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ISO Standards: A Platform for Achieving Sustainable Development Goal 2

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Abstract: The International Organization for Standardization (ISO) has recently begun promoting the linkages between its standards and the United Nations' Sustainable Development Goals (SDGs). However, further research is needed to explore how ISO standards can serve as a platform for achieving the SDGs. In this paper, we discuss the interlinkage between ISO standards and SDG 2 (i.e., Zero hunger—End hunger, achieve food security and improved nutrition, and promote sustainable agriculture). We review the literature on a set of 77 ISO standards related to SDG 2 and study existing evidence pertinent to SDG 2 and its targets. Specifically, we review research in four key areas of interest: agricultural productivity of ISO certified firms, adoption of ISO standards amongst small scale producers, ISO standards development, and governance of standards. We found implicit evidence in the literature that ISO standards have the potential to contribute to two SDG 2 targets, namely targets 2.3 and 2.4. Some aspects of ISO standards, however, such as low levels of adoption amongst small scale farmers or a lack of multi-stakeholder standard development, contradict key aspects of the SDG agenda. We outline key areas for future research in the four areas of interest noted above.

Keywords: ISO; standards; sustainable development goals; SDG 2; sustainable development

1. Introduction

The adoption of the United Nations' 2030 Agenda and its accompanying 17 Sustainable Development Goals (SDGs) by 193 heads of state in 2015 has been celebrated in academic, activist, business, and policy circles as a means to stimulate a radical shift in world affairs [1]. The SDGs closely link “sustainability” with “development” through the principles of “universality”, “integration”, and “leave no one behind”. However, the SDGs are not legally binding (i.e., governments are expected to take ownership and establish national frameworks for the achievement of these global goals), and political leaders around the world have not fully clarified the 2030 Agenda. For example, a clear distinction of the responsibilities of various stakeholders, including national governments, international agencies, and businesses, has yet to be made [2]. In 2019, Secretary-General António Guterres emphasized that “so far, we are not keeping pace”, in part due to poor financing of the SDG agenda in the developing world [3]. Jabbari, et al. [4] demonstrate that the progress in developing countries has been minimal. Due to the impact of the COVID-19 pandemic, the resourcing of the SDG agenda might become even more challenging. Therefore, finding new ways to progress with the SDGs is of paramount importance. One of the tangible mechanisms to help achieve the SDGs is through implementation of the standards developed by the International Organization for Standardization (ISO) and the existing quality infrastructure that has been already adopted across the globe.

ISO has developed standards that address practically all aspects of societal functioning—from standards on food systems to standards on medical devices to name just a few. With over 20,000 standards that are used in 162 member countries [5], ISO standards play a significant role in international trade and international relationships, as well as in domestic affairs [6]. ISO is the largest standards developer in the world, and its standards ensure consistency and transparency, as well as a transfer of best practices across the globe [7]. ISO has been influential in determining key principles and practices of sustainability through a set of standards, including “air, water and soil quality, on emissions of gases and radiation, and environmental aspects of products” [8]. New standards—such as ISO 20400 on sustainable procurement or standards that harmonize electric vehicles’ infrastructure [9]—continue to emerge, which suggests that the impact of ISO standards in this domain will continue to grow. ISO has been similarly active in the food domain. ISO has developed over 1600 standards for different aspects of the food sector, including the ISO 22000 standard for food safety management systems that has been adopted in more than 39,000 organizations worldwide [10].

Given the influence that ISO Standards have in the global marketplace on the one hand, and the importance of the SDG agenda on the other, it is timely to consider the linkages between ISO Standards and the SDGs. In this paper, we aim to determine the potential of ISO standards to address SDG 2—operationalizing the potential in terms of standards development, adoption, impact, and governance [11]—and analyzing that potential from the perspective of the SDG 2 targets. We focus specifically on SDG 2 Zero hunger which, according to the *Food and Agriculture Organization of the United Nations*, is key to the success of the entire SDG agenda [12]. To fulfill our aim, we conduct a systematic literature review and analyze a set of 77 ISO standards for food that are explicitly listed by ISO as exemplar standards that address SDG 2 [13]. Leveraging normative and institutional theoretical perspectives, our analysis focuses on four units of analysis, namely agricultural productivity, adoption of ISO standards, ISO standards development, and governance of standards.

