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Recent trends in sustainability reporting by German universities

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Abstract
Voluntary sustainability reporting in the higher-education sector is still in its early stages. To better understand it, we looked at all 401 German universities to examine the specific contents of disclosure; methodologically, we applied content analysis using a university-specific indicator system. This study covers 40 sustainability reports that were published by 21 universities prior to August 2016. The results provide insights into recent trends in universities' voluntary sustainability reporting by comparing the current results to international studies as well as an earlier study using the same population, which was published in 2014. Our findings indicate significant differences in reporting as well as an overall trend towards a broader and deeper coverage of reported content. In general, there is a strong focus on the university dimension, whereas the social dimension attracts much weaker attention. The reason for such emphasis on the university dimension can be traced back to self-profiling or attracting potential students and young scientists as well as to foster a positive public perception, for example, to increase the chances to acquire third-party funding.

Keywords Sustainability reporting · University · Voluntary disclosure · Germany · Content analysis · Higher education

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Aktuelle Trends in der Nachhaltigkeitsberichterstattung deutscher Universitäten

Zusammenfassung

Die Nachhaltigkeitsberichterstattung im Hochschulsektor befindet sich noch in einem frühen Stadium. Zur Generierung vertiefter Erkenntnisse hierüber wurden alle Nachhaltigkeitsberichte der 401 deutschen Hochschulen inhaltsanalytisch mit einem hochschulspezifischen Indikatorsystem untersucht. Die Studie umfasst insgesamt 40 Nachhaltigkeitsberichte, die bis August 2016 von insgesamt 21 Hochschulen veröffentlicht wurden. Die Ergebnisse bieten einen Einblick hinsichtlich aktueller Trends in der freiwilligen Nachhaltigkeitsberichterstattung von Hochschulen. Sie resultieren aus einem Vergleich mit internationalen Studien sowie einer früheren Studie aus dem Jahr 2014. Die Ergebnisse zeigen signifikante Unterschiede in der Berichterstattung sowie einen Trend zur breiteren und vertieften Berichterstattung. Im Allgemeinen legen die Berichte den Schwerpunkt auf die hochschulspezifische Dimension, während die soziale Dimension deutlich weniger Beachtung findet. Ein Grund für die Akzentuierung der hochschulischen Dimension kann die Profilschärfung von Hochschulen sein, um die Attraktivität für potenzielle Studierende und Nachwuchswissenschaftler zu verbessern sowie eine positive Wahrnehmung der erweiterten Öffentlichkeit zu fördern, beispielsweise um die Chancen der Drittmittelakquise zu erhöhen.

1 Introduction

Under mounting pressure from their stakeholders and the general public, private and public institutions (e.g., firms, universities) have chosen to present their sustainability performance through voluntary disclosure instruments such as standalone sustainability reports (Chapple and Moon 2005; Lozano and Huisingh 2011; Sassen and Azizi 2018b). Sustainability reporting has gained wider recognition and seen rapid growth as a result (Schreck and Raithel 2015). Although a large number of recent studies have addressed the sustainability-related practices of businesses (Dienes et al. 2016; Hahn and Kühnen 2013), fewer have examined the reports issued by universities (Ceulemans et al. 2015). Considering the roles of universities in educating future leaders and advancing sustainable development (Madeira et al. 2011; Myers and Beringer 2010), their stakeholders should ideally be kept well informed about sustainability-related issues through the additional transparency of sustainability documentation (Adams 2013). Beyond that, academic institutions could take a further step in shaping the economic landscape of their country or the sustainable development mindset of their environment by structuring their operations sustainably and committing to sustainability disclosure. Nonetheless, the practice of reporting by universities is still in its infancy, as indicated by both the relatively small number of institutions involved and the information they choose to disclose (Lopatta and Jaeschke 2014). The amount of empirical research on voluntary reporting by universities is likewise also limited (Ceulemans et al. 2015). As further proof of this situation, nearly all of the published studies that have made use of content analysis have consentaneously underlined this early state of both practice and research with regard to universities' sustainability reports (for details, see the literature review in Sassen and Azizi 2018b).

Given that shortfall in research, our proposition is to examine the voluntary sustainability reporting practices of German universities. This study aims to update a content analysis by Sassen et al. (2014) in order to (a) look at the status quo of the overall state of sustainability reporting by German universities and (b) provide recent trends in this field. To this end, our study investigated the contents of 40 sustainability reports published by 21 universities prior to August 2016. Of all 401 German universities, 5% disclosed a report, which is a moderate increase over the 2014 rate of 4% (Sassen et al. 2014). To ensure comparability across studies, our research design is in line with prior content analyses of university samples (see, e.g., Sassen et al. 2014; Sassen and Azizi 2018a; 2018b). A total of 130 indicators were applied to assess the sustainability reports and then score and rank them. Our research improves upon previous studies by providing a full census survey of German universities' sustainability reports, describing recent trends and offering comparisons to the 2014 study as well as further international studies.

This paper is structured as follows. First, the literature review (Sect. 2) briefly documents the research lenses on universities' sustainability reporting. Next, a description of the research design (Sect. 3) explains the choice of sample, the process of data collection, the content analysis methodology, and the categories of indicators. The following part (Sect. 4) introduces the empirical findings, starting with the overall aspects and the content of those reports, then proceeds to the presentation of scoring results. More detailed information about the university and the triad of economic-environmental-social dimensions is subsequently provided. After the results are given, recent trends are illustrated (Sect. 5). The study concludes with a discussion of the findings, implications for policy-makers, and practitioners, as well as its limitations and recommendations for further research.

2 Literature review: Previous research on sustainability reporting

One popular definition was developed by the UN World Commission on Environment and Development (WECD) in *Our Common Future* (Brundtland Report), in which development was determined to be sustainable if it "meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987). In terms of reporting, a three-pillar model is usually applied (Vaughter et al. 2016). The triple-bottom-line (TBL) concept (Elkington 1994), for instance, was introduced by the international Global Reporting Initiative (GRI) guidelines. The fundamental idea behind these guidelines is that reports should reveal both positive and negative effects with regard to the following three dimensions: environment, society, and the economy (GRI 2016).

The term *sustainable university* lacks a widely accepted definition (Madeira et al. 2011). Despite this being the case, a general consensus about the need for universities to work towards sustainability seems to have already been established (Madeira et al. 2011), as universities are believed to perform a key role in sustainable development. Given the future sustainability challenges that we are faced with, their task of educating tomorrow's leaders and preparing them with the necessary resources will have an enormous influence on how forthcoming changes are met and overcome (Myers and Beringer 2010). As a matter of fact, the importance of their role has been reflected in a number of international political initiatives, for instance, the UN Global Action Programme on Education for Sustainable Development or the UN Decade of Education for Sustainable Development (ESD) (2005–2014) (for German initiatives, see Sassen et al. 2014). From this standpoint, it is understandable that the ESD is considered to be a critical domain of activity for German universities.

The German government has not yet issued any direct requirements for private and public organizations to disclose a comprehensive sustainability report. Nevertheless, some large companies have to provide a non-financial statement in their annual report. Hence, the German legislator has transposed the great importance of the disclosure of sustainability information as a result of the CSR Directive adopted by the European Commission in 2014 for the disclosure of non-financial information in German law in 2017 (Böcking 2017). This development affects in particular large companies, financial institutions, and insurance companies (see for details § 289b HGB), which have to provide information on the non-financial aspects such as environment, society, employees, human rights, anti-corruption and diversity in governing bodies on an annual basis (§ 289c HGB) (Stawinoga 2017). Beyond the non-financial statement as part of the annual report, firms often provide

a comprehensive standalone sustainability report which is usually much more comprehensive compared to the non-financial statement. Many firms use the GRI guidelines as a framework for their sustainability report (GRI 2016). The GRI occupies a key position in regulating voluntary sustainable reporting and has become the most frequently used standard in various sectors as a result (KPMG 2017). Even though the GRI guidelines consist of many indicators for the economic-environmental-social triad, no university-specific supplement has been issued that covers teaching and research (Adams 2013). The practice of designing and implementing sustainability reports is therefore still subject to a large degree of individual discretion, which raises issues when it comes to comparability. As there are no mandatory sector-specific reporting standards, universities rely on existing (inter-) national assessment systems such as the Sustainability Code for Higher Education Institutions in Germany, the Sustainability Tracking, Assessment and Rating System (STARS) in North America, the Dutch Assessment Instrument for Sustainability in Higher Education (AISHE), the Learning in Future Environments (LiFe) Index and the People & Planet Green League in the United Kingdom, the ISCN reporting framework or the non-university-specific GRI guidelines.

