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A Case Study of LightStay (2010–2017)—Hilton's Corporate Responsibility Management System

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Abstract: This paper focuses on Hilton's proprietary sustainability performance measurement system (SPMS) called LightStay (2010–2017). It draws on the case-study method and relies on three principal sources of information: in-house documents, a questionnaire completed by users of LightStay and interviews conducted with external experts. Specifically, the paper traces the system's evolution and highlights its distinctive features, exploring the challenges and trade-offs related to the design and workings of an SPMS in a hotel multinational. The study shows, among other things, how LightStay, using an internationally approved methodology of data collection, calculation, metrics and benchmarking, compares a hotel's predicted and actual environmental performance. It concludes by arguing that LightStay is a holistic platform that not only integrates precise measurement of the firm's environmental effects with its business operations and strategic goals but also acts as a repository of sustainability knowledge and a facilitator of organisational learning. Its value and originality lie in providing unique insights into the workings of a proprietary SPMS at a nonanonymised hotel company.

Keywords: sustainability performance measurement system; environmental knowledge; energy and environmental indicators; energy saving; hotels

1. Introduction

Without doubt, there is a fast-growing realisation among individuals, companies and governments of the need to pursue sustainability. When applied to the business setting, it is referred to as corporate sustainability (CS), which is about "the integration of economic, environmental, and social considerations on the part of corporations" [1] (p. 688). Crucially, there is a large amount of overlap between CS, which derives from the idea of sustainable development, and corporate social responsibility (CSR), which is conceptually rooted in stakeholder theory and business ethics [2]. It is argued therefore, that CSR and CS are oriented towards "the same future" [3]. This is all the more so in the context of the 17 Sustainable Development Goals, with multinationals being particularly well placed to help attain most of them (e.g., clean energy). However, sustainability poses assorted challenges that "manifest themselves in terms of trade-offs which involve stakeholders, organizational operations, as well as financial and intangible assets" [4] (p. 337).

Central to these challenges is an organisation's sustainability knowledge, conceived of as comprising relevant data, information and other knowledge-related resources, which are collected through (and preserved within) organisational knowledge structures [5]. The emphasis on data bears upon the issue of precise measurement (and reporting) of sustainability performance, which per se is

highly problematic [6–8]. This also goes for the hotel industry, including hotel multinationals, which operate numerous properties varying in size, brand and geographical location. Therefore, of special interest to hoteliers should be sustainability performance measurement systems (SPMSs)—innovative IT-driven tools whose principal objective is to aid in making and assessing progress towards sustainability outcomes, such as a reduction in energy and water consumption [9].

In this context, the key question is how an SPMS is positioned within a company and, by extension, how it interacts with other corporate systems and, crucially, with its users. A strong case is made that it should be embedded into a firm's day-to-day operations, at the same time facilitating learning processes [10,11]. It follows that an "ideal" SPMS should bear all the hallmarks of a holistic platform that not only integrates precise measurement of a firm's environmental effects with its business operations and strategic goals but also acts as a repository of sustainability knowledge and a facilitator of organisational learning.

This paper, which employs the case study method [12], argues that LightStay, Hilton's proprietary corporate responsibility measurement platform (i.e., Hilton's SPMS), is close to meeting the above-mentioned criteria. In doing so, it draws on the implications of the sociotechnical systems theory [13] and social information processing theory [14]. In particular, the study aims to answer the following research questions:

RQ1: How does LightStay facilitate sustainability knowledge accumulation and organisational learning?

RQ2: How does LightStay address problems related to the development and operation of an SPMS in the hotel industry?

RQ3: How does LightStay help integrate sustainability performance measurement with business operations and strategic goals?

The paper makes a number of contributions to (closely related strands of) sustainability research. For one thing, it contributes to the literature on sustainability in the hotel industry (e.g., [15]). Specifically, it adds to the body of research on innovativeness-driven environmental management, which focuses on hotels' IT-assisted efforts to minimise their environmental impacts through, among other things, energy and water efficiencies (e.g., [5,16,17]). For another, the present study contributes to the literature on sustainability measurement and reporting (e.g., [18–23]). In this context, it has to be stressed that "research in the area of corporate SPMSs is in its embryonic stage and is marked by a lack of focus" [4] (p. 323). Some studies pertaining to this line of research deal with the design and implementation of SPMSs [24–27] or with the trade-offs associated with their introduction and functioning [4]. Crucially, there is relatively little published literature on SPMSs in the hotel industry in general and a paucity of deep (and nonanonymised) case studies in particular [9,10,28]. In fact, multinational hotel companies, which typically develop and operate such systems, are rather reluctant to allow researchers to "get under the skin" and to make their findings public. Therefore, this paper aims to fill this knowledge gap.

Given the fact that this paper is based on internal documentation and specific information that is normally off limits to the general public, it provides unique insights into the evolution and workings of a proprietary SPMS at a nonanonymised hotel company. Herein lies its value and originality. In this sense, the present study fulfils one of the basic conditions of a well-designed case study: it is revealing [12]. It not only expands prior theorising on sustainability in the hotel industry but also helps disseminate best practice among hoteliers. Specifically, the study provides new evidence in favour of the applicability of sociotechnical systems theory to exploring complex businesses processes underpinned by interaction between the technological and the human. At the same time, it is deeply embedded in business praxis, explaining in detail the elements and workings of an IT-driven proprietary system. This means that the paper can be of interest both to academics and practitioners who take interest in IT-assisted resource efficiency in general and energy savings in particular. Its structure is as follows. First, the theoretical background and the research method are presented. A case study of LightStay and discussion of the findings ensue. Finally, the study's limitations are highlighted, and future research avenues are suggested.

2. Theoretical Background

2.1. Environmental Knowledge and Organisational Learning

Central to the debate on sustainability is environmental knowledge, understood as the degree to which a firm is familiar with green issues in general and its environmental impacts in particular. In fact, "the concept of environmental knowledge has emerged to describe the relationship between the firm and those systems which connect environmentally-related data sets, their analysis and people for the benefit of the firm and society" [5] (p. 381). In other words, environmental knowledge is about "what people know about the environment, key relationships leading to environmental aspects or impacts, an appreciation of 'whole systems', and collective responsibilities necessary for sustainable development" [29] (p. 48). Seen in this way, green knowledge enables a company to align its strategic goals with the ongoing efforts to attain the 17 Sustainable Development Goals, especially those related the propagation of green energy and resource efficiency [30]. This in turn reflects a firm's "environmental orientation" or "the recognition of the legitimacy and importance of the biophysical environment in the formulation of organization strategy, and the integration of environmental issues into the strategic planning process" [31] (p. 181).

Given its importance, it is unsurprising that the way environmental knowledge is managed within an organisation matters a lot. Hence the idea of environmental knowledge management, which has come to denote the propagation of organisational practices and the use of bespoke tools with a view to creating and sharing (relevant) tacit and explicit knowledge. It follows that environmental knowledge management draws on a combination of environmental knowledge resources and knowledge management practices (which are centred on, among other things, energy efficiency) [30]. What lies at the core of these processes is a firm's environmental knowledge base. Once it is in place, it needs to be constantly developed and updated, which, arguably, calls for advanced technological solutions—a fact that emphasises the critical role of innovativeness [32]. An environmental knowledge base not only allows a firm to comply with the large and fast-growing body of environmental legislation [33] but, above all, undergirds organisational (environmental) learning.