The paper makes several contributions to the literature. First, the paper provides empirical evidence about the contribution of ISO standards to meeting the SDGs. So far, the literature has mainly focused on linking ISO standards that can *in principle* address the SDGs, but without specifically discussing the congruence and contribution of these standards to meeting the SDGs and their accompanying targets [13]. Second, we discuss and provide guidance on how research in this domain can be advanced, as well as further understanding about how the role and contribution of ISO standards can be further investigated. In our analysis and discussion, we leverage a *normative perspective* (i.e., discussing the role of standards as reference points and instruments of knowledge codification), as well as an *institutional perspective* (i.e., the role of infrastructure behind ISO standards, namely, accreditation, certification, and auditing; hence considering ISO standards as instruments of change). Combined, these two perspectives are employed to determine the current status of ISO standards’ contribution to the SDGs. Given the universally accepted importance of the UN’s SDGs for advancing sustainable development [14], there is a need to enhance and encourage academic research in this domain.

2. Conceptual Background—ISO Standards and the SDGs

2.1. ISO Standards

ISO Standards contribute to the global economy on multiple fronts, such as providing a springboard to the development of quality infrastructure in national economies, enabling international trade (i.e., by reducing barriers to international trade), enabling business-to-business (B2B) interactions, ensuring consumer safety, and providing a technical basis for regulation and policy making [5].

ISO, as an international standards development organization, consists of representatives from over 160 countries, and provides a strong institutional platform to develop standards. Standards are developed in committees by experts nominated by individual state members or liaison organizations [15]. For instance, the ISO/TC 207 committee is responsible for standardization in the domain of environmental management. These committees produce standards that, if approved, are accepted in

member countries. Because ISO is purely a developer of standards, other organizations are responsible for the monitoring of ISO's standards adoption and their consistent use. In general, this role is fulfilled by a network of accreditation and conformity assessment bodies (CABs). Whilst accreditation bodies are responsible for overseeing CABs, CABs are responsible for ensuring consistency in adoption of ISO standards by individual organizations. Such monitoring activities are universally employed across the globe [16].

Even though ISO is an international platform for standards development, it should be noted that the standards are also adopted at the national level as national standards. ISO standards are thus directly incorporated to “quality infrastructures” [17], which are “the combination of initiatives, institutions, organizations, activities and people that help ensure products and services meet the requirements of customers” [18]. Although quality infrastructures are not exclusively based on ISO Standards, ISO standards form a critical part and therefore provide an important mechanism to codify and institutionalize knowledge [19].

2.2. ISO Standards and Food

ISO Standards for food (numbering about 1600 standards) are designed to create confidence in food products, improve agricultural methods, and promote sustainable and ethical purchasing [13]. The standards cover a number of areas including food products, food safety management, and other food systems-related domains, as well nutritional and safety testing, quality, packaging, and traceability. The development of standards is managed by various committees and subcommittees. A list of the most important committees and key standards that were developed by these committees is provided in Table 1, which was developed based on the information provided in the recent *ISO and Food* report [8]. Table 1 also includes sustainability-focused standards that are developed by other committees. Although not primarily focused on food, these standards are often promoted by ISO as part of the list of standards that contribute to SDG 2 [13].

Table 1. ISO Standards for Food.

Typology of Food Systems Standards	Committees	Key Standards
Food products	ISO/TC 34, Food products ISO/TC 34/SC 5, Milk and milk products ISO/TC 34/SC 4, Cereals and pulses	ISO 20633, Infant formula and adult nutritionals—Determination of vitamin E and vitamin A by normal phase high performance liquid chromatography
Food safety management	ISO/TC 34/SC 17, Management systems for food safety	ISO 22000, Food safety management systems—Requirements for any organization in the food chain
Microbiology	ISO/TC 34/SC 9, Microbiology	ISO 16140, Microbiology of the food chain—Method validation
Fisheries and aquaculture	ISO/TC 234, Fisheries and aquaculture	ISO 12875, Traceability of finfish products—Specification on the information to be recorded in captured finfish distribution chains ISO 12878, Environmental monitoring of the impacts from marine finfish farms on soft bottom
Essential oils	ISO/TC 54, Essential oils	No standards are listed on the ISO website
Starch and its by-products	ISO/TC 93, Starch (including derivatives and by-products)	No standards are listed on the ISO website
Sustainability	ISO/TC 207, Environmental Management ISO/TMBG Technical Management Board—groups ISO/TC 34, Food products ISO/TC 34/SC 18 Cocoa	ISO 14001 Environmental management systems—Requirements with guidance for use ISO 26000:2010, Guidance on social responsibility ISO 20400:2017, Sustainable procurement—Guidance ISO/TS 26030:2019, Social responsibility and sustainable development—Guidance on using ISO 26000:2010 in the food chain ISO 34101-1:2019, Sustainable and traceable cocoa—Part 1: Requirements for cocoa sustainability management systems

