Article

SDGs reporting by Quality, Environmental, and Occupational Health and Safety certified organizations

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Abstract: Organizations can play a significant role in the advancement of Sustainable Development, and companies with Quality, Environmental and Occupational Health and Safety (QEOHS) certified management systems address the three Sustainability Dimensions (economic, environmental and social). This research aims to map the present level of engagement of those companies in contributing and reporting to the 17 Sustainable Development Goals of The United Nations 2030 Agenda. The content of companies reports (available in web sites, by 31 December 2017) of a total of 235 Portuguese organizations with QEOHS certified management systems, was analyzed. The results show a moderate reporting of SDGs by those companies, with the top five being SDG 12 - Responsible consumption and production (23.8%), SDG 13 – Climate action (22.1%), SDG 09 - Industry, innovation, and infrastructure (21.3%), SDG 08 - Decent work and economic growth (20.0%) and SDG 17 - Partnerships for the goals (19.6%). The results of the statistical tests indicate that the communication of SDGs is more prominent in organizations (QEOHS) with higher business volume, that are members of the United Nations Global Compact Network Portugal, and that disclose their sustainability reports on their web site. This study can be useful for decision-makers that aim to support organizations to contribute to the Sustainable Development Goals.

Keywords: Sustainable Development Goals (SDGs); Sustainability reporting; Quality, Environmental and Occupational Health and Safety; Certified organizations.

1. Introduction

Since the United Nations World Commission on Environment and Development released the "Our Common Future" report [1] the concept of sustainable development has been one of the worldwide most relevant topics. However, one of the main challenges for sustainability is to operationalize the resolutions of the Brundtland Report, to ensure simultaneously economic development, social development, and environmental protection, and achieve a higher quality of life for all people and protect all living beings and the planet. The 17 SDGs (with 169 other goals) included in the UN's document Transforming our World: The 2030 Agenda for Sustainable Development aims to foster the integration of sustainability into organizations worldwide, addressing current and future stakeholder needs and contributing to the achievement of sustainable development for society at large.

ISO has published more than 22.000 International Standards and related documents representing globally recognized guidelines and frameworks based on international collaboration [2]. ISO standards support the economic, environmental and social pillars of sustainable development and ISO as issued a document outlining how ISO standards contribute to the UN Sustainable Development Goals and therefore can help to transform our world as proposed in the United Nations 2030 Agenda [2].

The academic research addressing the implementation of ISO International Standards is significant are of scientific interest, e.g., Tari et al. [3] and Fonseca et al. [4]. The same applies to the

research addressing the incorporation of SDGs into, namely Topple et al. [5] and Morioka et al. [6]. However, there are still open issues regarding SDGs performance measurements, operationalization, and interlinkages [7].

This research aims to map the reporting of SDGs by Portuguese organizations that hold simultaneously Quality, Environmental and Occupational Health and Safety certifications. Since these International Standards already address (at least partially) the economic, environmental and social dimensions of SD, this investigation can contribute to gather further knowledge concerning SDGs adoption and foster its application by those organizations.

This article will proceed as follows. After the literature review in Sections 1.1, 1.2, and 1.3, section 1.4 presents the research hypotheses. Section 2 outlines the materials and methods that support the investigation. Section 3 presents the results of the study, while Section 4 makes a summary of the study discussions, conclusions, limitations, and recommendations for future research.

1.1. Quality, Environmental, and Health and Safety Management Systems

Voluntary management standards emerged within the globalization trend, as global regulatory mechanisms to address quality, environmental and health and safety in organizations and their supply chains [8]. Examples of voluntary standards include ISO standards for quality (ISO 9001:2015; [9]), environment (ISO 14001:2015; [10] and health and safety (OHSAS 18001:2007, [11]; ISO 45001:2018, [12]) management systems, along with other private standards such as SA 8000 for social accountability or FSC for sustainable forestry. A common characteristic of International Management Systems Standards is that the implementation of their requirements can be audited and certified by an independent external entity (called the CB - certification body). The CB assess if it complies with the applicable International Standard requirements and achieves the intended results [4].

Since the first edition of the ISO 9000 series, in 1987, ISO 9001 Quality Management Systems (QMS) have been adopted by more than 1 million organizations of all activity sectors, on a worldwide basis [13]. During first years following ISO 9001 introduction, the main objectives of organizations seeking its certification were to implement a documented quality system to facilitate their globalization efforts [14], [15]. Over time, the motivation evolved to improve process performance and results, enhance customer satisfaction and ensure company survival as reported by reaerchers such as Poksinska, Eklund, Jörn & Jens [16], Han & Chen [17], Singh, [18]; Prajogo, [19]; Chatzoglou, Chatzoudes & Kipraios, [20]; Zimon, [21] and Fonseca & Domingues [22] and Fonseca et al. [23].

For Castka and Corbett [24] there are economic and institutional motivations for organizations to adopt meta standards, and a standard should be a means to an end and, ultimately, proving to be beneficial [4].Therefore, the investigation addressing the benefits of ISO 9001 certification has gathered significant research interest. More than 100 empirical studies researching the impact of ISO 9000 standards worldwide have been identified by Karapetrovic et al. [25]. Casadesús and Giménez [26] and Boiral [27] posit that ISO 9001 certification can have both internal (e.g., improved product quality, short delivery times, cost reductions, better process performance, improved system documentation, and higher quality awareness), and external benefits (e.g., improved customer satisfaction, better market image and stronger competitive position). Tari et al. [3] and Fonseca et al. [4], based on literature reviews, also support the view that ISO 9001 QMS certified organizations benefit from its QMS certification. These benefits can have both an internal and external scope, such as improved product quality and process performance, cost reductions, and higher quality awareness, leading to enhanced customer satisfaction and a stronger competitive position. However, the success in the implementation of ISO 9001 QMS is linked to the organization motivations (most significant results when the motivations are internal rather than external) and to the way the standard is interpreted [13].