This kind of learning refers to a situation whereby staff interact with the environment, analyse the consequences of such actions and, accordingly, modify their views with regards to the relationship between man and nature [34]. It has to do with two key issues. On the one hand, organisational learning directly bears upon the concept of learning organisations (e.g., [35]). On the other, it is related to the view that the effective pursuit of corporate sustainability requires involvement of all members of an organisation [36]. It is not enough to engage all staff though. In fact, in order to learn, any organisation ought to disregard outdated knowledge and, crucially, eliminate obstacles that hamper new knowledge acquisition [37]. The implication is that organisational learning calls for effecting change [38], as well as instituting an organisational culture [39] (Schein, 2004) and/or fostering an organisational climate [36] that stimulate acquisition of knowledge and shape employee behaviours.

The mechanisms underlying these processes are explained by social information processing theory, according to which the social environment in which an individual functions influences their views and behaviours because it "provides a direct construction of meaning through guides to socially acceptable beliefs, attitudes, and needs, and acceptable reasons for action" [14] (p. 227). This implies that employees not only try to understand their workplace realities by interpreting social cues that come from the events or situations that occur at work but also learn from each other by observing behaviours, sharing experiences and developing commonly accepted mental models. Here, the key role can be played by so-called knowledge agents or "individuals with the willingness to invest their own resources into acquiring environmental knowledge for the benefit of the environment and, directly or indirectly, of their own institution" [5] (p. 382). Given their above-average levels of green knowledge, they are well placed to shape their coworkers' attitudes towards sustainability.

All of this underpins a company's learning orientation, which refers to "the degree to which an organization is satisfied with its theories in use, mental models, and dominant logics (. . .) and that

encourage, or even require, employees to constantly question the organizational norms that guide their activities and organizational actions" [37] (p. 413). It follows that much of the responsibility rests with people (qua employees and knowledge agents). The problem is that, especially nowadays, individuals often change jobs (or are simply dismissed); therefore, when one leaves, they not only take with themselves (workplace-specific) tacit environmental knowledge but also stop participating in these interpretative collective processes that foster individual learning. That underscores the importance of a firm's technical systems, which, as permanent (albeit evolving) fixtures in most workplaces, can help—in line with the implications of sociotechnical systems theory [13]—organisational knowledge accumulation and organisational learning. This theory takes as its premise that "workers jointly optimize the social and technical systems of the organization" [40] (p. 222), implying that the fit between these systems is likely to result in desirable (employee-related) outcomes. It is an SPMS—an example of a technical system par excellence—that takes centre stage in these processes. Not coincidentally, some of the most advanced SPMSs were developed in the hotel industry.

2.2. Sustainability in the Hotel Industry

In recent years, hotel companies have made efforts to improve their sustainable performance. There already exist hotels that are characterised by a near carbon neutral operation (i.e., a Nearly Zero Energy Hotel or neZEH) and by a clean-energy generation that exceeds that property's needs (i.e., a plus-energy hotel). For example, the Romantik Hotel Muottas Muragl in Samedan (Switzerland) is regarded as the first plus-energy hotel in the Swiss Alps. By and large, the aforesaid efforts have focused on minimising hotels' environmental footprints. In practice, the principal idea is to cut water and energy consumption and to reduce carbon dioxide emissions. Research shows that there is a positive link between the practice of environmental management and a firm's financial performance [32,41,42]. That said, there are studies that do not demonstrate any significant association between these two variables [43].

This is important given that a growing number of customers—especially millennials [44]—do exhibit a preference for green lodging facilities. Put another way, while choosing accommodation, they increasingly take into account a particular hotel's environmental credentials. Again, some researchers call into question the scale and authenticity of this trend [45]. It is argued in this context that in the era of flight-search and hotel-booking websites (such as Booking.com, Hotels.com or Kayak), what matters to most travellers is price rather than commitment to sustainability. Others suggest that it is possible to persuade tourists to pay attention to where they stay, for example, through "nudging" or subtle cues that incentivise people to make socially desirable choices [46,47]. Irrespective of the potential effectiveness of such initiatives, there is little doubt that it is hoteliers who ought to do more to explain to travellers the sense of organisational greening. However, that could prove problematic since there is evidence that some hoteliers "do not want to bother guests with their pursuit of more eco-efficient day-to-day operations" [15] (p. 236).

Furthermore, some scholars cast doubt upon the genuineness of the hotel industry's commitment to sustainability. Most notably, Jones, Hillier and Comfort [48] (p. 12) argue that most hotel companies continue to favour a "weak" rather than a "strong" model of sustainability and hence find themselves just at the beginning of "lengthy and arduous journey" towards making a significant contribution to sustainable development. Others point out that there are still numerous hotel firms that tend to view sustainability as an add-on to business, often introduced in reaction to external pressure rather than internal conviction. On the whole, this strand of research shows that environmental management practices in hotel facilities "still remain in the early operational stages and are driven by cost-savings" [49] (p. 336). The upshot is, as Melissen et al. [15] (p. 233) assert, that "sustainability is clearly not (yet) institutionalized within this sector".

Even though there is some justification for such claims, it is indisputable that some segments of the hotel industry—international hotel chains and independent (upscale) facilities—have gone to great lengths to put sustainability (or CSR) at the centre of their strategies [10]. They have introduced in

the process innovative measures that effectively assist them in reaching their goals. These include, to repeat, sustainability performance measurement systems.

2.3. Measuring and Reporting Sustainability: the Nature of the Challenge

Accurate measurement is essential for any company that seeks to improve its sustainability performance [23,50]. Thus, to ensure accuracy, accountability and reliability, the principles of financial accounting have been applied to social and environmental measurement and reporting [51,52]. The accent is on auditability, which relates to the view that organisational phenomena that are internally recorded and externally reported ought to be verifiable (by third parties) or, in other words, auditable. Therefore, auditability refers to ensuring the preservation of traceable data trails across the entire organisation [53]. The application of financial accounting methods to sustainability measuring and reporting gained traction with the introduction of the Global Reporting Initiative (GRI), which recommends that "the organization should gather, record, compile, analyze and disclose information and processes used in the preparation of a report in a way that can be subject to examination and that establishes the quality and materiality of the information" [54] (p. 16).

All of this raises the question of how sustainability measurement and reporting are actually managed within companies [55–59]. Of relevance here is the balanced scorecard [60]—arguably, the most well-known sustainability performance measurement framework. Crucially, Schaltegger and Wagner [57] argue for a holistic framework that connects environmental and social management with corporate strategy and day-to-day operations and that integrates data on environmental and social performance with business information and sustainability reporting. They underscore the need to adopt an integration-centric approach, warning against the emergence of a "parallel organisation" within a company, with a distinct focus on environmental and social performance. Furthermore, Thijssens et al. [58] (p. 87) have of late developed a typology of sustainability reporting management, which "is based on two crucial factors: [...] the level of formalisation of sustainability reporting and the level of integration of sustainability reporting into the day-to-day sustainability management". In fact, what emerges from this body of research is that measuring sustainability performance needs to be integrated with daily operations and strategic goals, and this is exactly what any SPMS should facilitate.