2.3. Sustainable Development Goals (SDGs)

A widely accepted definition of *Sustainable Development* is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [20]. The use of this definition focuses on intra- and intergenerational equity. The definition implies a continued emphasis on economic growth, while also requiring a greater focus on equity, which could include providing greater resources to the poor and encouraging effective citizen participation [21]. Furthermore, this concept also implies limits imposed by the present state of technology and social organization on environmental resources, as well as by the ability of the biosphere to absorb the effects of human activities [21]. Thus, defining a unified set of SDGs is challenging, especially when there can be conflict between individual goals, such as energy provision and climate-change, particularly with the human population set to rise to 9 billion by 2050 [22].

In September 2015, the United Nations (UN) General Assembly adopted 17 Sustainable Development Goals (SDGs) as an integral part of the 2030 Agenda for Sustainable Development [23]. The SDGs mark a historic shift for the UN towards one sustainable development agenda, finally integrating economic and social development with environmental sustainability, as well as placing sustainability goal-setting at the center of global policy and governance [23]. The SDG agenda addresses critical aspects of sustainable development related thematic issues, including water, energy, climate, oceans, urbanization, transport, science, and technology. The goals are conceptualized by individual targets and indicators that serve to monitor progress and that progress is reported through the UN’s website and through UN’s reports.

2.4. Sustainability Development Goal 2—Zero Hunger

Throughout the world, more than 820 million people suffer from daily hunger and this number has been slowly increasing in the past three years [24]. The problems with malnutrition and food availability are further exacerbated by the COVID-19 pandemic [25]. The UN report of the Secretary-General *Progress towards the Sustainable Development Goals* suggests that small scale producers were hit particularly hard by the pandemic and points out that sharp increases in food prices were concentrated largely in sub-Saharan Africa and that “aid to agriculture in developing countries fell, from nearly 25 per cent of all donors’ sector-allocable aid in the mid-1980s to only 5 per cent, in 2018” [26]. Apart from hunger and malnutrition, the world is also facing the growing threat of people being overweight and obese [1].

Hunger and food insecurity are the products of a complex set of factors, including climate-related triggers (e.g., drought, flood, cyclone), which are often further exacerbated by economic hardship and conflict [1]. SDG 2 aims to “end hunger, achieve food security and improved nutrition and promote sustainable agriculture” [27]. SDG 2 *Zero hunger* is operationalized by eight targets [28]. The overview of the targets (based on information from UN’s website [29]) is provided in Table 2.

The SDG 2 Targets combine broad societal issues (i.e., undernourishment), industry related issues (i.e., agricultural productivity), and international trade (i.e., prevention of trade restrictions and distortions in world agricultural markets as in Target 2b). ISO Standards, however, are mainly developed for industry by industry (as per our discussion in Section 2.2). Therefore, ISO standards are most directly aligned with Targets 2.3 and 2.4 as both of these targets focus on industrial aspects (processes) to achieve zero hunger. For instance, ISO 22000 for food management systems is a standard that directly addresses the need for increased productivity and food safety. Likewise, the ISO 14001 standard for Environmental Management Systems implicitly addresses the need for sustainable agriculture. On the other hand, there are no standards that would directly address large scale societal targets, such as reducing prevalence of undernourishment. For this reason, we focus on Targets 2.3 and 2.4 (see Table 2 for further details).

Table 2. SDG 2 Targets.

SDG 2 Targets	Indicators	Linkages between ISO Standards and the SDG 2 Targets
2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	2.1.1 Prevalence of undernourishment 2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)	The linkage is indirect, no standard directly addresses the issues of undernourishment and food insecurity
2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons	2.2.1 Prevalence of stunting (height for age <−2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age 2.2.2 Prevalence of malnutrition (weight for height >+2 or <−2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight)	The linkage is indirect, no standard directly addresses the issues of malnutrition
2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	2.3.1 Volume of production per labor unit by classes of farming/pastoral/forestry enterprise size 2.3.2 Average income of small-scale food producers, by sex and indigenous status	Direct link, ISO standards address agricultural productivity. ISO standards do not directly address income distribution in agri value chains
2.4 By 2020, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of agricultural area under productive and sustainable agriculture	Direct link, ISO standards address sustainability and agricultural practices value chains
2.5 By 2030, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed	2.5.1 Number of plant and animal genetic resources for food and agriculture secured in either medium or long-term conservation facilities 2.5.2 Proportion of local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction	Indirect link, ISO standards do not provide standards to maintain genetic diversity