According to ISO 9001:2015 (section 0.1. General, [9]) "The adoption of a quality management system is a strategic decision for an organization that can help to improve its overall performance

and provide a sound basis for sustainable development initiatives." Research on the contribution of Quality Management for sustainable development highlighted that Quality Management and integrated management systems are supportive of sustainable development initiatives, and Quality Management supports Environmental Management System implementation and the integration of sustainability considerations, e.g., Siva et al. [28].

The success of the ISO 9001 International Standards influenced the creation of Environmental Management Systems (EMS) standards and contributed to subsequent diffusion of ISO 14001 [4], and consequently the way business approaches sustainable development [29]. The 1992 Rio de Janeiro summit on Environment and Development with the approval of the Framework Convention on Climate Change, the Convention on Biodiversity, the Declaration on Forests and the Agenda 21 triggered an increased international emphasis for the development of environmental sustainability and for more environmental friendly products and services and increased the demand for voluntary EMSs, namely ISO 14001 International Standard. ISO 14001 [10] is supported by the assumption that better environmental performance can be attained when environmental aspects are systematically identified and managed through pollution prevention, improved environmental performance and compliance with applicable laws, giving a significant contribution to Sustainability [30]. According to Ann et al. [31], ISO 14001 helps organizations to achieve their environmental and economic targets. For Saizarbitoria et al [32] and Oliveira et al. [34] ISO 14001 is a benchmark for companies to operate in an environmentally friendly manner supporting cleaner production practices [34] and their business sustainability [35], [36]. The main motivations to implement ISO 14001 are related to ensure compliance with specific environmental legislation, improve environmental awareness and performance, waste reduction and resource conservation in the process, adoption of clean production, improve corporate image, minimize risks and respond to Stakeholders expectations [37], [38]. The main reported benefits of ISO 14001 implementation are cost-saving benefits due to improved efficiencies and energy efficiencies, increased company legitimacy with stakeholders, access to new markets and increased consumer satisfaction, minimization of the environmental impacts, compliance with environmental legislation and improvement in management systems, all contributing to an increased competitiveness [38], [39], [40] and [41].

In addition to the concerns with quality and environmental management, organizations also need to focus on preventing injuries and health problems related to work activities in workers and to provide a safe and healthy workplace. Before the introduction of ISO 45001 in 2018, OHSAS 18001 was the primary international occupational health and safety management system (OHSMS) adopted worldwide to support organizations eliminating and minimizing OHS risks by taking effective prevention and protection measures. OHSAS 18001 was developed to fill the gap of the lack of an international OHS standard and followed the PDCA approach and a similar structure of ISO 14001 [11]. OHS comprises the conditions and factors that affect or could affect the health and safety of workers, visitors, or any other person present in the workplace. For Zutshi and Sohal [42], the implementation and certification of the OHSAS 18001 system are of high relevance for many organizations and generalized worldwide. The introduction of ISO 45001 [12], aims to help organizations, independent of their size or sector, to conceive proactive systems to prevent injuries and worsening health problems as a result of occupational activity. All its requirements are designed to facilitate the integration of several ISO management systems standards, such as ISO 9001 QMSs and ISO 14001 EMSs [43]. An OHSMS results in the company's ability to create conditions for safe and healthy workplaces, preventing work-related injuries and health problems, and its performance of OHS [12]. There are several potential benefits that come from the implementation of OHSAS 18001:2007 /ISO 45001:2018. For example, increased productivity, reduced costs inherent to stoppages and production losses or defects, reduction of costs with insurance fees and lost workdays, improvement of the quality of services or the product provided, among others [44]. For scholars such as Chen [45] and Molamohamadi and Ismail [46], the implementation and certification of an Occupational Health and Safety MS (OHSMS), according to standard BS OHSAS 18001 (presently

standard ISO 45001), provides a set of relevant elements towards Sustainable Development (SD), namely with a focus on the social dimension of SD.

The adoption of different management models by companies is a reality justified either by competitive factors or by demands from clients or other relevant stakeholders. The integration of Management Systems (IMSs), namely Quality, Environmental and Occupational Health and Safety (QEOHS) Management Systems is a research topic addressed by scholars all over the world. Also, an increasing number of organizations has adopted integrated MSs to improve and optimize their organizational issues [47], [48], [49] and [50]. According to Kopia et al. [51], IMS interconnects a set of processes through sharing information, human and financial resources, and infrastructure in order to satisfy the needs of different stakeholders. The reported IMS benefits include: efficiency and capacity to meet customer needs improvement; higher level of employee satisfaction and motivation; better organizational climate with improved communication and knowledge sharing; systematization of procedures, processes and responsibilities leading to less bureaucracy; improvement of the organizational image and market competitiveness and better relationship with stakeholders , e.g., see Abad et al. 2014 [52] and Bernardo et al. [53].

By adopting common concepts, core text and high-level structure, ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018, facilitate the harmonization and unity of the IMS and facilitate the implementation and integration of other systems. There is a considerable stream of scholars that support the view that the three MSs (QMS, EMS, and OHSMS) respectively match the three Sustainability Dimensions (economic, environmental and social), and mutually reinforce each other, as supported by researchers such as Qi et al. [54], Rebelo et al. [47, 55], Domingues et al. [48], and Gianni et al. [56], with QEOHS MSs contributing for successful and balanced SD [53].