2.4. The characteristics of an SPMS

An SPMS denotes "a system of indicators that provides a corporation with information needed to help in the short and long-term management, controlling, planning, and performance of the economic, environmental, and social activities undertaken by the corporation" [21] (p. 240). In other words, it aids in monitoring and achieving a firm's sustainability objectives, including the area of energy use. This is done, inter alia, through the application of a standardised methodology across the portfolio [21,61]. What lies at the core of an SPMS are relevant metrics, defined as measurements that help specify goals and outline performance expectations. It follows that metrics underpin the generation and dissemination of information related to environmental and social performance. Modern SPMSs are, of course, IT-based, which not only enhances their effectuality but also fosters uniformity [10]. Yet, as noted earlier in the text, the key question is the positioning of an SPMS within a company and, by extension, its interaction with other corporate systems and its users. Given its functions and role, this is a fundamental issue that has implications at particular stages of the lifecycle of an SPMS.

In fact, the lifecycle of a typical SPMS encompasses three stages: (1) design; (2) implementation and (3) utilisation [26,27]. The design stage includes setting measurable objectives, translating them into operational activities (to encourage desired behaviour) and providing relevant data (to facilitate informed choices). Research on the design of relevant indicators and indicator-selection criteria highlights the necessity of using standards as reference points, accepting trade-offs and dialoguing with stakeholders [4,62]. During the implementation stage, "systems and procedures are put in place to collect and process the data that enable the measurements to be made regularly" [24] (p. 758). Here a lot depends on a firm's financial resources and IT capabilities, which not only condition

the evolution and refinement of data collection [63] but also help ensure systemic and procedural flexibility [64]. The utilisation stage relates to the day-to-day use of an SPMS, during which of great value is user-friendliness. In other words, an SPMS should be easy and intuitive to use [65].

The successful functioning of an SPMS is determined by several factors (or "enablers") that are instrumental at different stages of its lifecycle. These include the precise definition of CS, key performance indicators (KPIs) and measurable goals (design), integration of these into the SPMS framework and establishment of coordinating and monitoring mechanisms (implementation), a shared vision capability [66] and continuous organisational support (utilisation) [67]. Nonetheless, it is possible to identify several organisational barriers that undermine the introduction and operation of an SPMS. Thus, scholars highlight the cognitive barriers around the "myth of the fixed pie" [68] or uncertainties about the compatibility of sustainability requirements with financial performance [67]. Others point to poor coordination across multiple business units and potential resistance to monitoring due to perceived and expected changes in the existing procedures. Technical barriers have mainly to do with a firm's inadequate IT infrastructure [24], whereby, for example, an inability to access data excuses the separation of sustainability from the core business [69]. All this is also of concern in the hotel industry.

2.5. Specificity of Measuring and Reporting Sustainability in Hotels

It is argued that the quality of sustainability measurement and reporting in the hotel sector still leaves much to be desired [70,71]. This is attributed to the lack of industry-wide standardisation and methodological rigour. To help hotel firms address these issues, the industry launched a number of initiatives, including the Hotel Carbon Measurement Initiative (HCMI) in 2012, the Hotel Sustainability Tool (HST) in 2014, the Hotel Footprinting Tool (HFT) in 2015 and the Hotel Water Measurement Initiative (HWMI) in 2016. In addition, the World Travel and Tourism Council issued a set of guidelines on environmental, social and governance reporting [72]. Specifically, HCMI and HWMI are common methodologies for measuring and reporting hotels' carbon emissions and water consumption, respectively. The HST, developed by Chong and Ricaurte [28], makes it possible to compare energy and water use as well as carbon emissions. Finally, the HFT, launched by the International Tourism Partnership (ITP) and Greenview, enables hotels to calculate and benchmark their carbon and energy footprints.

These initiatives are useful in their own right since they provide standardised methodologies, thereby promoting consistency and accuracy within the industry. However, they address only some of the challenges faced by those who develop and implement SPMSs in hotel companies [10,28]. Of special interest here is Ricaurte's [9] study, which presents a holistic sustainability measurement framework for the hotel industry, dealing with all major methodological issues (i.e., data collection, metrics, key performance indicators, etc.). In this context, it is important to note that "typical key performance indicators applied in hospitality include utilities use, carbon footprint and waste generation per available or occupied room, per property unit area, guest-night or units of other services offered or sometimes even revenue" [10] (p.346). That said, benchmarks pose a challenge due to the uniqueness of individual properties and internal practices that limit the global applicability of comparisons.

The aforementioned studies as well as the evidence from other industries suggest that an "ideal" SPMS in a hotel company should not only possess such features as user-friendliness, functional comprehensiveness, measurement accuracy and performance-benchmarking capability but also integrate sustainability performance measures with a company's strategy and day-to-day operations as well as facilitate (green) knowledge acquisition. This is important since hotel companies face, apart from typical barriers, also industry-specific challenges. These include but are not limited to: (1) multiple stakeholders involved in a single asset (i.e., a property); (2) high labour turnover; (3) the idiosyncrasy of individual properties (which tends to make globally applicable benchmarking inaccurate); (4) newly-created standardised methodologies (and the resulting difficulties in their application); (5) varying standards and cultural issues in different destinations (which may lead to

a prioritisation of different aspects of sustainability) and (6) absence of standardised definitions of certain industry-specific factors, such as food covers.

3. Research Method

As mentioned in the introduction, this paper employs a qualitative case-study approach as the principal method of inquiry. Classic case studies typically focus on a single organisation or a specific event or a complex process [12]. They cover a range of topics, including sociocultural dynamics in groups and local communities or the implementation of various programmes, business practices and organisational changes. Drawing on the interpretative procedure [73,74], they lend themselves particularly well to answering why and how research questions [12]. Additionally, as mentioned in the introduction, well-designed case studies should fulfil a number of conditions. Chief among them is that case studies should be revealing, implying a situation wherein researchers have an opportunity to observe and explore phenomena that occur for the first time or that are normally off limits to the general public, as was the case here. Specifically, our case study relies on three principal sources of information: (1) in-house documents (such as external evaluations and software development specifications); (2) an online questionnaire completed (via SurveyMonkey) by users of LightStay at Hilton managed hotels and corporate offices in Europe, Middle East and Africa (or, in other words, among team members (TMs) as those employed at Hilton properties and corporate offices are called) and (3) email and phone (semistructured) interviews conducted with four external experts directly involved with LightStay (they represented DNV-GL, an organisation that verifies LightStay data and the system itself, and DEKRA, a body that verifies LightStay's and Hilton's conformity to ISO standards). These three information sources were meant to facilitate the analytical-cum-interpretative process and to offer alternative (and new) perspectives on the functioning of LightStay.

It has to be emphasised that, for triangulation purposes, the four coauthors analysed the totality of the research data. Cohen and Manion define triangulation as an "attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint" [75] (p.254). According to O'Donoghue and Punch, triangulation is a "method of cross-checking data from multiple sources to search for regularities in the research data" [76] (p. 78). Given that the four coauthors went through the research data and then shared their opinions and interpretations while the text was being created, it is fair to assume that this triangulation process resulted in "a more detailed and balanced picture of the situation" [77] (p. 147). As regards Hilton in-house documentation, we performed content analysis, which is "a technique for gathering and analysing the content of text. The content refers to words, meanings, pictures, symbols, ideas, themes, or any message that can be communicated" [78] (p. 219).