3. Theoretical Background and Operationalization of the Study

3.1. Theoretical Perspectives in Standardization Research

Academic research utilizes a broad set of theoretical perspectives to investigate various phenomena related to standards [30]. Based on the review of theoretical perspectives by Tuczec, Castka and Wakolbinger [30], the research is dominated by nine theoretical perspectives (Institutional Theory, The Resource Based View, Attitude Theory, Signaling Theory, Diffusion of Innovation Theory, Stakeholder Theory, Organizational Learning Theory, Transaction Cost Theory and High Reliability Theory). In our paper, we leverage two theoretical perspectives that are important in the context of this research—institutional and normative.

The institutional perspective is important in our research as a part of the discussion about the SDG goals focuses on the need for further institutionalization of the SDG agenda. Institutional Theory addresses the emergence, the mode of behaviour, and the collapse of institutions as a result of societal influence and explains why organizations converge and become similar [30–32]. The institutional

perspective is often employed to determine drivers for adoption of standards or to determine the extent to which organizations embed standards in their daily routines [33]. The institutional perspective is also often leveraged in studies that explore ethical issues related to standardization [34] or the legitimacy of the standard development processes [35]—both issues that are highly relevant to the SDG agenda.

The normative perspective is also commonly used in research on standards. By definition, normativity refers to an evaluative standard by which a judgement is made about the outcome or the process. In the context of literature on standards, standards are seen as ‘norms’ or ‘points of reference’ for disparate users and stakeholders. ISO standards represent codified knowledge (that is agreed upon and accepted across the world); hence the standards provide common “reference points” for disparate users and stakeholders. In relation to the pursuit of the SDGs, both theoretical perspectives are important in determining the potential of ISO standards to contribute to the SDGs. The normative perspective is useful in assessing the potential of ISO standards (and ISO as an organization) to facilitate progress towards the SDGs by providing, modifying, or developing instruments (standards) to achieve the targets. For instance, the SDGs and their targets could require clarification and codification that could be achieved through the development of ISO standards. As Gil, Reidsma, Giller, Todman, Whitmore and van Ittersum [14] suggest, some SDG targets are not explicit enough and therefore could benefit from further fine-tuning through ISO Committees. From the institutional perspective, the quality infrastructure around ISO standards can provide a platform to monitor the use of standards for the benefit of the SDGs. The institutional perspective is therefore a useful perspective in determining the potential of ISO standards as being effective “agents of change”. For instance, in some countries ISO standards are well embedded in national quality infrastructures, while in other countries this is to a lesser extent. Therefore, the level of the “quality” of quality infrastructure also affects the potential of ISO standards to address the SDGs. We leverage these perspectives further in other discussions later in the paper.

3.2. Operationalization of the Research Approach

In general, standards related research is operationalized through the lenses of adoption, impact, and governance [11]. These perspectives essentially address the role and functioning of standards: development of standards, who adopts standards and why, the impact of standards—as measured by, for instance, financial performance [36] or health & safety performance of adopting firms [37]—and issues related to governance—such as effectiveness of monitoring mechanisms [34]. Collectively, these perspectives provide an umbrella to investigate standards and this approach has been also adopted for conceptualization of this study.

Table 3 provides an overview of units of analysis used in this research and explains the research questions related to each unit of analysis. We determine and employ four units of analysis: ISO Standards Development, Adoption of ISO standards, Agricultural productivity of firms that adopt ISO standards, and Governance of ISO Standards. In determining these research units of analysis, we were guided by the objectives from SDG 2’s targets. For instance, Target 2.3 focuses on agricultural production, which is linked to an ‘impact’ perspective as discussed above. Importantly though, instead of investigating the impact of standards in general (as previous literature often does), we investigate whether ISO standards specifically improve agricultural productivity. In other words, we study each research unit of analysis specifically in relation to the core issues of SDG 2.

Table 3. Conceptualization of the study.