1.2. The Sustainable Development Goals (SDGs)

The concept of Sustainable Development (SD) was introduced in the document entitled Our Common Future by United Nations Commission on Environment and Development's (Brundtland Commission) report that aimed to deal with humanity aspirations of a better life within limitations imposed by nature. "Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [1]. Following this landmark, Elkington [57] proposed three dimensions for Sustainability (the Triple Bottom Line concept) for the operationalization of corporate social responsibility (CSR): the simultaneous search for successful economic development (profit), while taking consideration for the environment (planet) and social progress and equity (people). By 1997, the United Nations Agenda for Development adopted a definition of Sustainability framed on the Brundtland definition and integrating the triple bottom line approach: "Development is a multidimensional undertaking to achieve a higher quality of life for all people. Economic development, social development and environmental protection are interdependent and mutually reinforcing components of sustainable development" [58]. However, for Govindan et al. [59], one of the main challenges for Sustainability is to operationalize the resolutions of the Brundtland.

Corporate Sustainability has become vital for organizations' long-term success [60], [61], and generally refers to the integration of the triple bottom line of financial profitability, environmental protection and social responsibility into organizations' core purpose and activities ([57], [62], [63]. Although there is no consensus concerning the concept of CS, and Sustainability, most definitions take into consideration economic, social, and environmental dimensions [64]. Conceptually, both aim for the simultaneous search of profitable economic development with social progress and equity and respect for the natural environment, generating value for shareholders, customers, workers, partners and society in general [65]. Within this study, corporate Sustainability is used as an "umbrella construct" that could encompass concepts like sustainable development (SD), corporate social responsibility (CSR), corporate citizenship (CC), business ethics (BE) and triple bottom line [65]. This

approach is in line with the 2012 United Nations Conference on Sustainable Development in Rio: sustainable progress must cover all three dimensions that affect people's life chances (social, economic, and environmental).

Dyllick and Hockerts (p. 131, [64]) proposed as a definition for corporate sustainability "meeting the needs of a firm's direct and indirect stakeholders (such as shareholders, employees, clients, pressure groups, and communities), without compromising its ability to meet the needs of future stakeholders as well."Shared expression of stakeholder needs is currently represented at the global level by the 17 SDGs and the associated 169 targets announced by the 2015 United Nations General Assembly [66]. The proposal to create the Sustainable Development Goals (SDGs) arise in the Rio+20 United Nations Summit of 2012. The final document of the Rio+20 Conference (The Future We Want) approved the process to negotiate a consensus on the SDGs. After a highly participated process the SDGs (successors of the Millennium Development Goals) with a comprehensive set of development goals, were agreed on September 2015 in the United Nations (New York), by 193 countries. The UN's document Transforming our World: The 2030 Agenda for Sustainable Development includes a declaration of the 17 SDGs and 169 other goals, along with monitoring and review measures [67]. The SDGs range from ending world poverty to undertaking urgent action to combat climate change and its impacts by 2030, balancing economic, social, and environmental development [66]. The SDGs aim to inspire the integration of Sustainability into organizations worldwide, addressing current and future stakeholder needs, and contributing to the achievement of sustainable development for society at large [68].

Investigations addressing the incorporation of SDGs into the business are a relevant research subject, and there is a stream of research on this topic within the corporate sustainability literature, e.g., Topple et al. [5] and Morioka et al. [6]. Although there are still open issues regarding SDGs performance measurements, operationalization and interlinkages [7], the SDGs have already been linked to concepts such as industrial ecology and strategic management to support organizations to positively contribute to the SDGs while building competitive advantage [70].

1.3. SDG reporting

Sustainability reporting can be defined as the practice of reporting publicly on an organization's economic, environmental and social sustainability impacts and SDG reporting the practice of reporting publicly on how an organization addresses the SDGs [66], [71]. For Lozano [72], sustainability reporting can be an essential driver of an organization's sustainability orientation. Sustainability reports can, therefore, be a driver for organizations to measure, understanding, drive, and communicate their efforts towards the SDGs, setting internal goals and managing the transition towards more sustainable development [71]. The United Nations Global Compact is a significant initiative that has been pushing organizations to embrace the commitments to integrate sustainability into its strategy and operations, engaging with society and reporting the ongoing sustainability efforts and progress annually [73]. It is, therefore, expectable that the organizations that have joined this initiative are more prominent in sustainability reporting, including the SDGs.

However, research by Schramade [74] concluded that only a minority of companies currently mention the SDGs in their reports. Rosati and Faria [75] found that only 16% of a total of 408 organizations investigated in 2016, addressing the SDGs in the sustainability reports. They concluded that SDGs reporting is related to factors such as larger organization size and a higher level of intangible assets and a higher commitment to sustainability frameworks and external assurance. In a research with Portuguese Small and Medium Companies, Fonse and Ferro [69] concluded that those companies that adopted environmental management and community involvement programs received more feedback (positive, but also negative) from the community, stressing the need to pay special attention to their communication policies. This might explain why there are still some concerns from companies about public accountability.

1.4. Research Hypotheses

The literature review carried in the previous sections highlighted that the three MSs (QMS, EMS and OHSMS) respectively match the three Sustainability Dimensions (economic, environmental and social), and mutually reinforce each other [48], [54], [55], [56], with QEOHS MSs contributing for successful and balanced SD [53]. Corporate sustainability has become vital for organizations' long-term success [60], [61]. It is framed within the economic, environmental and social dimensions [65] and is related with "meeting the needs of a firm's direct and indirect stakeholders without compromising its ability to meet the needs of future stakeholders as well" [64].