The online survey of LightStay users was conducted in June 2016. In total, 42 TMs completed the questionnaire, of which 33 worked at Hilton properties (i.e., at the hotel level) and 9 worked at the corporate level, covering about 18% of the existing Hilton operated portfolio in the Europe, Middle East and Africa (EMEA) region. Hotel-level users of LightStay included engineers, sustainability champions and executive managers; corporate-level users encompassed, apart from engineers, TMs responsible for brand performance, corporate responsibility and quality assurance. It is true that the number of respondents who completed our questionnaire might, from a certain point of view, appear relatively small, but the fact remains that, due to their positions within the Hilton corporate structure and their job responsibilities, they were highly knowledgeable about the design and functioning of LightStay. In other words, rather than being representative of the whole workforce, they, collectively, constituted an invaluable source of relevant information, which is what matters most in case studies such as ours.

Interviews with external experts were conducted around the same time (phone interviews were digitally recorded). It should be noted that semistructured interviews are recommended whenever the research project has a "fairly clear focus" [79] (p. 479), as was the case here. Semistructured

interviewing makes it possible for the researcher to follow up his or her interlocutors' answers, ask penetrating questions and elicit sensitive information [80].

Certain themes addressed in the surveys and interviews overlapped. TMs were asked questions regarding the frequency of their use of LightStay, its user-friendliness and usefulness, attributes helping green knowledge and considered innovative, as well as suggestions for improvements. DNV-GL and DEKRA experts were asked about the strengths and weaknesses of LightStay from the perspective of its users and hotel-industry standards, the reliability of its software, its innovativeness in view of an industry-wide drive towards standardisation and, finally, required improvements they identified during the verification process.

A detailed thematic analysis of the questionnaire and interview data was conducted. This technique serves to identify categories for analysis [81]. The procedure entailed reading respondents' comments, creating categories, identifying themes (i.e., relevant recurring ideas) and indicating emerging patterns [82]. At the same time, "common and distinct conceptualisations for multiple observations across a data set" were itemised [83] (p. 103). The identified themes were related to each other, the research questions and the extant literature [81], helping to get the "big picture" [84].

4. Results: A Case Study of LightStay

4.1. Evolution of LightStay

Hilton—which uses, alongside sustainability, the term corporate responsibility (CR) rather than corporate social responsibility in official documents and reports—was the first company to build a hotel with running water, to install TV sets in guest rooms and, critically, to launch an energy conservation campaign [85]. Implemented in the early 1970s, it focused on reducing wastage of energy and introducing standardised efficiency solutions. In line with the principle that "one cannot manage what one does not measure", tools for monitoring energy consumption were introduced at Hilton properties. These facilitated accurate recording and analysis of utility consumption data. Later, digital utility reporting was seen as the next step towards greater data transparency and efficient collection mechanisms. All this enhanced understanding of the benefits arising from the roll-out of environmentally friendly solutions (see Figure 1). In 2002, Hilton Hotels Corporation (the North American portfolio) launched EnergyWatch. Its innovative cloud-based approach, data availability in real time and portfolio-wide benchmarking capability were widely recognised at that time with different awards (nonetheless, the information provided concerned only the consumption and cost of energy and was used for internal decision-making). The ability to monitor energy use in real time through dashboards and automated consumption alerts enabled local teams to take immediate action.

In 2004, Hilton International, the rest of the global portfolio, launched Hilton Environmental Reporting (HiltonHER) [86]. HiltonHER was different from EnergyWatch in that it used energy, water and waste data reported by individual sites to inform action on environmental and economic benefits. However, it also included information on hotel features, facilities offered, initiatives implemented and other sustainability performance data, and provided feedback reports and league tables. This approach was in line with the then strategy that focused primarily on the environmental aspects of operation, with utility costs being one of the major drivers for action. By 2005, both systems delivered aggregated data on carbon dioxide emissions, total energy and water consumption and progress towards goals laid out in Hilton's CR reports [87].

In 2007, the features of the two systems that best supported Hilton's sustainability strategy were merged into the Hilton Environmental Analysis and Tracking (HEAT) tool. HEAT retained the focus on measuring utility and cost performance on a monthly basis and included details on a hotel's profile and operational characteristics that were seen as central to benchmarking. Instructions for data capture and manipulation were enhanced to ensure transparency and verifiability of the impact of sustainability efforts across the portfolio. Information was collected by engineering departments on each site and reports issued were used by both site management and corporate management. In 2008, HEAT

underpinned the launch of global sustainability goals, which included five-year reduction targets on energy and water consumption, carbon-dioxide emissions and reduction in waste generation [88].

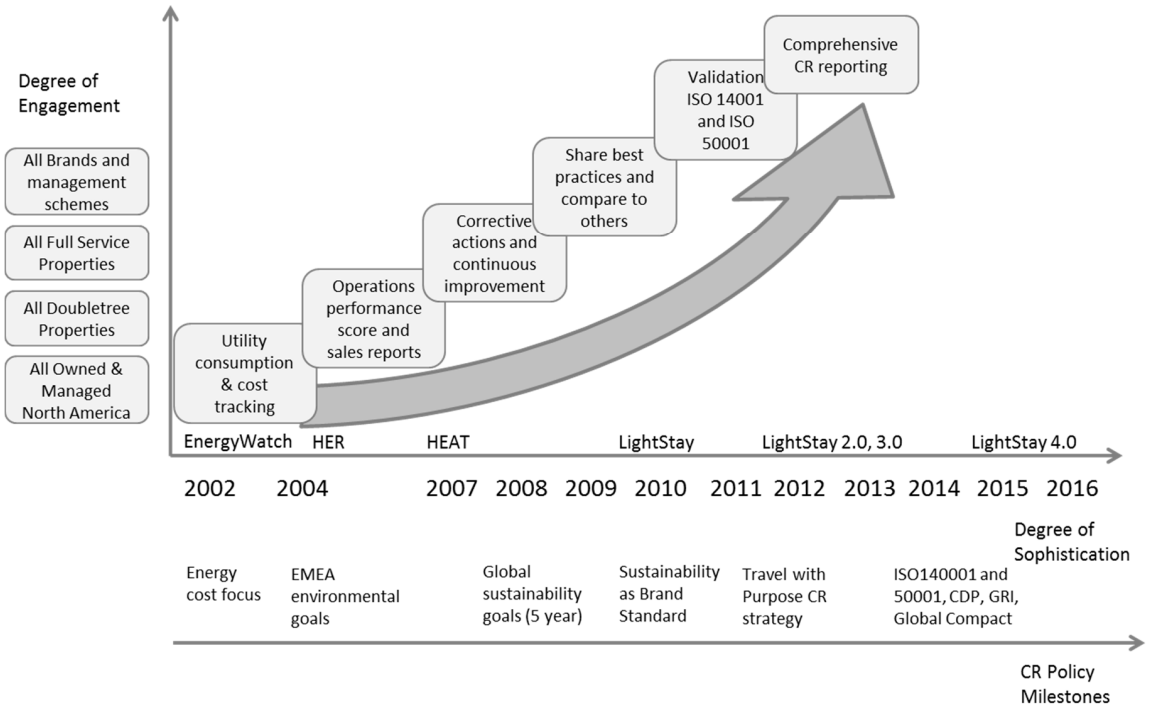

Figure 1. Evolution of LightStay in alignment with Hilton's strategy Data source: Hilton's in-house documentation.