There are some further differences between universities and private companies concerning the determinants of sustainability reporting practices in higher education and their theoretical foundation. For instance, legitimacy and stakeholder theory are often applied to explain a company's motivation to publish a sustainability report. In this sense, the company is bound to a social "license to operate" to access the necessary resources to successfully conduct business (Hahn and Kühnen 2013; Deegan 2002). If the company does not meet the expectations of its various stakeholders, e.g. by externalizing costs, it might be sanctioned through a deprivation of legitimacy and eventually lose its license. In opposition to that, universities are public organizations that follow a social mission. This implies a different notion of the legitimacy question, as they are less incentivized to externalize costs, although they need to maintain legitimacy, e.g. through relevant research. The theoretical framing of universities' sustainability reporting and their determinants have not been subject to a significant amount of research. Different theoretical framings on a more general level of sustainability at university have been discussed by Bien et al. (2017). Nevertheless, this study offers some suggestions why universities' sustainability reporting has discovered a positive trend in recent years (see Chap. 5).

Despite a lack of prior studies on the topic, universities' sustainability reporting has recently received more research attention. One literature review carried out by Ceulemans et al. (2015) revealed that early research approaches to this topic were rather fragmented. Some publications concerned

themselves with the course of sustainability implementation (e.g., Ralph and Stubbs 2014), whereas others examined specific tools used for assessment (e.g., Fischer et al. 2015; Kamal and Asmuss 2013; Lozano 2006; Lozano and Young 2013). Even though these lines of inquiry touched on the subject, as Ceulemans et al. (2015) commented, they did not reach the heart of it. Another study by Rodríguez Bolívar et al. (2013) focused on the online dimension of responsibility disclosure by examining 25 leading Anglo-American higher-education institutions and found that those universities usually neglected the importance of online sustainability reporting. At the same time, some individual university sustainability reports have been studied empirically. Madeira et al. (2011) employed the process of the Faculty of Engineering of the University of Porto (FEUP) to develop a methodology for selecting sustainability indicators

that can be used to assess reports as well as for other purposes. Dagilienė and Mykolaitienė (2016) concerned themselves with the case study of Lithuania. Meanwhile, other scholars carried out their research with larger sample sizes and also more organized approaches. Alonso-Almeida et al. (2015), for example, investigated 45 reports published during the period from 2001–2012 from 18 different nations. The scale of this study is considered the broadest so far in terms of quantitative research. Content-wise, this survey analyzed the distribution of GRI in universities' reports as well as the level of adoption of the GRI guidelines.

The majority of empirical research on this subject has been approached by content analysis methods. Bice and Coates (2016), for instance, examined ten GRI reports from 2011 to 2013 in seven different countries; however, they took only the GRI index into account and not university-

Table 1 Results of previous studies and catalogues of indicators used (based on Sassen and Azizi 2018b)

Authors	Fonseca et al. (2011)	Lozano (2011)	Lopatta and Jaeschke (2014)	Sassen et al. (2014)	Sassen and Azizi (2018a)	Sassen and Azizi (2018b)	This study
Method/approach	Content analysis	Content analysis	Content analysis and interview study	Content analysis	Content analysis	Content analysis	Content analysis
Countries	Canada	11 countries	Germany and Austria	Germany	USA	Canada	Germany
n	7	12	6	24	23	20	40
Period	2006–08	2002–09	2005–11	2004–14	2012–14	2011–15	2004–16
Source of indicators for the TBL dimensions	GRI 3	GRI 2	GRI 3	GRI 4	GRI 4	GRI 4	GRI 4
Source of indicators for the university dimension	Campus sustainability assessment tools	GASU tool	GASU tool	Fonseca et al. (2011), Lozano (2011), Lopatta and Jaeschke (2014)	Sassen et al. (2014)	Sassen et al. (2014)	Sassen et al. (2014)
Organization profile, governance, reporting approach	9	–	–	–	–	–	–
Environmental	8	35	28	34	34	34	34
Social	16	48	23	48	48	48	48
Economic	3	13	9	9	9	9	9
University	20	30	27	39	39	39	39
Total number of indicators	56	126	87	130	130	130	130
Environmental (%)	63	17	29	9	30	15	15
Social (%)	21	7	14	2	7	1	4
Economic (%)	19	11	25	16	11	4	16
University (%)	25	6	30	17	21	13	23

The reporting levels of the four sustainability dimensions refer to 130 indicators. The reporting levels published in Sassen et al. (2014) referred to the indicators that were actually reported. The average values on the respective indicators in the study of Sassen et al. (2014) are divided by the number of reports that contain the information on the respective dimensions and not by the total number. In order to ensure comparability of the figures, the values were brought in line with the calculation in the present study and methodically adjusted

specific aspects. The study by Romolini et al. (2015), which explored 20 GRI reports from eight countries in 2012, was conducted in the same manner. A more general method was applied by Siboni et al. (2013) and accounted for more features such as the organizational framework, reporting procedure, disclosure data, and structure (e. g., length of the report, disclosure area), and social reporting and planning of nine Italian pioneering institutions. However, the authors presented no insight into the applied indicators. Prior to that, Lozano (2011) reviewed twelve GRI-based reports from eleven different countries during the period from 2002–2009. These reports were evaluated based on the Graphical Assessment of Sustainability in Universities (GASU), which was developed by Lozano (2006) using the GRI 2 guidelines (2002; 126 indicators). Fonseca et al. (2011) analyzed seven sustainability reports published in Canada from 2006 to 2008, exploring only the top 25 of 94 Canadian academic institutions. In that study, a 56-indicator framework was developed on the basis of the GRI 3 and a range of assessment tools for university sustainability. Lopatta and Jaeschke (2014) investigated German and Austrian public universities that had published reports prior to September 2011. A mixed evaluation system of 60 indicators from the GRI 3 and a custom selection of 27 university-specific indicators from GASU was applied. Three expert opinions were incorporated into the development of this tool of 87 indicators in total. Prior to July 2014, Sassen et al. (2014) carried out a full survey of 394 German universities and detected 24 first-time and follow-up reports from 14 institutions (4%). Sassen and Azizi (2018a) utilized the same approach to investigate 23 reports disclosed by 356 public and private US universities up to November 2014. This study, however, included only participants of the Sustainability Tracking, Assessment, and Rating System that disclosed an additional comprehensive sustainability report between 2012 and 2014. STARS is a transparent, self-reporting system for universities to measure their sustainability activities. The assessment system provides tools for reporting about achievements in the following sectors: academics, engagement, operations, and planning and administration (Sassen and Azizi 2018a). Following a similar approach, Sassen and Azizi (2018b) then investigated 20 sustainability reports by 160 Canadian universities. In another study, Gamage and Sciulli (2016) found eight 2013 reports from 40 public and private institutions in Australia; however, only five of them were compatible with the GRI guidelines and were examined. They studied 46 aspects on the basis of the GASU tool, which addressed four dimensions: economy, environment, society, and education. Numerical scoring was used, yet the process was conducted on a superordinate level instead of an indicator level. The results of this study did not include the overall findings for the primary dimensions, which makes it non-comparable to all of the studies mentioned above. Therefore, we did not integrate this specific research into Table 1, which presents a systematic summary of those studies related not only to GRI issues but also to particular aspects of academic institutions. Finally, the study by Del Sordo et al. (2016), which investigated twelve social reports published by 61 Italian public universities, is also not taken into account in Table 1 owing to its inclusion of only social and environmental data. However, unlike prior studies, even though content analysis through GRI indicators was also used, only public-sector indicators, not university-specific ones, were integrated. Table 1 consists of the following details: study approaches, source of indicators, study findings, and their indicator catalogues. All in all, the level of reporting practice by universities is consentaneously agreed to still be in its infancy, as denoted by both the number of institutions involved and the maturity of their reports.