The SDGs are a shared expression of stakeholder needs represented at the global level [66]. Also, the research addressing the incorporation of SDGs into business is a relevant topic within the corporate sustainability literature [5], [6] and sustainability reporting can be an essential driver of an organization's sustainability orientation [72]. However, research results highlights that only a minority of companies currently mention the SDGs in their reports [74], [75]. Larger organizations, or with a and a higher commitment to sustainability frameworks and external assurance (e.g., QEOHS certification) show a high level of SGDs reporting [75]. Since QEOHS certification started within the secondary sector (latter expanding to services), SDGs might show the same pattern. SDGs reporting might also be more intensive in organizations that are members of the United Nations Global Compact network and, therefore, commit to integrating sustainability into its strategy and operations and annually report the progress.

Accordingly, the following research hypotheses are stated as follows:

H1. The Communication of SDGs is more prominent in organizations (QEOHS) with higher business volume;

H2. The Communication of SDGs is more prominent in organizations (QEOHS) operating in the secondary sector;

H3. The Communication of SDGs is more prominent in organizations (QEOHS) that are members of the United Nations Global Compact Network Portugal;

H4. The Communication of SDGs is more prominent in organizations (QEOHS) that disclose their sustainability reports on their web site.

The following section presents the materials and methods that support this investigation. Section 3 provides the results of the study. The final sections present a summary of the study discussions (Section 4) and conclusions, limitations, and recommendations for future research (Section 5).

2. Materials and Methods

The content analysis method was adopted as research method for this investigation, in line with Carvalho et al. [76]. According to Krippendorff [77] (p. 18) "content analysis is a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use ". The application of the content analysis technique has been applied in investigation related to SD organizational communication through the corporate website as supported by Branco and Rodrigues [78], Gill et al. [79], Tagesson et al. [80]. Lee et al. [81] and Amran et al. [82].

According to Bardin [83], the adoption of this research method requires the definition of the corpus, categories, and units of analysis. For this research, the documents of analysis (corpus) encompass the institutional reports (e.g., sustainability reports, integrated reports, environmental reports, management reports, annual reports, governance reports) available in the web sites of QEOHS certified organizations. The categories of analysis were defined based on the three

fundamental SD dimensions (economic, environmental and social) in line with researchers such as Gallego ([84], Ho & Taylor [85], Gill et al. [86], Carvalho et al. [76], [87], and Carvalho [88]. The units of analysis were defined as the concept (theme, word and/or phrase) which translates the SD commitment [83]. The parameters of the content analysis method are presented in Table 1:

Table 1.. Parameters of the content analysis method (adapted from Carvalho, [88])

Corpus of analysis (documents of analysis)	Categories and subcategories of analysis (SDGs)	Units of analysis
Institutional reports disclosed on the institutional website of the organization (i.e., the *corpus* of analysis). Institutional reports, such as, for example: sustainability report; social responsibility report; environmental report; occupational health and safety report; management report; accounts and report; accounts and management report; financial report; corporate governance report; integrated report)	01. No poverty 02. Zero hunger 03. Good health and well-being 04. Quality education 05. Gender equality 06. Clean water and sanitation 07. Affordable and clean energy 08. Decent work and economic growth 09. Industry, innovation, and infrastructure 10. Reduced inequalities 11. Sustainable cities and communities 12. Responsible consumption and production 13. Climate action 14. Life below water 15. Life on land 16. Peace, justice and strong institutions 17. Partnerships for the goals	Concept (i.e., the theme, word and/or phrase)

In Portugal, the universe of the certified QEOHS organizations comprised, by 31 December 2017, a total of 698 organizations, with 145 (20.8%) included in the 1000 biggest Portuguese companies, and 401 (57.4%) belonging to the secondary sector. A total of 59 (8.5%) organizations are member of the UN Global Compact initiative embracing the commitments of the UN Global Compact to integrate sustainability into its strategy and operations, engaging with society and reporting annually the ongoing sustainability efforts and progress [89]. The number (n) of organizations in the sample is 235 (33.7%), representing all organizations in the universe that made available as of July 31, 2019, an institutional website accessible on the internet and, in turn, still provided at least one institutional report from the last four years.

Data was collected between May and July 2019, through exploratory analysis of the institutional website content of the Portuguese organizations QEOHS certified to identify and download the latest available versions of computer files at PDF format of the annually published institutional reports. Subsequently, the institutional reports were analyzed individually, and the extracted data were classified and registered in the research database by applying the technique of content analysis regarding coding and categorization. Data was analyzed dichotomously, assigning to the item the code or value "1 – one" (if present), otherwise, assigning to the item the code or value "0 – zero"

(Haniffa and Cooke [90], p. 405). Software IBM SPSS Statistics® version 22 (International Business Machines – Statistical Package for the Social Sciences) and macro KALPHA version 2007 (macro Krippendorff's α) were adopted to conduct the statistical calculations, hypotheses testing and reliability assessment.

The research dependent variable Sustainable Development Goals Communication Index (SDGCI) and its mathematical formulation (in line with Carvalho et al. [76]) is (equation 1):

$$SDGCI_j = \sum_{i=1}^{n_j} \frac{G_{ij}}{M_{ij}}$$

(1)

Where, SDGCI is the Sustainable development goals communication index, G represents the Goals number that an organization communicate, and M is the Maximum number of goals expected that an organization communicate. The dependent variables are Business volume (BV), Activity sector (AS), UNGC NP members (UM), and Sustainability reports (SR). The definition of the dependent variables is presented in Table 2:

Table 2. Definition of the independent variables (adapted from Carvalho, [88]).