4.2. Features of LightStay

LightStay was unveiled in 2010 [89]. In order to support Hilton's CR strategy, its scope was extended to measure further environmental impacts across 200 areas of hotel operations, including housekeeping, paper product use, food waste, chemical storage and transportation. The accent was on continuous improvement. In particular, LightStay made it possible to set targets on utility use, waste generation and carbon-dioxide emissions, and to monitor progress towards these goals at the local, regional and global levels. Through various reporting and trending features, LightStay provided operators with relevant data to help identify focus areas and take continuous action to improve a hotel's performance. A degree of priority was given to internal networking, benchmarking and best practice sharing, including the creation of a database of CS projects. All these features were implemented following feedback from focus-group sessions held globally. Crucially, the structure, implementation and data validity of LightStay were audited by third parties. Originally, this was done by KEMA-Registered Quality, which was later replaced by DEKRA—a company that also helped Hilton achieve ISO14001 certification [90].

The "meeting impact calculator", which measured the environmental impact of any meeting or conference held at a property, was a specific feature requested by businesses to enable better sustainability communication with corporate customers. This report provided customers with hotel-specific carbon, water and waste data, as well as information about operational practices, allowing them to consider the impact of hotel stays and meetings when making purchasing decisions. Customers were also able to include it in their own sustainability reporting, thus expanding Hilton's sustainability goals over the supply chain.

In 2011, Hilton announced Travel with Purpose (TwP), its "corporate responsibility commitment to providing shared value to its business and communities by creating opportunities for individuals to reach their full potential; strengthening communities where Hilton operates; and preserving

environments through the measurement, analysis and improvement of the company's use of natural resources" [91]. This involved applying a uniform strategy across the portfolio, while taking local considerations into account with a view to overcoming organisational and cognitive barriers. A message of "sustainability being simply good business" [89] spread across the globe and, by the end of 2011, sustainability performance measurement became a brand standard. From then on, all Hilton facilities were required to report into LightStay and were evaluated as part of regular reviews. Individual properties reported on all dimensions of TwP, but there was baked-in flexibility in activities undertaken to ensure engagement in aspects that mattered at the local level. Locally available reports focused on visualising KPIs and providing suggestions for involvement of TMs in improving performance and connecting with local communities. Depending on the location, progress towards goals was reviewed locally or functionally and could be part of a recognition scheme. Specialised reports were available regionally and for business functions.

In the following years, a series of upgrades were made to the system (Versions 2 and 3), improving its flexibility and expanding its scope to cover other aspects of Hilton's CR strategy in line with the business needs and in response to customer expectations [92]. These upgrades included: (1) the capability to track volunteer opportunities, service hours and monetary contributions; (2) incorporation of the HCMI 1.0 methodology into the "meeting impact calculator"; (3) a donations-recording feature to support relevant partnerships; (4) an LCA (life-cycle assessment)-based comparison of key brand-mandated products and (5) verification of the LEED score for North American-based hotels. These improvements allowed Hilton to achieve ISO50001 certification in 2014 [93].

By the end of 2014, LightStay had over 90% participation rate and was in use at more than 4200 properties. It had gathered 250,000 months of utility consumption data and enabled the accomplishment of 20,000 improvement projects, de facto evolving into a big-data platform. Thus, LightStay 4.0, unveiled in 2015, can be seen as a holistic platform for reporting environmental, operational and social impacts made by all Hilton hotels [94]. In response to demands (from business) for accurate forecasting, LightStay 4.0 had the capability to analyse a given property's performance and determine baseline models that can project future energy and water cost and consumption based on variables such as occupancy and weather. It was used to support budget planning and to track the benefits of various conservation and efficiency initiatives. Actual and expected performance was cross-referenced, and automatic alerts were sent to hotel teams whenever performance fell below expected levels.

This resultant improved quality of data and alignment of information collection with the requirements of legal (the UK's Carbon Reduction Commitment) and voluntary (the Carbon Disclosure Project) reporting and certification procedures (TripAdvisor's GreenLeaders or the US Department of Energy's EnergyStar) made LightStay a useful support tool for compliance and CR reporting. Hilton's 2015–2016 CR report included social and community measures, such as hours spent volunteering and items donated to charitable causes (however, it has to be admitted that the methodology for, and indicators of, social impact required further refinement to reach a level comparable to environmental reporting).

4.3. Opinions of Users and Evaluators

As mentioned earlier in the text, an SPMS should be characterised by both usefulness and user-friendliness, which, in turn, determines user satisfaction [64]. Ease of use has an indirect effect on user satisfaction via usefulness capability; users tend to consider a system less useful if it requires a significant amount of learning or work to manage it [65,95]. Various capabilities must be included to ensure learnability and usability, such as easy navigation between modules, high-quality user guidance and options to undo previous actions. Therefore, TMs and experts were asked to assess the usefulness and user-friendliness of LightStay.

As for the former, six in ten considered it to be "useful" and "very useful" (see Figure 2). However, it is worth noting that responses of "average" should also be considered positive, given comments provided by respondents (e.g., "LightStay gives you a very useful snapshot of your hotels' energy

and environmental performance" or "it is a great tool where you can check your water/waste/energy consumption as well as the projects at each property"). Additionally, TMs emphasised that it was especially useful to help improve performance as "everything can be measured and compared" and to share best practice. It turned out, too, that LightStay's most useful feature was the comparison option. The experts from DNV-GL and DEKRA pointed out that it offers "a consistent format for reporting by all Hilton properties globally that enables objective data collection and analysis" and that it combines "quantitative key improvement efforts (energy, water, waste) with more subtle culture change improvements", which can be seen as "truly innovative". They emphasised the intuitive nature of the interface, data alerts and the inclusion of eLearning courses. This last aspect is important in view of what has been said about (the role of) environmental knowledge acquisition by employees, who, to repeat, need to be involved in organisational greening.