3 Research design

The population consists of 401 German higher-education institutions, of which 110 are universities (*Universitäten*), 233 are universities of applied sciences (*Fachhochschulen*), and 58 are colleges of art and music (*Kunst- und Musikhochschulen*). The data collection method chosen for this research was systematic searches of university websites using keywords. Data was collected up to August 2016 by looking for the German translation of the following terms: *sustainability report, CSR report, climate action plan, green report, GHG inventory*, and *sustainability office*. After being screened, only those reports that were eminently recognizable as a sustainability report and available for download as an independent standalone report from the universities' websites were investigated. All other types of reports were excluded, including but not limited to reports with titles indicating a limited scope of disclosure (e. g., only one sustainability aspect, such as an environmental sustainability report). In the end, 40 sustainability reports published by 21 universities were selected for our research.

This study aims to draw replicable and legitimate findings from texts on the basis of their applied contexts (Del Sordo et al. 2016; Krippendorff 2012; Parker 2005). This led us to adopt content analysis, a longstanding methodology in sustainability literature (Gamage and Sciulli 2016; Lodhia et al. 2012). Nonetheless, previous studies have shown that various and incompatible approaches can be used to evaluate the relative importance of reporting issues in an empirically legitimate way (Unerman 2000; Guthrie et al. 2004). Arriving at similar findings, Milne and Adler (1999) stated that the relative importance of reporting was signified by aspects such as the number of words, sentences, and pages, the proportion of pages given to a par-

Table 2 Scoring scales (based on Sassen and Azizi 2018b)

Scale	Reporting level	Explanation
4	Complete reporting	The level of the information disclosed is excellent. This score is awarded if reporting totally fulfils what the indicator calls for
3	Good	The level of the information disclosed is good. The reporting provides approximately 75% of what the indicator calls for
2	Average	The level of the information disclosed is average. The reporting provides approximately 50% of what the indicator calls for
1	Low	The level of the information disclosed is poor. The reporting provides approximately 25% of what the indicator calls for
0	No reporting	There is a total lack of information for the indicator

ticular topic, or the ratio of disclosed information within an annual report. However, they considered these metrics to have failed to shed light on the importance of the reported themes; thus, they lack the necessary reliability. Unerman (2000) agreed with this, demonstrating that word count alone cannot indicate the true value of a sustainability report. Accordingly, a more valid and trustworthy method is needed (Milne and Adler 1999). The idea advanced by Guthrie et al. (2004) is that the content analysis methodology needs to be a systematic, unbiased, and reliable way of categorizing qualitative and quantitative data into predetermined sets to identify patterns in the course of presenting and reporting—patterns that might enable researchers to determine how much emphasis is placed on the themes written in the text. To achieve the highest efficacy of content analysis, the following technical prerequisites are necessary: (1) a clear and operational explanation of the classification categories, (2) an absence of bias in the categorization of disclosed information, (3) quantifiable data, and (4) consistency guaranteed by a reliable coder (Guthrie et al. 2004).

To comply with the technical requirements of this methodology, a 130-item indicator catalogue to assess sustainability reports was developed by Sassen et al. (2014; see Appendix for an overview of the catalogue). The same was employed in a US and Canadian study sample by Sassen and Azizi (2018a; 2018b). Despite the fact that this tool originated from the German context, it is built on the basis of global standards such as the GRI and other international studies on universities' sustainability reporting (Sassen et al. 2014; see also Table 1). Comparability is better established as a result. It was also essential to add a university-specific dimension to the GRI, as there have not yet been any supplements for the higher-education sector. By not adding these particular university-context indicators, applying the GRI guidelines would neglect the sustainability activities in the core domains of their operations, which are research and teaching (Adams 2013). To generate comparable results, we have taken into consideration the indicators used by Sassen et al. (2014) and Sassen and Azizi (2018a; 2018b) that were employed in those preceding studies (Lozano 2011; Fonseca et al. 2011;

Lopatta and Jaeschke 2014), and other evaluation tools for campus sustainability (see also Table 1). In the end, a total of 130 indicators were used in this research, among which 39 are related to the university dimension, 34 to the environmental dimension, 48 to the social dimension, and nine to the economic dimension.

In accordance with Lopatta and Jaeschke (2014), Lozano (2011), Sassen et al. (2014), as well as Sassen and Azizi (2018a; 2018b), a five-point scale from zero to four was used for the evaluation of the indicators, with zero denoting an absence in reporting and four denoting a complete level of reporting (Table 2). For reporting on an indicator to be able to be graded as a (4), all requirements from the GRI guidelines or from the university-specific prerequisites for sustainability reporting needed to be fulfilled. The lower values—namely, (1) low, (2) average, and (3) good—indicate the level of the information reported. If no information was disclosed, a (0) grade was given. The requirements for each indicator with regard to the environmental, economic, and social dimensions are described in the GRI technical protocol. For the university dimension, a corresponding method was applied.

To avoid subjectivity as much as possible, the coding of the disclosed information was performed at least by two independent researchers in each case. In the next step of the coding process, the researchers reviewed, compared and discussed the coded data to minimize the discrepancies that could be resulted from the diverging interpretation in regards to the assignment of reports' data to the appropriate scale (0 to 4 points) to each indicator (Deegan and Gordon 1996).

Besides the evaluation of 130 indicators, this research also provides a summary of the scoring values of each university, both dimension-wise and overall, to create a comprehensive ranking of the institutions. The relative value of the reporting level of all dimensions was computed by adding all the scores from all indicators in each dimension and then dividing the respective sums by the highest possible score for each dimension.

Fig. 1 Sustainability reports per year (initial and follow-up reports)
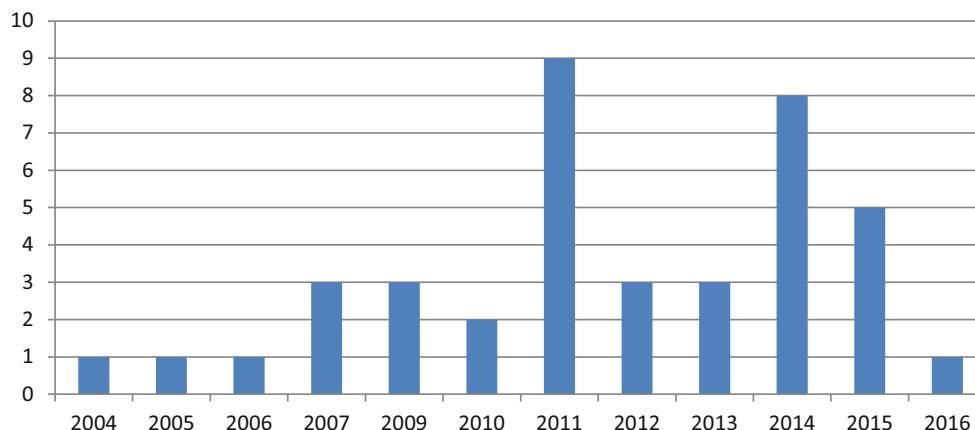
4 Results

4.1 General contents of the sustainability reports

Following a systematic search on the websites of all 401 German universities, we identified 40 sustainability reports disclosed by 21 universities (5%) published up to August 2016. All of these reports were included in our content analysis. The analysis excluded those reports that, by their title, suggested that they only addressed individual dimensions of sustainability, such as environmental reports. The reporting periods analyzed ranged from 2004 to 2016. In the event that sustainability reports from more than one period were accessible, all available documents (both initial and follow-up reports) were collected and included in the analysis. Fig. 1 provides an overview of the distribution of the sustainability reports by year. At nine reports in total, the majority of the 40 sustainability reports were from 2011. All told, 73% of the reports referred to the years between 2011 and 2016, which suggests that German universities have started to deal more concertedly with their sustainability reporting in recent years.

Of the 40 identified reports, 21 were initial reports (around 53%) and 19 were follow-up reports (47%). At the time our study commenced, twelve universities had issued only one report (57%), and seven universities (33%) had published two or three reports. Two of the 21 universities (10%) had published four or more sustainability reports.

In most cases (85%), the reports were published by the university itself (34 of 40). Of these, some reports were prepared under the direct participation of student initiatives or university working groups. 5% (2 of 40) of the reports were developed as the result of a research project, and 10% (4 of 40) of the reports were prepared directly by student initiatives. Of the 40 reports analyzed, 37 contained a statement from the university's leadership (93%).