Variables	Description
Business volume (BV)	The organization is classified dichotomously (i.e., binary form) according to the business volume, in euros (€), obtained in 2017. When the business volume (i.e., turnover) is among the 1,000 largest of Portugal the organization is classified as "Greater" (1), otherwise, is classified as "Other" (0)
Activity sector (AS)	The organization is classified dichotomously (i.e., binary form) according to the activity sector. When the activity sector (i.e., economic sector or industrial sector) is framed on the secondary sector (second sector) the organization is classified as "Second sector" (1), otherwise, is classified as "Other" (0)
UNGC NP members (UM)	The organization is classified dichotomously (i.e., binary form) according to the relationship with the UNGC NP. When belongs to an economic group that assumes a relationship (i.e., member) with the UNGC NP the organization is classified as "Member" (1), otherwise, is classified as "No" (0)
Sustainability reports (SR)	The organization is classified dichotomously (i.e., binary form) according to the disclosure of the sustainability reports on the institutional website. When disclose the sustainability report on the website the organization is classified as "Disclose" (1), otherwise, is classified as "No" (0)

Note: UNGC NP, United Nations Global Compact Network Portugal; BV, Business volume; AS, Activity sector; UM, UNGC NP members; SR, Sustainability reports.

In the investigation, the estimation of the profile of the Portuguese organizations certified in quality, environment and health and safety (QEOHS), whose reporting on Sustainable Development Goals Communication is prominent (ie above average), was based on "logistic regression". For Kleinbaum and Klein [91], logistic regression "is a

modelling approach mathematics that can be used to describe the relationship of independent variables with a dichotomous dependent variable" (p. 5). The proposed estimation model is supported by equation 2, which was based on the mathematical assumptions of binary logistic regression [91], [92], and, in turn, the dependent variable and independent variables are all binary (0, 1). Therefore, the following Binary logistic regression model was used to statistically test the research hypotheses (equation 2):

$$logit\ [P(SDGCI_{(0,\ 1)j} = 1 | BV, AS, UM, SR)] = \beta_0 + \beta_1 BV_j + \beta_2 AS_j + \beta_3 UM_j + \beta_4 SR_j + \varepsilon_j \quad (2)$$

Where,

SDGCI(0,1) – Sustainable development goals communication index (binary)

BV – Business volume

AS – Activity sector

UM – UNGC NP members

SR – Sustainability reports

β – Regression coefficients

Ɛ – Error term

logit – Link function

P – Conditional probability

j – Organization
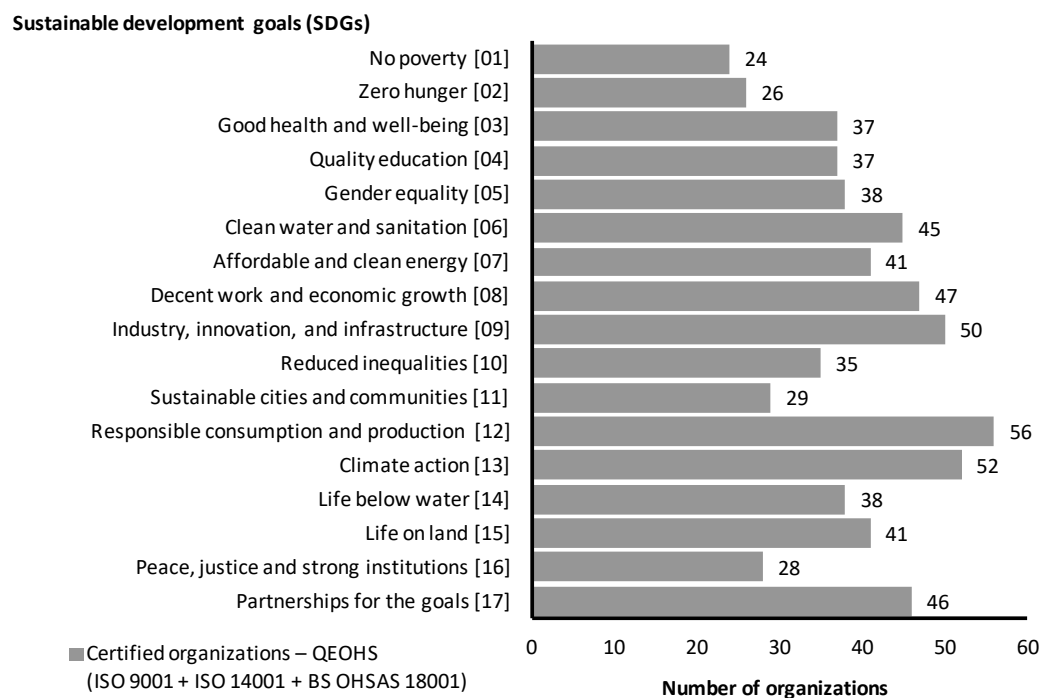
3. Results

3.1. Descriptive analysis

As stated before, the research sample (n) consists of 235 organizations, that is, all Portuguese organizations that were certified, within the scope of Quality (ISO 9001), Environment (ISO 14001), Safety and Health at Work (BS OHSAS 18001) as of December 31, 2017, and that made available an institutional website accessible on the Internet as of July 31 2019, where they release their institutional reports, at least one, concerning the last four (4) years. The descriptive analysis of the results highlights that the SDGs that have a higher reporting frequency (SDGs: 12, 13, 9, 8, 17 and 6) are balanced within the three pillars of SD (Economic: ECO; Environmental: ENV; Social: SOC) as shown in table 3 and figure 1 below:

Table 3. Communication of sustainable development goals (adapted from Carvalho, [88]).