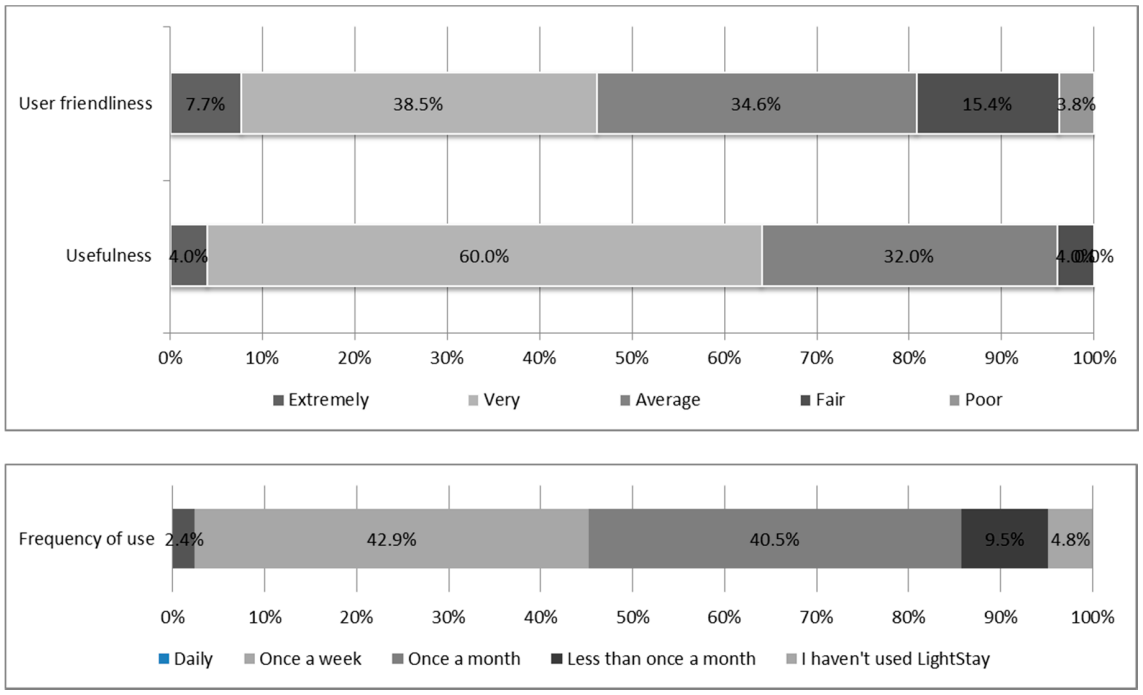

Figure 2. Users' responses on frequency of use, usefulness and user friendliness of LightStay. Data source: Collected by the Authors.

Regarding the latter, more than 45% of respondents stated that it is extremely or very easy to use (with such comments as "it is very easy to navigate and find information" being frequent). Still, 35% ranked the tool as average for user-friendliness as "it requires some proficiency". Some TMs noted that "it looks a bit complicated when you have a first look into it" and "it is user-friendly once you get the hang of navigating your way around the site". In sum, users recognised Hilton's attempts to improve LightStay, but indicated that effort is needed to support its use locally because of its comprehensive nature. The experts noted that inexperienced users might initially be overwhelmed by LightStay's comprehensive functionality, underscoring the need for adequate training and continuous support. One of them observed that "lack of awareness among users about reports and graphs available at the local hotel level" made it harder for general managers to make the most of the data. Furthermore, another representative of DEKRA argued that "some GMs (general managers) are not fully aware of the value that can be provided by proficient use of the tool".

Asked what features/attributes of LightStay were truly innovative, the answers varied. Six in ten respondents regarded its interface and "visual" dimension (i.e., the way data were presented via colours, graphics, etc.) as highly innovative. The inclusion of indicators for monitoring and evaluating social, rather than only environmental, aspects was also mentioned. Questioned about

what is considered innovative about LightStay relative to similar tools developed by other companies, the experts noted that it complied with international standards (ISO 9001, ISO 14001 and ISO 50001), that it was subjected to regular audits conducted by third parties and that it was constantly improved. Queried about LightStay's usefulness in the context of an industry-wide drive towards standardisation, they concurred in their belief that its potential for application across the global hotel industry was great, provided that it was used in conjunction with oversight from an independent ISO certification body. In this sense, any hotel organisation hypothetically willing to adopt LightStay would have to introduce an extensive QA audit programme and subject every property to it (at least annually), with a view to ensuring that requirements are enforced. Finally, asked whether, while conducting verification, they encountered any challenges, the experts observed that several corrections, modifications and updates to the tool were implemented as a result of the verification process.

Finally, asked to suggest improvements to the tool, TMs came up with the following suggestions: (a) availability of LightStay in multiple languages; (b) development of a better mobile app (as "it is not user-friendly on a small handheld device"); (c) creation of discussion forums to share opinions (an echo of what has been argued in the theoretical section about the nature of the interpretative processes that take place among employees and underpin individual learning); (d) inclusion of other measurements systems and (e) provision of more training on the Hilton online training platform. One respondent also noted that "as the platform matures, we should be able to use our data to share our energy efficiencies and waste reduction achievements with our guests via public LED TV screens that display the hotel's daily energy performance".

5. Discussion

The evolution of LightStay follows a logical pathway: from driving reductions in utility consumption, associated costs and environmental impacts, through providing knowledge exchange and promoting ecoefficiency, to reporting on all aspects of sustainability (again, given what has been argued throughout the text, the question of green knowledge sharing—and hence organisational learning—should be emphasised). The transition from purely environmental to inclusive sustainability reporting was conditioned by the advances in collective understanding of what CS stood for and the initial difficulties of measuring and reporting on social impacts (see also [96]). The successful implementation and operation of an SPMS depends on operational and cognitive enablers, such as the level of management support, engagement and motivation, as well as training and IT. Hilton's top management committed themselves to sustainability by making LightStay the centrepiece of the firm's sustainability (or CR) strategy (underpinned by TwP), which is embedded in all operations and endorsed by all functions. This aspect merits special recognition since research shows that, in those hotels that are commonly perceived as green, sustainability is embedded in business operations [97]. LightStay also became a brand standard, with its use being obligatory across the entire portfolio—regular compliance verification was performed with negative consequences for noncompliance.

Certain brand and business targets are measured via LightStay and this link between sustainability performance and internal rewards—both nonfinancial (recognition, awards, published case studies) and financial (competitions and bonus programmes)—enhances the engagement of individuals and teams. Engagement is further secured through flexibility in destination-led prioritising of CR actions; all properties work within the same focus areas, but targets are set individually, depending on local priorities, which reduces the effect of "being imposed targets" [24].

Furthermore, the successful introduction of an SPMS needs to be accompanied by specialist training provision as well as awareness-raising campaigns. It is necessary to familiarise those in charge of the implementation with the basics of a tool's operation, whilst all employees should understand the importance of sustainability and, given the global reach, the necessity of uniform implementation across the portfolio [98,99]. Hilton's eLearning modules support this, and various TwP initiatives help raise awareness. In this way, it becomes clear why LightStay can also be seen to facilitate individual and collective green knowledge acquisition. The transparency of the process (data collection, calculation

and benchmarking) is required for the sake of trust-building, auditability and third-party verification. LightStay is based on an internationally approved methodology, relies on globally accepted standards and metrics, and undergoes rigorous verification. That said, further improvements should focus on the quality of input data and their verification. Here it seems necessary to simplify and automate the transfer of information from suppliers, beneficiaries or other hotel systems to add value to users through less manual involvement and better data accuracy. In this sense, real-time data with automatic data capture should be an ultimate goal (i.e., how it should be in an "ideal" SPMS). If unavailable, clear definitions and reporting rules must be established. The development of LightStay in this area continues, including integration with other business tools for automated data input. Unfortunately, some technical barriers exist where the third-party automation of data is dependent on supplier capabilities. Solutions require cooperation and further technical progress.

Hilton's experience implies that technical-system advances facilitate organisational integration by providing reliable and comprehensive information for sustainability management and control. To that end, an SPMS must provide information that is sought at the local and regional levels—i.e., performance reports, visualisations, forecasting or, increasingly, suggestions for actions aiming to improve performance and engagement. Feedback should encompass all the available sustainability metrics to further enhance understanding, and the communication channel must be user-friendly. As a consequence, LightStay offered a variety of reports applicable to various end-users and functions but endorsed a single scoreboard approach to holistically determine progress towards the goals. Efforts are now made to understand how property features, location and other variables condition environmental performance and how this can be used to support budget forecasting and control.