Twenty-one of the 40 sustainability reports (53%) contained information on all four defined dimensions: economic, environmental, social, and university. Another eight reports had information on at least three dimensions (20%). Eight sustainability reports addressed only two dimensions or less (20%), and three reports did not contain any information that met the criteria of the indicator catalogue (7%). In total, the indicator analysis for all four dimensions found 94 out of the 130 possible indicators.

Altogether, 15 reports used the GRI guidelines as their framework. In nine of these 15 cases it was the GRI 3 reporting framework. Four universities followed the GRI 4 guidelines, and one applied GRI 2. In one case, a mix of GRI 3 and GRI 4 was used. The Hochschule für Nachhaltige Entwicklung Eberswalde (HNEE) used its own framework for sustainability reporting (*Nachhaltigkeitsgrundsätze*). The HNEE and the Leuphana Universität Lüneburg are the only universities that have applied additionally the Sustainability Code for Higher Education (*Hochschulspezifischer Nachhaltigkeitskodex*) of the German Council for Sustainable Development (RNE). The HNEE is also the only university that integrates reporting and brings all the academic reports together in one report. Furthermore, the Leuphana Universität Lüneburg is guided by the ISCN/GULF Sustainable Campus Charter framework in addition to the Sustainability Code for Higher Education of the RNE in the most recent sustainability report (Lüneburg 2015), thus distancing itself from the GRI standard previously used in four prior reports.

The length of the sustainability reports—between eight and 254 pages—varied considerably. On average, the number of pages was around 79. Only 21 of the 40 reports provided information on the exact timeframe of the reporting period, and the reporting periods themselves were quite heterogeneous. In eight cases it was a period of 12 months (20%) and in nine cases a period of 24 months (22%). A period of 36 months or more was found in four cases (10%).

The following chapters detail the results for each sustainability dimension (4.2–4.5) and present an overall evaluation and scoring of the results (4.6).

4.2 University dimension

Overall, 34 of the 40 sustainability reports included information on university aspects. The reporting level for the university dimension was 23%, which represents the highest of all four dimensions. A closer examination revealed that "External community" and "University operations" were the most comprehensively reported categories in the university dimension (48%). The indicators for the "University operations" category saw a reporting level of 27%. The "Teaching" and "Research" categories, by contrast, had lower levels of reporting of 18% and 20%, respectively. All 39 of the indicators were addressed in the reporting. However, the reporting level of these 34 sustainability reports differed strongly from one to the next. The resulting point spread ranges from a minimum score of one point, or a reporting level of 1%, up to a maximum score of 100 points, which corresponds to a reporting level of 64%. The HNEE sustainability report was deemed to be the most comprehensive report in terms of university-specific coverage (HNEE 2013). Despite all indicators being covered in the German universities' sustainability reporting, only one indicator—namely, EX2 ("Partnerships for sustainability with educational, business, and governmental entities")—achieved an above-average level (≥2.0 points).

All 12 indicators in the "Teaching" category were reported. This category saw the lowest reporting level (18%). The indicators TE3 ("Number or percentage [with respect to the total] of degree programs related to sustainability content") and TE5 ("Number or percentage [with respect to the total] of courses related to sustainability content") received the highest average number of points: 1.4 and 1.3, respectively. Leuphana Universität Lüneburg's sustainability report (2011) provided a detailed overview of its sustainability-related courses (seminars and lectures) according to the degree program. The university's 2015 sustainability report also noted that all bachelor-degree students deal with sustainability-related topics in their first semester. The information provided in the Teaching category was often incomplete and less operationalized, for instance, by only listing related courses and lectures. Furthermore, there was less reporting on interdisciplinarity and transdisciplinarity in teaching. This could be a reason why, inter alia, this category saw the lowest reporting level in the university dimension.

The "Research" category saw reporting on all 12 indicators as well. The reporting level of 20% is slightly higher than that of the "Teaching" category; overall, despite wide-ranging coverage of the indicators, a relatively low reporting level can also be observed for this category. The following indicators were reported most frequently: RE3 ("Research projects [with respect to total] with a focus on sustainability-related issues") was awarded 0.9 points, and RE4 ("List issues addressed: renewable energies, ecological economics, urban planning, etc.") 1.7 points. The reporting on research projects was more qualitative, as the qualitative indicator RE4 was awarded a value almost as twice as high (1.7) as the quantitative indicator RE3 (0.9). The Universität Hamburg (2014), for example, reported that about 24% of its research projects are related to sustainability topics. It also published a list of those 53 sustainability-related research projects (Universität Hamburg 2014). Similar to the "Teaching" category, the information provided on the "Research" category was often incomplete and less operationalized, for instance, by only listing research projects (RE3) without a comprehensive list of subjects (RE4). Furthermore, there was less reporting on interdisciplinarity and transdisciplinarity in research. Once again, this could be related to the fact that both categories saw the lowest reporting level in the university dimension.

The reporting level for the "External Community" category (48%) was the highest in the university dimension. The two indicators EX1 ("Student, faculty, and staff contributions to community") and EX2 ("Partnerships for sustainability with educational, business, and governmental entities") performed close to the average (1.9 points) or at the average score of 2.0 points, respectively. Overall, 24 and 22 reports, respectively, provided information on these two indicators. This is possibly a result of the strong influence of the municipal system on the universities, which operate many projects to support and develop their local communities. In addition, they cultivate many partnerships with different organizations at the local, regional, national, and international levels. Numerous student initiatives play a significant role in this context.

At 27%, the "University operations" category saw the second highest level of reporting. Eight of 13 indicators were scored with a value greater than one point.

4.3 Economic dimension

A total of 25 sustainability reports included information on the economic dimension, altogether covering 8 of the 9 possible indicators. Here, the dimensional indicator analysis of the reports shows a calculated reporting level of 16%.

Among the sustainability reports that addressed the economic dimension, there were differences in reporting extent. The point spread is between four and 20 points. Only 11 of 26 reports (42%) scored ten or more points. In scoring 20 out of a maximum of 36 points, which corresponds to a reporting level of 56%, the Universität Hamburg's sustainability report (2014) was the most comprehensive in terms of the economic dimension.

All four aspects of the economic dimension were covered in the reports. Only two reports provided information on the aspect of "Procurement practices." The indica-

tor EC3 ("Coverage of the organization's defined benefit obligations") was not covered in the sustainability reporting of any of the German universities. One of the reported indicators, EC1 ("Direct economic value generated and distributed"), surpassed the average (≥2.0 points) by scoring 2.2 points. At 1.8 points, the indicator EC4 ("Financial assistance received from government") scored close to the average.

4.4 Environmental dimension

A total of 31 sustainability reports included information on the environmental dimension, altogether covering 25 of the 34 possible indicators. As a result, the indicator analysis for the environmental dimension shows a reporting level of 15%. The Hochschule Furtwangen's sustainability report (2015) stood out as the most comprehensive report, scoring 55 of the possible 136 points, and thereby achieving a reporting level of 40%.

With the exception of "Compliance" and "Environmental grievance mechanisms," all categories of the environmental dimension were covered in the sustainability reports (10 of 12). Two indicators, EN3 ("Energy consumption within the organization") and EN23 ("Total weight of waste by type and disposal method"), exceeded the average score (≥2.0 points) with scores of 2.2 and 2.1 points, respectively.

Several universities have established environmental management systems, such as the Eco-Management and Audit Scheme (EMAS). Seven of 21 reporting universities have an EMAS certification (Universität Bremen 2010; HNEE 2015; Katholische Universität Eichstätt-Ingolstadt 2015; Hochschule Furtwangen 2015; Leuphana Universität Lüneburg 2013; Hochschule Trier 2014; Hochschule Zittau-Görlitz 2009). The HNEE and Leuphana Universität Lüneburg are climate neutral (HNEE 2015; Leuphana Universität Lüneburg 2015). The Umwelt-Campus Birkenfeld of the Hochschule Trier is Europe's only zero-emission campus (Hochschule Trier 2014).

4.5 Social dimension

Of the four categories within the social dimension, three were covered by the reports, namely, "Labor practices and decent employment", "Human rights", and "Society". No reporting on the "Product responsibility" category was identified. Overall, the level of reporting on the social dimension was 4%. This was the lowest level of reporting of all four dimensions. Of the 40 reports, 29 did provide information on the social dimension, but the majority of the GRI indicators were not taken into account. Information was provided for only 22 of 48 indicators.