Unit of Analysis	Research Question	Relation to the SDG 2/Rationale
ISO Standards Development	RQ 1: Do ISO standards provide a platform to develop standards that are aligned with SDG 2 targets?	Advancement of the SDG 2 goals and targets requires a mechanism to develop standards that support their realization
Adoption of ISO standards	RQ 2: To what extent do small-scale food producers adopt ISO standards? Do they benefit from the adoption?	Small farms and wellbeing of local communities and indigenous people is central to Targets 2.3 and 2.4
Agricultural productivity of firms that adopt ISO standards	RQ 3: Does adoption of ISO Standards lead to improved agricultural productivity?	Improved agricultural productivity is central to Target 2.3; especially by small scale food producers
Governance of ISO Standards	RQ 4: Do the institutions associated with monitoring of ISO standards provide a platform for institutionalization of SDG 2?	Advancing the SDG 2 goals and targets requires a mechanism to institutionalize sustainable food production systems and develop resilient agricultural practices

3.3. Sample of Standards

ISO has developed over 1600 standards for food [5]. In the recent report, *ISO & SDGs: Contributing to the UN Sustainable Development Goals with ISO standards* [13], ISO singled out four standards of particular importance. On its website, as of 13 September 2020, ISO provides a list of a total of 77 standards that contribute to SDG 2 [38]. In our systematic literature search, we have included all these standards. As we report later, we found that the most papers are related to a narrow set of standards, with the greatest emphasis on ISO 22000, ISO 26000, and ISO 14001. The full list is provided in Appendix A.

3.4. Search Procedure

Our search procedure follows a standard approach used in systematic literature reviews: we defined the search protocol, retrieved the documents, determined criteria by which papers were included or excluded, and clarified the analytical processes by which the papers are reviewed [39,40]. The articles for this review were obtained from the ProQuest database—the largest multidisciplinary, full-text database available. We searched for peer reviewed articles in English—the search was conducted on 13 September 2020. In our search, we used a set of 77 ISO standards related to SDG 2. To obtain as many relevant articles as possible, we shortened the full names of standards; for instance, instead of searching for “ISO 34101-1:2019” or “ISO 34101-2:2019”, the search was simplified as “ISO 34101”. We have also recognized that some researchers refer to “ISO 14000”, others to “ISO 14001”. We have therefore used a string “ISO 1400*”. The full search protocol is disclosed in Table 4, the search string “(All standards)” contains a list of all 77 standards (see Appendix A).

In line with Macpherson and Holt [40], we used a set of string searches that relate to our search sample. For each search sample, we used a set of 77 standards and a combination of key words (as disclosed in column ‘Search String’ in Table 4). The combination of keywords in the search string was determined based on the research questions as discussed in Table 3. For instance, in searching for “Agricultural productivity of firms that adopt ISO standards”, we used a string (“productivity” OR “production” OR “income”) AND (“food” OR “agribusiness”). The details are provided in Table 4.

Table 4. Search Protocol.

Search Sample	Objective	Scope	Search String	of Entries	of Relevant Entries
Scope of research on ISO standards	To provide descriptive statistics about the research studies	Abstract, Scholarly journals, Peer-reviewed, English, search on Sep 13, 2020; publication date 'all'	(All standards)	949	949
ISO Standards Development	To address RQ1	Abstract, Scholarly journals, Magazines, Peer-reviewed, English, search on Sep 13, 2020; publication date 'all'	(All standards) ("standard development" OR "committee")	17	15
Adoption of ISO standards	To address RQ2	Abstract, Scholarly journals, Peer-reviewed, English, search on Sep 13, 2020; publication date 'all'	(All standards) AND ("adoption" OR "benefits") AND ("food" OR "agribusiness")	14	12
Agricultural productivity of firms that adopt ISO standards	To address RQ3	Abstract, Scholarly journals, Peer-reviewed, English, search on Sep 13, 2020; publication date 'all'	(All standards) AND ("productivity" OR "production" OR "income") AND ("food" OR "agribusiness")	15	13
Governance of ISO Standards	To address RQ4	Abstract, Scholarly journals, Magazines, Peer-reviewed, English, search on Sep 13, 2020; publication date 'all'	(All standards) AND ("governance")	8	7

3.5. Analytical Procedure

The search procedure on all 77 standards yielded a total of 949 articles. This data set was used to determine which standards have been covered in the literature and no further analysis was performed. The in-depth analysis was conducted on a set of 47 articles that were identified in searches that addressed our research questions (as per Table 3). The analysis of each of those articles was guided by the research questions listed in Table 3. For instance, the analysis of articles on *Agricultural productivity of firms that adopt ISO standards* was guided by the research question "Does adoption of ISO Standards lead to improved agricultural productivity?" Whilst analyzing the articles, we collected notes on the evidence (such as whether the article reports favorable results, how productivity is measured, what are the limitations of the research, etc.) so that we could answer each research question. Similar processes were followed for all research questions.