The general consensus is that interaction with stakeholders and tacit knowledge sharing during the development of an SPMS help to overcome some of the operational, cognitive and technical barriers [100]. Close cooperation between IT specialists and other stakeholders generally allows pre-emption of business needs, ensures buy-in and helps disseminate the sustainability message among functions [64]. Therefore, at Hilton, focus group sessions were held globally across the business operations via calls, videoconferencing and webinars and proved to be an excellent instrument to seek information on business requirements. Additional interaction options arise during the operation of the system, where best practice is shared, and lessons learnt inform future improvements. There is a need for a constant discussion forum and information exchange to ensure everyone benefits from the full capabilities of an SPMS. This is usually (but not only) done online and/or on social media (accordingly, there exist intranet forums at Hilton). Last but not least, a robust but flexible and user-friendly software framework is required. The idea is to ensure a stable platform that offers versatility, given the differences between particular properties (which vary in location, ownership priorities, hardware and skill levels, as well as climatic conditions, operational mode, star categorisation, size, brand, headcount and CS/CSR priorities).

It is fair to say that LightStay bears all the hallmarks of a holistic SPMS that covers a hotel company's environmental, social and financial performance. In particular, it not only encompasses user-friendliness, functional comprehensiveness, measurement accuracy and capability to compare performance but also integrates sustainability performance measures with Hilton's strategy and day-to-day operations as well as facilitates organisational learning. Indeed, it has a number of advantages. First, it constitutes a single source of all relevant TwP information. Second, many of its users consider it user-friendly thanks to intuitive navigation, increasing automation, iconic and language-agnostic feedback and instantaneous updates, and universal accessibility on mobile platforms (although, admittedly, some users, as emphasised earlier in the text, still see scope for further improvement or refinement). Third, due to its extensive yet audience-specific and easy-to-understand reporting, communicating progress to internal and external stakeholders is simple. Fourth, hotel managements and department heads can use it for various purposes, including team-awareness raising, individual engagement, follow-up on performance and recognition monitoring. Fifth, LightStay's meeting calculator is of particular help to sales teams, who can more effectively market and implement

"Meet with Purpose"—a scheme designed to offer meetings with reduced environmental impacts and healthy food.

LightStay—especially when seen through the prism of SPMS-related challenges—can arguably be regarded as being close to an "ideal" SPMS. Table 1, while focusing on the workings of an "ideal" SPMS and the nature of particular challenges, shows how LightStay addresses them. Nonetheless, there are still issues that require further attention and improvement. Therefore, the Table also includes (in bold) the issues to be improved.

Table 1. An "ideal" sustainability performance measurement system (SPMS) and LightStay.

"Ideal" SPMS	Challenges	Hilton's LightStay (2010–2017)
(**1**) Engagement of all (ownership, management and operation) parties through stakeholder and managerial support as well as endorsement at all levels within the company.	(**1**) Multiple stakeholders involved in a single asset (i.e., property), such as an owner, a management company and an operator, with varying priorities.	(**1**) Sustainability reporting—a brand standard (critical for the success in a franchised portfolio); an ongoing reference to the importance of activating Hilton's CR strategy (i.e., TwP) by top management in meetings, intranet forums and on social media; organisational and brand targets measured through LightStay.
(**2**) All relevant internal stakeholders not only have a good understanding of the system, but also possess general green knowledge.	(**2**) High labour turnover (typical of the entire hotel industry) means there is a constant need for specialist training provision and green awareness raising.	(**2**) eLearning and other forms of support; documents available in local languages; engagement of individuals through activation of TwP initiatives. **However, support should be provided for those who struggle with timely and accurate reporting.**
(**3**) Transparency, a standardised methodology for metrics and calculation of impacts, as well as benchmarking classes and methodologies.	(**3**) Standardised methodologies are only now being developed and implemented. The uniqueness of individual properties frequently makes globally applicable benchmarking inaccurate.	(**3**) An internationally approved methodology of data collection, calculation, metrics and benchmarking used and described within the system. Third-party data verification. **Yet benchmarking capabilities should be improved, and data uniformity should be systematically policed.**
(**4**) Equality in the importance of reporting key performance indicators and targets.	(**4**) Varying standards, policies, cultural issues and focus existing in different destinations, which may prioritise different aspects of sustainability.	(**4**) Flexibility in prioritising sustainability actions and individual goals depending on the destination, whilst keeping the key aspects on the agenda to ensure engagement and the desired outcome.
(**5**) Transparency and standardisation of conversion factors used in calculations (carbon-dioxide for electricity and fuels, waste volume to weight and currency conversions).	(**5**) The process requires awareness from suppliers and destination teams, availability of information and can become time consuming at individual property level.	(**5**) Internationally approved conversion factors applied.

Table 1. *Cont.*

"Ideal" SPMS	Challenges	Hilton's LightStay (2010–2017)
(**6**) Automated, supplier driven input of relevant information (utilities, waste, consumables, costs and weather) to avoid human errors. Ideally in real time.	(**6**) Limited availability from suppliers and additional IT requirement related to systems compatibility and data security.	(**6**) Automated transfer of external drivers (weather), including utility in real time (ongoing). **Availability of automated transfer of utilities or waste data in real time should be bettered.**
(**7**) Automated transfer of property operational data, such as room and meeting room occupancy, food and beverage covers from other business systems.	(**7**) Standardised definitions of various drivers do not exist across the sector (i.e., food covers). Internal systems not integrated necessitate manual work.	(**7**) Automated transfer of internal drivers (occupancy).
(**8**) Property characteristics as defined in design, asset schedules and market positioning documents.	(**8**) Information may be available for new builds but incomplete for existing portfolio.	(**8**) Input provided locally, and accuracy verified regionally.
(**9**) Evidence of donations, skills sharing/volunteering, and the numbers of individuals being directly impacted.	(**9**) Lack of standardised definitions and collection methods. Beneficiary organisations may not be equipped to keep track to the degree of detail required.	(**9**) Information sourced locally based on detailed definitions (verified internally).
(**10**) Reliable, meaningful and relevant feedback in a visual, language-agnostic, intuitive and easy-to-understand format.	(**10**) Information being conveyed may be complex and units at different organisational levels will require different degrees of detail.	(**10**) Local reports visualise KPIs and provide improvement and engagement suggestions; specialised reports available for business functions and levels within the business (e.g., cost-based metrics for general managers and owners, relatable metrics) for TMs and utility consumption for engineers; regional feedback inclusive of raw data, high level and deep dive reports, single scoreboard report with all CR metrics to holistically determine progress towards the goals. **However, the method of calculating predictions and the methodology behind KPI displays should be simplified. Communication to external users could be slightly improved.**
(**11**) Provision of tailored improvement suggestions.	(**11**) Solutions must be destination-appropriate, which increases complexity.	(**11**) Improvement tips and projects gallery available for all.
(**12**) Stakeholder involvement in the development process to address business needs.	(**12**) Applicable only to custom made solutions and can lead to a large number of requirements.	(**12**) Stakeholders involved in the development process.
(**13**) A flexible software platform adaptable to the heterogenic portfolio of users.	(**13**) Requires IT sophistication, smart development and system compatibility.	(**13**) A web-based platform compatible with multiple devices and operating systems.