Reporting on the social dimension was strongly characterized by information on the "Labor practices and decent

employment" (12 of 16 indicators) and the "Society" categories (7 of 11 indicators). No indicator reached an above-average level (≥2.0 points).

Many of the universities contribute to the reconciliation of work and family life, for example, by providing flexible working hours and study periods or by offering childcare or advice to students with children. Some universities even provide childcare allowances or neonatal subsidies (Nordakademie 2014; HNEE 2015), and are labeled "family friendly" in this regard (Hochschule Trier 2014; Leuphana University of Lüneburg 2013; HNEE 2015). The reports referred to, among other things, the signing of the Family Charter, whereby universities are committed to established standards for the compatibility of family and work or family and studies (HNEE 2015).

The point spread by university ranged from one (a reporting level of 0.5%) to 48 points (a reporting level of 25%). The report by the Nordakademie, Hochschule der Wirtschaft (2014) was the most comprehensive report, scoring 48 points.

4.6 Overall evaluation of the results

An overview of the overall results of the indicator analysis can be found in Table 3.

The Universität Hamburg's sustainability report (2014) can be classified as the most comprehensive report, scoring 183 of 520 points and achieving a reporting level of 35%. The overall assessment concludes with the sustainability reports from the GGS Heilbronn (2014) and the Universität Osnabrück (2014). These two sustainability reports achieved the lowest reporting level, scoring just 7 out of 520 points and a reporting level of 1%. Three further reports were calculated to have a reporting level of 0%.

Overall, the four sustainability dimensions saw the following reporting levels:

- University dimension ($n = 34$): 23%
- Economic dimension ($n = 25$): 16%
- Environmental dimension ($n = 33$): 15%
- Social dimension ($n = 29$): 4%

The reported content thus shows a strong focus on the university dimension. By highlighting university-specific aspects, universities might be attempting to enhance their own profile and thus their attractiveness and competitiveness. In addition, it can be assumed that many in and outside the university see the core tasks of universities to consist of research and teaching, which is why they are considered to be topics that are particularly worth reporting.

The reporting level of the economic dimension was relatively low (16%). Two indicators (EC1 and EC4) achieved reporting levels above or near the average, which might result from universities collecting financial data on a reg-

Table 3 Overall result of the indicator analysis from all dimensions

Rank	Report	UN	EC	EN	SO	Sum	RL (%)	Trend[a]
1	Hamburg 2014	82	20	51	30	183	35	↑
2	HNEE 2013	100	15	44	20	179	34	↑
3	Lüneburg 2015	81	10	46	24	161	31	↑
4	Lüneburg 2013	59	18	36	25	138	27	↑
5	Kassel 2014	77	6	36	13	132	25	First
6	HNEE 2015	71	4	38	11	124	24	↓
7	Lüneburg 2011	70	12	28	12	122	23	↑
8	Kaiserslautern TU 2014	58	8	37	18	121	23	↑
9	Nordakademie 2014	38	6	26	48	118	23	First
10	Furtwangen 2015	43	0	55	13	111	21	First
11	RheinMain 2016	47	14	35	14	110	21	First
12	Lüneburg 2006	57	10	32	3	102	20	First
13	Lüneburg 2009	58	10	28	4	100	19	↓
14	Oldenburg 2012	38	9	28	24	99	19	↑
15	Eichstätt-Ingolstadt 2015	57	0	36	3	96	18	↑
16	Eichstätt-Ingolstadt 2013	51	0	36	2	89	17	↑
17	Zittau/Görlitz 2009	42	14	20	3	79	15	First
18	Trier 2014	24	11	28	10	73	14	↑
19	HNEE 2009	58	8	0	0	66	13	First
20	Bayreuth 2007	16	12	32	2	62	12	First
	HNEE 2011	54	8	0	0	62	12	↓
22	Hamburg 2011	37	8	12	3	60	12	First
23	Trier 2011	3	6	32	15	56	11	First
24	Duisburg-Essen 2011	32	8	12	1	53	10	First
	Eichstätt-Ingolstadt 2012	44	0	8	1	53	10	First
26	Bremen 2010	31	8	0	0	39	8	↑
27	Trier 2012	5	6	16	8	35	7	↓
28	Oldenburg 2007	32	0	0	0	32	6	First
	Ostwestfalen-Lippe 2004	26	0	3	3	32	6	First
30	Osnabrück 2004	0	8	18	1	27	5	First
	Heilbronn 2011	27	0	0	0	27	5	First
32	WHU 2015	20	0	2	1	23	4	First
33	Osnabrück 2006	1	8	11	2	22	4	↓
34	Bremen 2005	16	0	0	0	16	3	First
35	Osnabrück 2014	0	0	13	0	13	3	↑
36	GGS Heilbronn 2014	4	0	2	1	7	1	First
	Osnabrück 2011	0	0	7	0	7	1	↓
38	Kaiserslautern 2011	0	0	0	0	0	0	First
	Witten/Herdecke 2011	0	0	0	0	0	0	–
	Witten/Herdecke 2010	0	0	0	0	0	0	First
Average		*36*	*6*	*20*	*8*	*71*	*–*	*–*
Reported indicators		*39/39*	*8/9*	*25/34*	*22/48*	*94/130*	*–*	*–*
Maximum number of points		*156*	*36*	*136*	*192*	*520*	*–*	*–*

[a] *First* first report; ↑ positiv trend compared to prior report; ↓ negativ trend compared to prior report

Fig. 2 Visualization of equally rated universities with a report level of 23%
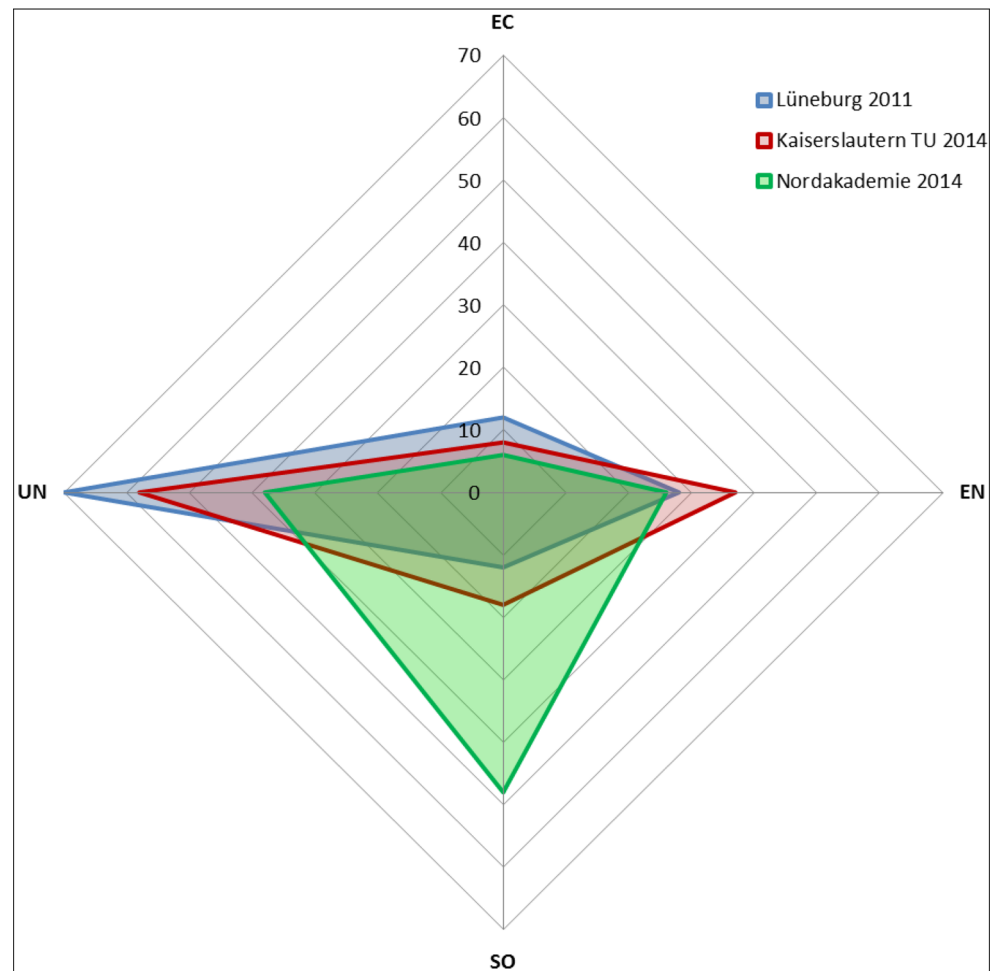
ular basis and disclosing this information in their annual or financial report. One reason for the extensive disclosure on indicator EC4 ("Financial assistance received from government") might be that the vast majority (16 out of 21) are state universities. These universities are dependent on governmental funding and are required to publish data on their funding sources. In addition, public funding is often earmarked, so from this perspective accountability is also compulsory.

