graphical illustration or the chapter includes a part that describes how the firm operates with the inputs to create an output.		
Input-output models – Outputs	Outputs of the sustainable value creation process or the business model are described.		
	Measurement	Results of fiscal year	The outputs are quantified as results of fiscal year activities.
		Targets	The quantification of the outputs includes a target number that was to be achieved in the current fiscal year or is to be achieved in the future.
		Target achievement	Target achievement status is available.
		Link to other sections for quantification	There is a link to other sections of the report where the outputs are further described and quantified. In case the quantification is already visualized this item might still apply if there are further refinements available in other sections of the report. Links need to be very explicit.
Input-output models – Impacts	Impacts of the sustainable value creation process or the business model are described.		
	Measurement	Results of fiscal year end	The impacts are quantified as results of fiscal year activities.
		Targets	The quantification of the impacts includes a target number that was to be achieved in the current fiscal year or is to be achieved in the future.
		Target achievement	Target achievement status is available.
		Link to other sections for quantification	There is a link to other sections of the report where the impacts are further described and quantified. In case the quantification is already visualized this item might still apply if there are further refinements available in other sections of the report. Links need to be very explicit.

Sustainable value creation disclosure details, content analysis step 2 (continued from previous page)			
Links	Link to material topics	Direct link	Material topics are included in the sustainable value creation visualization or chapter, and each material topic is related to one or more impacts or outputs.
		Indirect link	Material topics are included in the sustainable value creation visualization or chapter but not assigned to impacts and outputs explicitly.
	Link to SDGs	Direct link	SDGs are included in the sustainable value creation visualization or chapter, and each SDG is related to one or more impacts or outputs.
		Indirect link	SDGs are included in the sustainable value creation visualization or chapter but not assigned to impacts and outputs explicitly.
	Link to business environment	Direct link	The business environment elements are included in the sustainable value creation visualization or chapter, and each element is related to one or more impacts or outputs.
		Indirect link	The business environment elements are included in the sustainable value creation visualization or chapter but not assigned to impacts and outputs explicitly.
Aggregation	KPIs in three areas (economic, social, environmental)	The firm lists KPIs in three different areas (business, environment, and society) in a table which looks like an income statement.	
	Monetarization of KPIs	The firm moves closer to an overall income statement by monetarizing KPIs such that numbers can be aggregated over the different sections.	
	Aggregation of monetarised KPIs to overall impact number	The firm provides an overall impact number which is the aggregation of earlier monetarised KPIs per sustainability area.	