4. Findings

The literature has lamented the lack of breadth of studies on ISO Standards [11]. Research often focuses on a relatively narrow set of standards, such as ISO 9001, ISO 14001, ISO 22000, and, more recently, ISO 26000. This has been also the case in our systematic literature review. Apart from these four widely covered standards, there are only 3 other standards in our set of 77 that are covered in the literature. Reini, et al. [41] focuses on the ISO 20400 standard for sustainable procurement and confirms the validity of the standard's elements, a point of shared agreement with Teixeira, et al. [42]. *ISO 19869 Clean cookstoves and clean cooking solutions—Field testing methods for cookstoves* is scrutinized by Arveson [43] as a framework to unravel "the tipping pot problem" of cooking safety (which causes injuries in developing countries). Ten studies use *ISO 19152 Geographic information—Land Administration Domain Model (LADM)* and demonstrate the normative value of this standard for creating on cadasters [44–47]. Next, we turn into the in-depth analysis of our research questions.

4.1. ISO Standards Development

The development of ISO Standards has long been overlooked in the literature. In part, the lack of studies was attributed to the lack of transparency of the standards development process [15,48].

However, the ISO standards development process became more transparent with the introduction of a multi-stakeholder standards development process—which was introduced as part of the development of the ISO 26000 standard for social responsibility [49]. During the development of ISO 26000, data, in the form of stakeholders' comments, was made publicly available. The dataset was used in the first academic studies on the ISO standards development process [48,50]. These studies, however, highlighted that the standards development process is biased towards industry stakeholders and towards participants that have experience with the standards development process. As a result, participants from developing countries tend to have less influence on the decision-making processes.

The literature search conducted in this study identified 15 articles related to the ISO standards development process. The literature demonstrates that ISO standards are widely recognized by industry and each revision is carefully scrutinized—especially within the community of quality practitioners [51]. ISO Standards are frequently set as reference points [52] and the credibility of the standards development process is often legitimized by the robust committee structure [53]. The standards development process is also coordinated between committees. This coordination results in opportunities for integration of various standards, which can benefit end users [54]. For example, the integration of ISO standards has been discussed in the context of ISO 14001 and ISO 9001 [55], as well as in relation to the Sarbanes-Oxley Act [56]. The articles also demonstrate that the committee processes facilitate continuous improvement of existing standards [57] and that the revision process is publicly debated [58].

Although the literature provides some insight into ISO standards development, the effectiveness of both the standard development process and the involvement of underrepresented stakeholders is rarely addressed. Apart from the above-mentioned studies into the development of ISO 26000 [48,50], most of the other literature provides a process-oriented analysis of the ISO standards development process. The literature does not cover ISO Standards development related specifically to food (i.e., ISO 22000) and agribusiness (i.e., development of standards on sustainability and resilience). There is also a lack of research related to issues of malnutrition and how the ISO standards development processes might serve to address malnutrition and matters related to SDG 2 Targets 2.1 and 2.2. Despite these shortcomings in empirical evidence about the standards development process, the capabilities to develop standards and the infrastructure that is already in place could provide valuable to the SDG agenda. We conclude that:

Proposition 1. *The ISO standards development processes is well established and could provide a platform to develop new standards to achieve the SDG 2 targets.*

4.2. Adoption of ISO Standards

Adoption of ISO standards has been widely covered in the literature [11]. Broadly, the literature focuses on adoption at the firm level (e.g., reasons for adoption), as well as at the macro level (e.g., why and how standards diffuse). Adoption of standards in the context of SDG 2 is particularly important in the context of Target 2.4. Target 2.4 aims to achieve adoption of 'sustainability' and 'resilient' practices. As part of Target 2.4, the emphasis is particularly put on adoption of irrigation systems and on fertilizer use, even though this emphasis is questioned by some as quite narrow [14]. Another important question is about the adoption of ISO standards amongst small scale producers.