The environmental dimension saw a low reporting level of 15%, possibly owing to the lower number of reported indicators (25 out of 34) and the low average scores (less than one point) of the reported indicators (17 out of 25). On the one hand, this might result from the fact that some indicators are only partially or not at all relevant to the context of higher education, for example, negative effects in the value chain or breaches of compliance regulations. On the other hand, some indicators are not worth reporting owing to the time-consuming nature of data collection. Here, for example, the issue of GHG emissions can be cited, such as the indicator EN17 ("Further indirect GHG emissions"),

which was addressed by only one university, or the wholly unreported indicator EN26 ("Habitats significantly affected by the organization's discharges of water and runoff"). Finally, the environmental dimension saw a lower reporting level than the economic dimension despite a higher number of reported indicators.

The social dimension saw the lowest reporting level (4%). Nearly half of the respective indicators were not reported (26 out of 48). The high level of unidentified indicators can be attributed to the fact that higher education is regulated by law in this regard; for example, universities are obliged to promote gender equality and equal opportunities. Information on social issues might therefore be published in a separate report (for example, in a gender equality report). The poor coverage of the social dimension could therefore come down to the fact that social issues, such as human rights, are only marginally or not at all relevant to sustainability reporting. Exceptions in this category would include anti-discrimination matters (Lopatta and Jaeschke 2014).

Table 4 Comparison of results

Categories	ID	No. of indicators	Germany [a] (n = 10) (2011–2014)	Germany Update [a] (n = 13) (2014–2016)	Trend
Materials	MA	2	2.30	1.00	−1.30
Energy	EN	5	2.80	9.69	+6.89
Water	WA	3	1.40	2.08	+0.68
Biodiversity	BI	4	1.10	1.92	+0.82
Emissions	EM	7	2.40	8.08	+5.68
Effluents and waste	EF	5	1.70	4.00	+2.30
Products and services	PR	2	0.00	0.85	+0.85
Compliance	CO	1	0.00	0.00	/
Transport	TR	1	0.00	1.69	+1.69
Overall	OV	1	0.00	0.62	+0.62
Supplier environmental assessment	SU	2	0.00	0.46	+0.46
Environmental grievance mechanisms	EG	1	0.00	0.00	/
Labour practices and decent work	LA	16	3.70	9.69	+5.99
Human rights	HR	12	0.00	1.23	+1.23
Society	SO	11	1.20	3.46	+2.26
Product responsibility	PR	9	0.00	0.00	/
Economic	EC	9	5.90	6.08	+0.18
Teaching	TE	12	8.60	12.15	+3.55
Research	RE	12	8.90	12.46	+3.56
External community	EX	2	2.60	5.23	+2.63
University operations	UO	13	13.70	18.77	+5.07

[a] Average of summed points of all reports per categories

The overall results of the present study illustrate the different foci of sustainability reports. In some cases, several universities achieved the same scores or the same reporting level with different degrees of coverage of sustainability dimensions. Fig. 2 illustrates this observation using the example of equally rated universities with a reporting level of 23%.

To extend the insights gained from this study of sustainability reporting by German universities, the next section compares the results of this study to the study by Sassen et al. (2014) (5.1–5.2) as well as to international studies (5.3). This allows us to take a closer look at recent trends in sustainability reporting in the German higher-education sector.

5 Recent trends

5.1 Positive trends

To determine recent trends in sustainability reporting by German universities, we have constructed two subsamples (Table 4): (Sample 1) To gain an as comparable as possible basis for a detailed comparison of the four sustainability dimensions, their categories and aspects, we included only the ten most recent reports from the study by Sassen et al.

(2014) that were published between 2011 and 2014. (Sample 2) The 13 most recent reports for each university of the 16 new sustainability reports create the second subsample. These 13 reports were published between 2014 and 2016.

The results show a positive overall trend in most categories. Only one category of the environmental dimension—namely, "Materials" (MA)—showed a decline in numbers. "Compliance" (CO), "Environmental grievance mechanisms" (EG), and "Product responsibility" (PR) remained unchanged (no reported content) and thus seem to be irrelevant to the higher-education sector. The categories, "Energy" (EN), "Emissions" (EM), and "Labor practices and decent work" (LA) showed a significant increase in their reporting level. Five formerly unreported categories were addressed in the more recent reports for the first time. Furthermore, the indicators used in the reporting rose from 62 (2011–2014) to 92 (2014–2016) out of a possible 130. It should be noted that the increase in reported indicators is reached through sustainability reports of solely four universities (Universität Hamburg, Leuphana Universität Lüneburg, HNEE and Katholische Universität Eichstätt-Ingolstadt) represented in both samples.

Overall, these findings show a positive vertical trend through an increased reporting level of categories. This means that universities are possibly offering more and better information as well as data on a diverse range of indicators.

This holds specifically true for the categories of the social dimension, in which a significant increase of 5.99 points was observed in reporting on "Labor practices and decent work" (LA) as well as a distinct increase in reporting on "Human rights" (HR) (+1.23 points) and "Society" (SO) (+2.26 points). A comparison of the university dimension also revealed a high increase in every category. This further supports the findings of both the present and previous studies that the university dimension is the most relevant to German universities.

The analysis also reveals a positive horizontal trend as new, previously unreported categories are now being reported, thus broadening the thematic framework that is addressed within sustainability reporting. The expansion of reported content appears in such categories as "Products and services" (PR), with an increase of +0.85 points; "Transport" (TR) with an increase of +1.69 points; "Overall" (OV), with an increase of +0.62 points; and "Supplier environmental assessment" (SU), with an increase of +0.46 points. The economic dimension shows a minor increase of +0.18 points from 5.90 to 6.08.

Explanations for the positive development of sustainability reporting in German universities can be found (1) within the institutions (internal factors) as well as (2) in their environment (external factors).

1. With respect to the internal factors, it is likely that the universities gained experience with sustainability reporting over time, as we generally observed higher-scoring follow-up reports that were better ranked than their predecessor in terms of the reporting level (see Table 3). More experience in reporting can have a decisive impact on the reporting level over time as more data sources are identified, information channels become more established, and responsibilities and processes are determined. Furthermore, it can be assumed that an in-depth analysis of barriers, a definition of the reporting scope, and a clear understanding of relevant terms and concepts will have already been carried out and refined, thereby allowing the institution to optimize disclosure practices. This would most likely lead to a broader and deeper investigation of the topics that comprise our content analysis indicators.

Another reason for the positive development is based on the assumption that universities in Germany have generally expanded their sustainability efforts. In turn, this would lead to a greater number of activities that can be disclosed. Publications of best practices (e.g., netzwerk *n* & Virtuelle Akademie Nachhaltigkeit 2016; Deutsche UNESCO-Kommission e.V. 2014) and more systematic approaches underpin this assumption as they show that concepts such as sustainability and sustainable development have significantly gained attention in recent years (Etzkorn and Singer-Brodowski 2017). This might have a positive influence on the willingness and intrinsic motivation of academics and administrative staff to foster sustainability initiatives at their own institutions and report on such activities.

Additionally, some universities are bound to other disclosure obligations, for example, through EMAS. In this case, an environmental report can be enhanced by other dimensions to fulfill the requirements for a comprehensive sustainability report.