Sustainable development goals (SDGs)	SD DIM	N	%
SDG 01. No poverty	SOC	24	10.2
SDG 02. Zero hunger	SOC	26	11.1
SDG 03. Good health and well-being	SOC	37	15.7
SDG 04. Quality education	SOC	37	15.7
SDG 05. Gender equality	ECO&SOC	38	16.2
SDG 06. Clean water and sanitation	ENV&SOC	45	19.1
SDG 07. Affordable and clean energy	ECO&ENV	41	17.4
SDG 08. Decent work and economic growth	ECO&SOC	47	20.0
SDG 09. Industry, innovation, and infrastructure	ECO	50	21.3
SDG 10. Reduced inequalities	ECO&SOC	35	14.9
SDG 11. Sustainable cities and communities	ENV&SOC	29	12.3
SDG 12. Responsible consumption and production	ECO&SOC	56	23.8

Sustainable development goals (SDGs)	SD DIM	N	%
SDG 13. Climate action	ENV	52	22.1
SDG 14. Life below water	ENV	38	16.2
SDG 15. Life on land	ENV	41	17.4
SDG 16. Peace, justice and strong institutions	SOC	28	11.9
SDG 17. Partnerships for the goals	ECO&ENV&SOC	46	19.6

Note: SDG, Sustainable Development Goal; Sustainable Development Dimension (ECO - Economic, ENV - Environmental and SOC - Social), N, Number; %, Percentage.

Sustainable development goals (SDGs)

SDG	Number of organizations
No poverty [01]	24
Zero hunger [02]	26
Good health and well-being [03]	37
Quality education [04]	37
Gender equality [05]	38
Clean water and sanitation [06]	45
Affordable and clean energy [07]	41
Decent work and economic growth [08]	47
Industry, innovation, and infrastructure [09]	50
Reduced inequalities [10]	35
Sustainable cities and communities [11]	29
Responsible consumption and production [12]	56
Climate action [13]	52
Life below water [14]	38
Life on land [15]	41
Peace, justice and strong institutions [16]	28
Partnerships for the goals [17]	46

■ Certified organizations – QEOHS
(ISO 9001 + ISO 14001 + BS OHSAS 18001)

Number of organizations

Figure 1. Communication of SDG goals in institutional reports (adapted from Carvalho [88]).

3.2. Univariuate, bivariate and multivariete analysis

The results obtained from the analysis of the statistical parameters are presented in Table 4. The descriptive characteristics that characterize the continuous dependent variable called SDGCI – Sustainable development goals communication index, show that for 235 organizations, a minimum SDGCI of 0.000 and a maximum value of 1.000, meaning the range of the dependent variable SDGCI was totally filled. The SDGCI mean value equals 0.168, with a standard deviation of 0.306 and a variance of 0.093, hinting the occurrence of high dispersion and variability among the organizations analyzed. Four independent variables (BV, AS, UM, and SR) are dummy or binary variables (qualitative) and assume the value of 0 or 1 according to their classification category (see Table 5). In terms of statistical dimension all categories (0 or 1) include at least 45 organizations:

Table 4. Statistical results of characterization of the dependent variable.

Dependent variable	N	Minimum	Maximum	Sum	Mean	SD	Variance
Sustainable development goals communication index	235	0.000	1.000	39.412	0.168	0.306	0.093

Note: *N*, Number; *SD*, Standard deviation; SDGCI, Sustainable development goals communication index.

Concerning the bivariate analysis, relevant differences in the calculated values of the sum and average (dependent variable) by categories 0 and 1 (independent variables) were detected (see Table 5). The nonparametric Mann–Whitney U-test [93], [94], was adopted to assess the significance of the differences detected considering that the statistical assumptions of the normality of the dependent variable and the homogeneity of variances between the categories 0 and 1 were not conclusive. For the study of normality of distribution, the Kolmogorov–Smirnov with Lilliefors correction and the Shapiro–Wilk tests were applied and the Levene test was adopted to assess the homogeneity of variances. Table 6 presents the results of the Mann–Whitney U-test breakdown by research hypothesis.

Table 5. Statistical results of the relationship between variables.

	Variables	**Dependent**						
		Sustainable development goals communication index						
H	**Independent**	**N**	**Minimu**	**Maximu**	**Sum**	**Mean**	*SD*	**Varianc**
H1	Business volume							
	(0) Other	141	0.000	1.000	18.824	0.134	0.288	0.083
	(1) Greater	94	0.000	1.000	20.588	0.219	0.325	0.106
H2	Activity sector							
	(0) Other	103	0.000	1.000	20.000	0.194	0.341	0.116
	(1) Second sector	132	0.000	1.000	19.412	0.147	0.275	0.075
H3	UNGC NP members							
	(0) No	190	0.000	1.000	20.882	0.110	0.252	0.063
	(1) Member	45	0.000	1.000	18.529	0.412	0.386	0.149
H4	Sustainability reports							
	(0) No	129	0.000	1.000	11.765	0.091	0.259	0.067
	(1) Disclose	106	0.000	1.000	27.647	0.261	0.332	0.110

Note: H, Hypothesis; *N*, Number; *SD*, Standard deviation.

Since the significance level is 0.05 (confidence level of 95 per cent), the results of the Mann–Whitney U-test, presented in Table 6, provide statistical evidence (p-value = 0.000), to conclude there are significant differences p-value < 0.05) in the dependent variable SDGCI for categories 0 and 1 of three independent variables (BV, UM, SR). In this sense, the results suggest that individually these three independent variables, according to their category 0 or 1, contribute significantly to a "lower" or "greater" calculated value of the average of the dependent variable by category.