Data source: The Authors.

Now let us go through the contents of Table 1, bearing in mind that some of the points have already been discussed or touched upon earlier in the text. As we can see, an "ideal" SPMS ensures engagement of—and the flow of information to—all parties concerned. LightStay addresses this

issue by serving (also) as a communications platform. First, it underpins standardised sustainability reporting, which goes a long way towards making sure that both internal and external stakeholders are updated about Hilton's sustainability performance (including progress made towards particular goals or targets). At the same time, it facilitates tacit knowledge exchange among staff via best practice and project information database, as well as links to intranet forums and social media. Second, given that stakeholders—with employees to the fore—should have not only a good understanding of the system but also general environmental knowledge, LightStay, as already mentioned, ensures provision of training, e-learning and green awareness-raising campaigns. That said, more support should be provided for those who struggle with timely and accurate reporting. This is particularly important in the context of the high labour turnover that has afflicted the hotel industry (at least, prior to the coronavirus pandemic). Third, an "ideal" SPMS should operate on the basis of a standardised methodology for metrics and calculation of impacts, which is what, as argued earlier in the text, LightStay does. However, benchmarking capabilities should be improved, and data uniformity should be systematically policed. Fourth, an "ideal" system should ensure equality (across the portfolio) and, hence, by extension, flexibility in reporting key performance indicators and targets. LightStay is flexible enough to make it unproblematic to prioritise sustainability actions and individual goals depending on the destination, thereby allowing for certain place-based idiosyncrasies. Fifth, an "ideal" system should be based on transparency and the standardisation of conversion factors used in all calculations. LightStay uses internationally approved conversion factors, which, among other things, eliminates some problems at an individual property level. Sixth, an "ideal" system operates on the basis of automated, supplier-driven input of relevant information ("so-called external drivers") as well as property operational data ("so-called internal drivers"), ideally in real time (this helps minimise the risk of human error). As indicated in Table 1, LightStay ensures the automated transfer of both types of driver. However, it is important to note that availability of the automated transfer of utilities or waste data in real time should be bettered. Seventh, when it comes to property characteristics, LightStay works on the premise that input is provided locally and accuracy is verified regionally. Eighth, an "ideal" system should also encompass social sustainability issues, providing information on corporate donations, employee volunteering for charities and civic organisations, etc. LightStay gathers information that is sourced locally and based on detailed definitions, thereby addressing the major relevant issue, namely, lack of standardised definitions and collection methods. Ninth, the general consensus is that an "ideal" SPMS should offer reliable, meaningful and relevant feedback in a visual, language-agnostic, intuitive and easy-to-understand format. LightStay does so by offering, among other things, the visualisation of KPIs and detailed deep-dive reports. However, the method of calculating predictions and the methodology behind KPI displays should be simplified. Communication to external users should also be slightly improved. Without a doubt, SPMS users should also be given an opportunity to put forward suggestions for improvement. This is also the case with LightStay. Finally, an "ideal" SPMS should be undergirded by a flexible software platform adaptable to the heterogenic portfolio of hotel companies. In this respect, it has to be stressed that LightStay is a web-based platform compatible with various devices and operating systems.

With the contents of Table 1 and the entire analysis in mind, it is possible to recapitulate the answers to our research questions. In fact, as regards RQ1, LightStay facilitates environmental knowledge accumulation and organisational learning by serving as a platform on which e-learning modules (courses), training and awareness campaigns are provided and through which relevant information flows and tacit knowledge is shared (project, best practice and awards/certification databases, links to intra company communication channels, etc.) among staff from different units and properties. By undergirding standardised sustainability reporting, it ensures that all parties concerned are informed about Hilton's sustainability performance. When seen holistically, it determines organisational change in the spirit of the concept of "learning organisations". Regarding RQ2, LightStay uses an internationally approved methodology of data collection, calculation, metrics and benchmarking. In other words, all the aspects crucial to the proper operation of any SPMS are baked in LightStay, which is undergirded

by a flexible software framework. The tool also allows third-party data verification. Moreover, since it allows involvement of stakeholders in the development process, LightStay helps bring improvements and introduce corrections. When it comes to RQ3, LightStay integrates sustainability performance measurement with business operations by, among other things, drawing on internally approved conversion factors, by offering an automated transfer of external and internal drivers and, last but not least, by providing visualisations of key performance indicators (as well as suggestions for improvement). Furthermore, given that LightStay is embedded in Travel with Purpose—the centrepiece of Hilton's CR strategy that defines its purpose—the system "automatically" aligns the company's actions with its strategic goals.

6. Conclusions

To recapitulate, this study offers several theoretical and practical implications, thereby making contributions both to the literature of the subject and business praxis. It expands prior theorising on the applicability of sociotechnical systems theory [13,101], showing how an SPMS can act as a repository of sustainable knowledge and a facilitator of organisational learning. A primary theoretical contribution of this research lies in providing further evidence in favour of the validity of sociotechnical systems theory and its applicability to analysis and understanding of complex business processes that involve interaction between technical systems and human beings. This study also adds further substance to the view that social information processing theory is particularly useful in explaining how the work environment (which, of course, also includes a company's technical systems) affects employee behaviour and attitudes. At the same time, the paper explains how LightStay helps address particular problems related to a hotel's sustainability performance measurement and reporting. It explains why LightStay can be seen as being close to an ideal SPMS. In this sense, this study, while helping disseminate best practice, might be of particular interest to hoteliers seeking to improve their properties' sustainability performance, as well as to Hilton itself, which might consider introducing suggested improvements. Crucially, by providing important insights into the mechanisms underlying a multinational's efforts to reduce its environmental effects, it contributes to the ongoing debate on how to effectively achieve some of the Sustainable Development Goals.

The paper has a number of strengths, including the Authors' access to Hilton's relevant documentation and to the system's users and evaluators—it has to be stressed that, at the moment of writing, two of the Authors worked at Hilton. This is all the more so given that, as mentioned in the introduction, in-depth non-anonymised case studies are few and far between in the literature of the subject. The implication is that the present paper provides unique insight into a proprietary SPMS that is currently in operation in one of the top intentional hotel chains, which is what conditions its value and originality.

However, like in most research projects, the present work has some limitations that should be acknowledged. First, it examines the workings of a system developed by a single company. Therefore, it might be instructive to analyse tools used by Hilton's direct competitors, such as Marriott or IHG. Such a comparative study would help detect the influence of company specific variables on the challenges faced. Future researchers might focus too on how to select social and environmental indicators that are relevant to stakeholders' expectations. Second, this work is based on in-house documents and TMs' subjective views, although this was counterbalanced by referring to the opinions of third-party experts. It also relies on self-reports, which implies that caution is required since employees tend to portray things related to their company in a favourable light out of political correctness and organisational loyalty. These limitations notwithstanding, it is hoped that the present study deepens our understanding of sustainability-related issues in the hotel industry, contributing both to the relevant body of research and business praxis.

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writing—review and editing, P.Z. and P.B.-G.; visualization, P.B.-G, C.W. and G.M.; supervision, P.B.-G. and C.W.; project administration, G.M.; funding acquisition, P.Z. and G.M. All authors have read and agreed to the published version of the manuscript.

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