2. There are also numerous external factors that promote sustainability reporting in Germany. Here the professionalization of the field should be considered, starting with political developments and legal regulations. First and foremost, the RNE has developed a Sustainability Code for Higher Education, which is currently in the testing stage. This is the first attempt to design a guide for sustainability reporting by universities. The code consists of four aspects: strategy, process management, environment, and society, and these four aspects are split into 20 further criteria. Currently, the HOCH^N project of eleven German universities is working in a participatory process on an advanced version of the Sustainability Code for Higher Education. This code can be used as a low-threshold instrument for sustainability reporting by universities. Additionally, there are a few sustainability-related target agreements between universities and their respective federal states (e.g., Hessen). The state of Hessen is increasingly committed to anchoring sustainability reporting in the higher-education sector and has launched a unique pilot project called Sustainability Reporting at Hessian Universities (Romanski 2016; HIS-HE 2016; Hochschule RheinMain 2016). This project aims to provide support and technical guidance to universities in their sustainability reporting. Finally, it is stated in the university laws of individual federal states such as Schleswig-Holstein (§ 3 HSG) or Hamburg (§ 3 HmbHG) that a future-oriented development in this day and age should be guided by the concept of sustainability. Aspects of sustainability such as equal rights (§ 3GG, § 3HRG) and sustainable waste disposal (§ 1 KrWG) are also enshrined in law, which means that universities are fostered to prepare reports on those topics.

Increased interest in implementing sustainability in the higher-education sector and reporting on sustainability-related higher-education activities also increases the need for exchange and networking. By now, numerous networks and initiatives have been developed to initiate a corresponding restructuring of the higher-education landscape such as the nationwide networks HOCH^N or netzwerk *n* and further regional networks (e.g., in Baden-Württemberg, Berlin-Brandenburg, or Bayern). In light of the enormous need for knowledge and action, such initiatives are not only desirable but also necessary.

However, the wider environmental conditions are becoming more and more complex for universities. Criteria such as market orientation and competitiveness are becom-

ing increasingly important. The demand for accountability to funders (government and society), efficacy, and relevance has increased accordingly (Martin 2012), and external stakeholder interest in the idea of sustainability or simply sustainability reporting has contributed to the fact that universities feel more and more obliged to address it explicitly. Yet universities face numerous challenges in this regard. There has been a reduction in governmental funding, which is why universities are increasingly looking for financing options in industry or seeking to acquire third-party funding. Universities are therefore under increasing competitive pressure in the higher-education sector and are striving for a more attractive positioning in the higher-education landscape, for example, by contributing to sustainable development. Declarations, agreements, conferences, and climate summits on an international level are providing some early approaches to the transformation required to integrate sustainability into universities' operations while also increasing pressure on universities to do so (e.g., Agenda 2030; UN Dekade BNE).

5.2 Negative trends

In contrast to the overall positive trend, Table 4 illustrates the decline in the reporting on "Materials" (EN). One explanation for this might be a lack of data on the subject and the high administrative cost of acquiring it. Tracking and auditing materials is a challenging task and often needs to be implemented from the ground up. Building a framework to collect such data and finding adequate software to support this process puts high barriers into place. Even if a good monitoring system is implemented, most materials for universities, with the possible exception of paper, are not that relevant for each university, making it difficult to score points on the basis of the GRI-based indicator system. It thus becomes clear that reporting on materials is especially difficult for first-time sustainability reports.

5.3 International trends

In an international comparison among existing studies that have used samples from the US (Sassen and Azizi 2018a) and Canada (Sassen and Azizi 2018b), the sustainability reports by German universities scored relatively high (see Table 1). The studies included in the comparison used the 130 possible indicators to assess the reporting levels. German universities achieved the best results in the economic dimension. In the social and university dimensions, they scored second best.

Whereas US and Canadian universities have tended to focus on the environmental dimension (due to the STARS framework), German universities have focused on the university dimension. This might be due to a range of possible

reasons. First, it can be assumed that the focus on the environmental dimension in US and Canadian universities' sustainability reporting is a result of the financial optimization of university processes. These are in part a result of financial incentives from legislators but also incentives for materials and in turn monetary savings that stem from adopting environmentally sound measures (Sassen and Azizi 2018a, 2018b). Cost-savings through environmental measures is an often met argument for sustainability. The emphasis of the university dimension in German reporting might aim on self-profiling or fostering a positive public perception, for example, to better acquire third-party funding (Azizi and Sassen 2018). Both argumentations might to a certain degree also apply in other national contexts, indicating that further research should carry out general drivers and motivations of sustainability reporting in relation to different national contexts.

The overall low reporting level across all four dimensions in the international comparison is also reflected in the results of previous studies.

6 Conclusion

6.1 Discussion

This study can be considered a follow-up to Sassen et al. (2014). A closer look at the major differences between these two studies seems beneficial for two reasons. One is to discuss the results of the comparison of sustainability categories and thereby focus on the development of sustainability reporting in German universities, as done in the previous section. The second is to observe and update the overall status quo of sustainability reporting in Germany and compare the results to those of 2014 (Sassen et al. 2014).

Whereas Sassen et al. (2014) investigated 24 sustainability reports by 14 universities (14 of 394 or around 4%) between 2004 and 2014, the content analysis of the current study evaluated 40 sustainability reports between 2004 and 2016 disclosed by 21 universities. This leads to an overall share of 5%, or 21 of the 401 universities in Germany, and an increase of 1% relative to the reporting period of the prior study. The reporting levels of the 24 sustainability reports observed by Sassen et al. (2014) were 16% (EC), 9% (EN), 2% (SO), and 17% (UN). This means that there is a broad positive trend in the environmental, social, and university dimensions, and no significant change in the economic dimension (EC 16%, EN 15%, SO 4%, UN 23%).

The results for the social dimension show that it sees the lowest reporting level of all four dimensions, which supports the results of previous studies (Lopatta and Jaeschke 2014; Lozano 2011; Sassen et al. 2014; Sassen and Azizi 2018a, 2018b). This also supports the conclusion drawn by

previous studies that the required information in this dimension might already have been disclosed in other (mandatory) reports, such as a diversity or human resource report. Similar to the social dimension, an explanation for the low level of reporting on the economic dimension could be that most German universities already publish separate annual financial reports. It should be emphasized that the reporting level of the environmental dimension shows a positive trend of +6%. As the dimension with the most comprehensive reporting, the university dimension clearly remains the most important one for German universities. It too shows a positive trend of +6%.

In terms of both the relative share of German universities that published a sustainability report and the level of reporting, the results indicate that sustainability reporting of universities is still in its infancy. In the current study, the most comprehensive report, which was issued by the Universität Hamburg, reached a reporting level of only 35%. In the previous study by Sassen et al. (2014), the most comprehensive report, issued by Leuphana Universität in 2011, was determined to have a reporting level of 23%. It is now ranked seventh.

The disclosure of sustainability issues requires financial and human resources which are often restricted. There are no legal requirements for sustainability disclosure in the higher-education sector. As a result reporting on sustainability-related activities is purely voluntary. The low reporting rates could therefore be explained by the fact that the costs of a sustainability disclosure might overweigh its benefits (Sassen and Azizi 2018a). Another explanation for the low level of reporting might be a materiality consideration, which means that only aspects which are material to stakeholders are included in the report (Unerman and Zappettini 2014).

The indicator analysis shows that not all reports provided information on all four dimensions. This finding can be understood in light of several factors. Universities define sustainability in different ways, and sustainability reports are based on these different definitions. Furthermore, the people in charge of sustainability reports at different universities have different opinions about which sustainability topics are relevant to the respective university and in turn which indicators should be included in the reporting on these topics. Reporting can also pursue different goals. In some cases, universities orient themselves along general higher-education topics rather than along GRI guidelines or university-specific sustainability indicators. The availability and collection of data can be another major barrier in the preparation of sustainability reports.

The findings indicate a positive trend in almost all categories. Despite the low level of reporting overall, this trend can be interpreted as an ongoing improvement in university sustainability reporting in Germany. Explanations for

this include an internal basis, which involves institutional factors ranging from more experience in sustainability reporting to a greater number of sustainability efforts worth highlighting along with an increase in staff members who possess a high degree of intrinsic motivation for sustainability initiatives (Schmitt and Sassen 2018). There is also an external basis for this positive development, such as a greater professionalization in the field of sustainability (e.g., regulations, networks, summits), advancing research on sustainability, increased competition between universities, and a high demand for accountability on the part of stakeholders and the public. Nevertheless, from an international perspective, the sustainability reporting of German universities is in a good state but there is still a lot of room for improvement.

6.2 Implications

As mentioned above, some indicators were not disclosed in the universities' sustainability reports, although it can be assumed that the necessary data may have been collected for other reports. The consolidation of an institution's sustainability-relevant data and its integration into a single report can contribute to a more transparent and comprehensive reporting. Thus, universities that have published other reports containing relevant information to sustainability, like a human resource report, an equality report, a health and safety report or an EMAS report, should exploit these potential synergies when preparing a standalone sustainability report. As for the low reporting level of the four sustainability dimensions, the percentages could be increased by relatively simple means such as the usage of data from other reports containing sustainability related information.