Table 6. Statistical results of the Mann-Whitney U test.

	Variables	**Dependent**				
		Sustainable development goals communication index				
H	**Independent (categories)**	**N**	**Sum of ranks**	**Mean of ranks**	**Mann-Whitney**	*p*-Value (one-tailed)
H1	Business volume					
	(0) Other	141	15574.000	110.450	5563.000	0.005
	(1) Greater	94	12156.000	129.320		
H2	Activity sector					

H	Independent (categories)	N	Sum of ranks	Mean of ranks	Mann-Whitney	p-Value (one-tailed)
			Dependent			
			Sustainable development goals communication index			
	(0) Other	103	12414.000	120.520	6538.000	0.263
	(1) Second sector	132	15316.000	116.030		
H3 UNGC NP members						
	(0) No	190	20555.000	108.180	2410.000	0.000
	(1) Member	45	7175.000	159.440		
H4 Sustainability reports						
	(0) No	129	13124.000	101.740	4739.000	0.000
	(1) Disclose	106	14606.000	137.790		

Note: H, Hypothesis; *N*, Number; *p*-Value, Probability value or significance (one-tailed).

Concerning the multivariate analysis, the mapping of the profile of the certified Portuguese organisations (QEOHS), in which the SDGCI (0, 1) – Sustainable development goals communication index is more prominent, was supported in the binary logistic regression model.

The assumption of absence of multicollinearity between the independent variables that set the binary logistic regression model was tested (see Annexes A1 to A5) and the results suggesting the absence of multicollinearity. The statistical results of the binary logistic regression model, which encompass the joint statistical analysis of the four independent explanatory variables is presented in Table 7.

Table 7. Statistical results of the binary logistic regression model.

H	Independent	β	SE	Exp(β)	Wald	p-Value
H1	Business volume	0.770	0.355	2.159	4.704	0.030
H2	Activity sector	-0.032	0.360	0.968	0.008	0.928
H3	UNGC NP members	2.003	0.407	7.413	24.270	0.000
H4	Sustainability reports	1.671	0.367	5.319	20.721	0.000
	Constant	-2.638	0.396	0.071	44.335	0.000
Statistical parameters of the binary logistic regression model:					Statistics	p-Value
Overall statistics – Chi-square (χ^2)					57.353	0.000
Overall percentage – Percentage correct (%)					79.100	–
Omnibus tests of model coefficients – Chi-square (χ^2)					59.837	0.000
-2 Log likelihood					219.228	–
Cox & Snell – R-square (R^2)					0.225	–
Nagelkerke – R-square (R^2)					0.323	–
Hosmer and Lemeshow test – Chi-square (χ^2)					6.624	0.469

Note: H, Hypothesis; β, Regression coefficient; *SE*, Standard error; Exp(β), Exponential regression coefficient; Wald, Statistic test; *p*-Value, Probability value or significance (two-tailed).

Considering a significance level of 0.05, the statistical results of the binary logistic regression model, supported by the Wald test, show, with significant statistical evidence (p-value < 0.05), that three independent variables (BV, UM, PT and SR), contribute significantly to the values calculated of the category "more prominent" (1) of the dependent variable

(SDGCI(0, 1)), when adjusted to the logit function. The statistical parameters of the binary logistic regression model present significant statistical evidence, therefore, it can be stated that the proposed regression model has a moderate adjustment power.

The results of the of the statistical tests following the application of the binary logistic regression model are summarized in Table 8.

Table 8. Statistical results obtained by the application of hypothesis testing.

Research hypotheses tested with the binary logistic regression model			
H1	H2	H3	H4
Accept	Reject	Accept	Accept

Note: H, Hypothesis.

4. Discussion

The United Nations 2030 Agenda for Sustainable Development requires the collaboration of multiple stakeholders for the successful implementation of the 17 Sustainable Development Goals. Organizations can play a significant role in the advancement of the Sustainable and its recognized that those with Quality, Environmental and Occupational Health and Safety certified management systems respectively match the three Sustainability Dimensions (economic, environmental and social). This research aims to map the present engagement level of those companies in addressing and reporting the SDGs. The content of companies reports available in the respective web sites, by 31 December 2017, of a total of 235 Portuguese organizations with QEOHS certified management systems, was analyzed. The results show a moderate reporting of SDGs by those companies, with the top five being SDG 12 - Responsible consumption and production (23.8%), SDG 13 - Climate action (22.1%), SDG 09 - Industry, innovation, and infrastructure (21.3%), SDG 08 - Decent work and economic growth (20.0%) and SDG 17 - Partnerships for the goals (19.6%).   These results are consistent with Schramade [74] and Rosati and Faria [75] conclusions that most companies currently do not mention the SDGs in their reports. Although 23.8% is higher than the 16% found by Rosati and Faria [75], this indicates that there is still considerable room for improvement in this regard.

The results of the statistical tests have pointed out that the communication of SDGs is more prominent in organizations (QEOHS) with higher business volume which is in line Rosati and Faria [75] claims that larger organizations show a high level of SGDs reporting. The results of the hypotheses testing did not support the assumption that organizations of the secondary sector are more prominent in reporting the SDGs. However, concerning the United Nations Global Compact, SDGs reporting is indeed higher within members organizations, consistent with the network purposes. Finally, the results also confirm that the organizations that publish sustainability reporting are more prominent in reporting SDGs, supporting Lozano [72] claims that sustainability reporting can be an essential driver of an organization's sustainability orientation.

Although this research contributes to the SDGs reporting body of knowledge, it suffers from some limitations to be acknowledge when generalizing its findings. First, the sample is restricted to Portuguese organizations with certified QEOHOS management systems. Second, the investigation is restricted to the reporting of SDGs in company reports available on web sites without evaluating the performance in terms of SDGs advancement. Third, other organizational factors such as resources and capabilities and sustainability performance were not investigated. Future research could be carried to evaluate the evolution of SGDS reporting with time and consider other organizations than those QEOHS certified, and in other countries.

This study can be useful for decision-makers that aim to support organizations to contribute to the Sustainable Development Goals. From a managerial perspective, it highlights that QEOHS certified organizations that already address the economic, environmental and social dimensions, due to its management systems certification can be more ambitious and match their strategies and actions

with the relevant SDGs and report accordingly. Considering that the SDGs goals reporting is still modest, it would be desirable to have a more intense pressure from stakeholders to promote it, and have more prominent companies disseminating the adoption of SDGs within their supply chains.

Appendix A

Verification of the statistical treatment assumptions: Normality; Homogeneity of variance.

- Mann-Whitney U test

Table A1. Statistical results of the tests of normality to the dependent variable.

Research variables			Tests of normality					
			Kolmogorov-			Shapiro-Wilk test		
Dependent			Statisti	*df*	*p*-Value	Statisti	*df*	*p*-Value
SDG CI	Sustainable development goals communication index		0.428	235	0.000	0.603	235	0.000
Independent		Category	Statistic	*df*	*p*-Value	Statistic	*df*	*p*-Value
BV	Business volume	0 Other	0.466	141	0.000	0.521	141	0.000
		1 Greater	0.367	94	0.000	0.702	94	0.000
AS	Activity sector	0 Other	0.424	103	0.000	0.609	103	0.000
		1 Second sector	0.431	132	0.000	0.600	132	0.000
UM	UNGC NP members	0 No	0.463	190	0.000	0.501	190	0.000
		1 Member	0.257	45	0.000	0.818	45	0.000
SR	Sustainability reports	0 No	0.498	129	0.000	0.391	129	0.000
		1 Disclose	0.331	106	0.000	0.764	106	0.000

Note: (*) Lilliefors significante correction; SDGCI, Sustainable development goals communication index; BV, Business volume; AS, Activity sector; UM, UNGC NP members; SR, Sustainability reports; *df*, Degrees of freedom; *p*-Value, Probability value or significance (two-tailed).

Table A2. Statistical results of the test of homogeneity of variance in the relationship of the variables.

Research variables		Dependent	Sustainable development goals			
		Statistical	Tests of homogeneity of variance			
Independent		parameters	Levene	*df1*	*df2*	*p*-Value
BV	Business volume	Based on mean	6.538	1	233	0.011

Research variables		Dependent	Sustainable development goals			
		Statistical	Tests of homogeneity of variance			
Independent		parameters	Levene	*df1*	*df2*	*p*-Value
AS	Activity sector	Based on median	4.483	1	233	0.035
		Based on mean	6.611	1	233	0.011
UM	UNGC NP members	Based on median	1.377	1	233	0.242
		Based on mean	28.161	1	233	0.000
SR	Sustainability reports	Based on median	26.969	1	233	0.000
		Based on mean	30.469	1	233	0.000
		Based on median	19.330	1	233	0.000

Note: BV, Business volume; AS, Activity sector; UM, UNGC NP members; SR, Sustainability reports; *df*, Degrees of freedom; *p*-Value, Probability value or significance (two-tailed).

Verification of the statistical treatment assumptions: Multicollinearity.

- Binary logistic regression

Table A3. Statistical results of the correlation between the independent variables.

Research variables			Correlations matrix			
Independent		Statistical parameter	BV	AS	UM	SR
BV	Business volume	Pearson correlation	1	0.196	0.000	0.168
		p-Value	−	0.003	1.000	0.010
		N	235	235	235	235
AS	Activity sector	Pearson correlation	0.196	1	0.059	-0.233
		p-Value	0.003	−	0.365	0.000
		N	235	235	235	235
UM	UNGC NP members	Pearson correlation	0.000	0.059	1	0.059
		p-Value	1.000	0.365	−	0.370
		N	235	235	235	235
SR	Sustainability reports	Pearson correlation	0.168	-0.233	0.059	1
		p-Value	0.010	0.000	0.370	−
		N	235	235	235	235

Note: BV, Business volume; AS, Activity sector; UM, UNGC NP members; SR, Sustainability reports; *N*, Number; *p*-Value, Probability value or significance (two-tailed).

Table A4. Statistical results of the collinearity coefficients of the research variables.

Research variables		Collinearity statistics		
Independent		Model	Tolerance	Variance inflation factor (VIF)
BV	Business volume	1	0.913	1.096
AS	Activity sector		0.883	1.133
UM	UNGC NP members		0.990	1.010
SR	Sustainability reports		0.893	1.120

Note: BV, Business volume; AS, Activity sector; UM, UNGC NP members; SR, Sustainability reports; VIF, Variance inflation factor.

Table A5. Statistical results of the collinearity diagnostics of the research variables.

Model	Dimension	Eigenvalue	Condition index	Variance proportions				
				Constant	BV	AS	UM	SR
1	1	3.029	1.000	0.020	0.040	0.030	0.030	0.030
	2	0.770	1.983	0.000	0.090	0.010	0.880	0.010
	3	0.615	2.219	0.000	0.000	0.250	0.000	0.480
	4	0.419	2.690	0.070	0.870	0.110	0.090	0.060
	5	0.166	4.273	0.900	0.000	0.610	0.010	0.420

Note: BV, Business volume; AS, Activity sector; UM, UNGC NP members; SR, Sustainability reports.

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