Our analysis of the data sample made it evident that the 40 sustainability reports differed strongly among one another. Therefore, more standardization in sustainability reporting in the higher-education sector is clearly desirable. This could yield the benefit of reducing the effort involved in creating and interpreting a sustainability report, ultimately resulting in a better allocation of resources thus saving cost, time, and manpower. At the same time, the university-specific set of indicators ought to be developed further and better adapted to the needs of universities.

Lastly, sustainability-specific rankings should be taken into consideration as a way of incentivizing sustainability activities and reporting on those activities. Rankings are often conducted on the basis of a custom framework and indicator system, and their requirements could have an influence on how universities approach sustainability and sustainability reporting. This influence could be broadly positive, as the case of US universities suggests, given their high reporting level in the environmental dimension as a result of the STARS ranking system (Sassen and Azizi 2018a).

6.3 Limitations

The current study has some inherent limitations. First and foremost, the sample of 40 sustainability reports might seem relatively small compared to the total number of universities in Germany. For a content analysis, however, it is an adequate size. It is also the largest research sample for sustainability reports of universities in general (see Table 1) as well as in specific terms of the methodological approach based on 130 indicators.

Accompanying this predefined set of indicators is another constraint on the interpretation of the results. This study has documented the level of reporting in accordance with the 130 indicators to reveal the relative importance of the disclosure topics to universities. The measured reporting level does not necessarily represent the quality of the reporting nor does it serve as an indicator for the actual sustainability performance of the universities investigated. To best assess the quality of a report, the decisive factor should be the degree to which stakeholder expectations have been fulfilled and not to which extent guideline requirements have been met. In other words, the quantitative reporting level should not be confused with the quality of sustainability-specific reporting or the university's actual sustainability performance.

The set of indicators could lead to further limitations. To consider universities' needs within the sustainability disclosure a catalogue of indicators has been used according to previous research (Lozano 2011; Fonseca et al. 2011; Lopatta and Jaeschke 2014; Sassen et al. 2014; Sassen and Azizi 2018a; 2018b). On the one hand, the standardized indicator system could contribute to objective, transparent, and comparable universities' sustainability reports. On the other hand, the standardized set of indicators might not consider the multidimensional nature of sustainability topics (e. g., UO7 is appointed to the university specific indicators but also contains environmental information).

In further research, a larger sample could help to investigate determinants, drivers, motivations and processes of disclosing sustainability-related issues at universities. Additionally, examining universities' complete reporting portfolio could shed light on the topics that have been disclosed in other formats (e. g. voluntary and obligatory reporting) and are of interest for sustainability reports.

Appendix

Table 5 Categories and number of indicators of the economic, environmental, social, and university dimensions. (Sassen et al. 2014; Sassen and Azizi 2018a, b)

| Dimensions and Aspects			
Dimension	**Economic**		**Environmental**
Categories	Economic performance Market presence Indirect economic impacts Procurement practices		Materials Energy Water Biodiversity Emissions Effluents and waste Products and services Compliance Transport Overall Supplier environmental assessment Environmental grievance mechanisms
Number of indicators	9		34
Dimension	**Social**		
Categories	*Labor practices and decent work*	*Human rights*	*Society*	*Product responsibility*
Aspects	Employment Labor/management relations Occupational health and safety Training and education Diversity and equal opportunity Equal remuneration of women and men Supplier assessment of labor practices Labor practices grievance mechanisms	Investment Non-discrimination Freedom of association and collective bargaining Child labor Forced or compulsory labor Security practices Indigenous rights Assessment Supplier human rights assessment Human rights grievance mechanism	Local communities Anti-corruption Public policy Anti-competitive behavior Compliance Supplier assessment of impacts on society Grievance mechanisms for impacts on society	Customer health and safety Product and service labeling Marketing communications Customer privacy Compliance
Number of indicators	16	12	11	9
	48			
Dimension	**University**		
Categories	*Teaching*	*Research*	*External community*	*University operations*
Aspects	General Incorporation of sustainability into the curricula Interdisciplinary and trans-disciplinary Self-regulated learning Monitoring of incorporation of sustainability into curricula	General Grants Research programs, projects, centers, services Interdisciplinarity and transdisciplinarity	Community activity and services	Student demographics Quality management Campus life Student mobility
Number of indicators	12	12	2	13
		39		

Table 6 Indicator catalogue for the university dimension (Sassen et al. 2014; Sassen and Azizi 2018a, b)

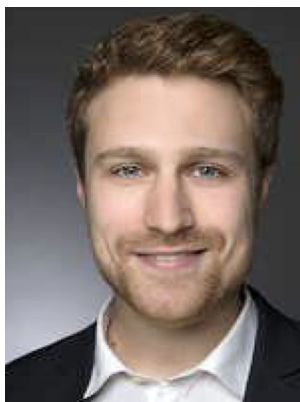| Category	Aspect	Indicator	Description
Teaching	General	TE1	Policies related to sustainability in curriculum
		TE2	Scholarships offered to sustainability-related education
	Incorporation of sustainability into the curricula	TE3	Number or percentage (with respect to total) of degree programs related to sustainability
		TE4	Number of students enrolled in sustainability-related degree programs
		TE5	Number or percentage (with respect to total) of courses related to sustainability
		TE6	List of course titles that contain sustainable development topics
		TE7	Number of students enrolled in sustainability-related courses
	Interdisciplinarity and transdisciplinarity	TE8	Management procedures for interdisciplinarity and/or transdisciplinarity in courses
		TE9	Number or percentage (with respect to total) of courses
	Self-regulated learning	TE10	Availability of e-learning programs and other self-regulated learning options
	Monitoring of incorporation of sustainability into curricula	TE11	Management procedures to monitor incorporation of sustainability topics into curricula
		TE12	Management structure and incorporation of follow-up procedures, continuous improvement of methods, etc.
Research	General	RE1	Policies related to sustainability in research
	Grants	RE2	Income (with respect to total) from grants and contracts specifying sustainability-related research
	Research programs, projects, centers, services	RE3	Research projects (with respect to total) with a focus on sustainability-related issues
		RE4	List of issues addressed: renewable energy, ecological economics, urban planning, etc.
		RE5	Sustainability-related research programs
		RE6	Incentives to sustainability research
		RE7	Percentage of graduate students conducting research in sustainability
		RE8	List of knowledge fields involved
		RE9	Number or percentage of faculty/centers on campus conducting sustainability research or providing sustainability-related services
		RE10	Published research (with respect to total) with a focus on sustainability-related issues
	Interdisciplinarity and transdisciplinarity	RE11	Management procedures for interdisciplinarity and/or transdisciplinarity in research projects
		RE12	Number or percentage (with respect to total) of research projects
External community	Community activity and services	EX1	Student, faculty, and staff contributions to community
		EX2	Partnerships for sustainability with educational, business, and governmental entities
University operations	Student demographics	UO1	Total number of students by faculty, broken down by gender and migration status
		UO2	Total number of new students by faculty
	Quality management	UO3	Percentage of students changing course of study or quitting studies
		UO4	Average length of time needed to finish studies, broken down by degree
		UO5	Ratio of educators to learners
		UO6	Results of surveys indicating students' satisfaction
	Campus life	UO7	Projects indicating a healthy and sustainable study environment
		UO8	Consulting and support services for students with children
		UO9	Participation of students and workforce in organizational changes
		UO10	Programs for skills management and lifelong learning that support the initial employability of students and assist them in managing career entry
	Student mobility	UO11	Number or percentage (with respect to total) of incoming international students
		UO12	Number or percentage (with respect to total) of outgoing students
		UO13	Number of partnerships with universities abroad

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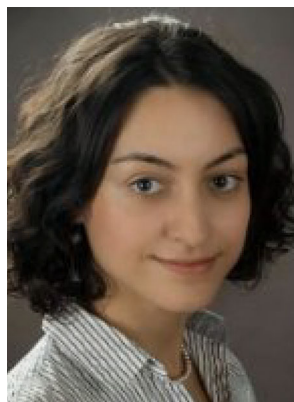
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