We found 12 papers that cover various aspects of implementation in the context of the food and agribusiness sectors. In general, the most emphasis is placed on ISO 22000 and many studies concluded that adoption is more challenging and less likely in small companies [59,60]. Small scale producers are in general less likely to seek ISO certification, which is in part attributed to 'organisational readiness' of small producers [59,61], cost [59,62], and lack of knowledge [62]. However, studies also show that even in the context of small scale producers, ISO standards can serve as a springboard of adoption of multiple productivity enhancing principles—such as lean or requirements of multiple standards [63]. Adoption is driven by external (i.e., pressure from customers) and internal motives (i.e., seeking improvements in operations), and these motives often overlap [64]. Escanciano and Santos-Vijande [65]

assert that ISO 22000 is used across the value chain and point out that the reasons for adoption do not significantly differ between small and large firms. Massoud, et al. [66] assert that food companies are more concerned with adoption of food safety rather than sustainability practices. Few companies in Africa (except for those that are large and focused on exports) have adopted ISO 22000 [67].

The literature underlines the global adoption of ISO standards whilst pointing out the difficulties for adoption of ISO standards for small scale producers. The research, however, tends to be grounded in the context of food firms and provides far less insight into entire agribusiness value chains. The studies do not address the matters that are central to SDG 2, such as adoption of sustainability and resilience practices. We conclude that:

Proposition 2. *ISO standards are less adopted by small scale producers and in developing countries; adoption of standards (at the moment) amongst these groups limits the potential of ISO standards to contribute to the SDG agenda.*

4.3. Agricultural Productivity of Firms that Adopt ISO Standards

The impact of ISO standards is widely researched. Previous studies have investigated the impact in terms of financial performance, operational performance, and numerous other performance indicators [11]. Even though there is discrepancy of findings across the measures and across the individual studies, on balance, the results suggest a positive impact of standards [7,11].

Agricultural productivity is key to Target 2.3. In general, productivity is defined as a ratio of outputs to inputs. In the agricultural context, output is usually measured by the market value of the produce, while the input can be measured by, for instance, in terms of labor or land (crop yield) [14]. We have identified 13 papers that broadly address this topic. The papers are mostly focused on the impact of ISO 22000 on food production systems [64,65,67–69] and investigate the processing and distribution of food rather than focusing on agricultural processes. ISO 22000 is reported to positively affect the implementation of codified processes [68]. It is also reported to provide a platform for implementation of other key processes in food production—such as critical control points [70] or Hazard Analysis and Critical Control Point (HACCP) [71]—and also in providing conceptual guidance (i.e., decision trees that are specified in the standard) [70]. In these papers, the authors point at the *indirect* impact of ISO standards on productivity in food systems. The direct impact is determined by relatively few studies. Zimon, Madzik and Domingues [68] point out that ISO 22000 leads to improvements in food quality and waste minimization. This point is also made by Escanciano and Santos-Vijande [65], who attribute improvements in efficiency and food safety to ISO 22000 as well. Based on a review of the literature, Panghal, Chhikara, Sindhu and Jaglan [69] conclude that “ISO 22000 along with its sister standards are auditable, reliable, and reasonable to ensure safe production, distribution, and consumption of food.” Salim, Padfield, Chew, Syayuti, Papargyropoulou and Mun Hou [62] assert that the standards have a greater positive impact on larger firms, as smaller firms benefit less due to high implementation cost and lack of knowledge about the requirements of the standards. Păunescu, Argatu and Lungu [64] propose that the main impact is in terms of provision of safer products by reduction of illnesses and other risks. Kussaga, Jaxsens, Tiisekwa and Luning [67] attribute, in part, food contamination in African food-processing firms to low uptake of ISO 22000 and HACCP.

It is notable that none of the papers reviewed provides a clear-cut analysis of agricultural productivity. The studies show improvement in food safety and productivity (i.e., ISO 22000). However, SDG targets are more specific (i.e., preparedness for climate change; progressive improvement of land and soil quality, etc.). Studies that would determine, for instance, the impact of ISO standards on land yield, are missing. There is also a lack of studies that would shed light on the impact of ISO standards on income of small-scale producers. It is also unclear if (and how) ISO standards can address the need to “double the agricultural productivity” (as per Target 2.3) as well as if (and how) ISO standards guide firms toward improved capabilities to adapt to climate change or other sustainability performance

related aspects. Target 2.4 is focused on the development and implementation of food production systems, which not only increase productivity, but also strengthen the capabilities of the food sector to adapt to climate change and improve land and soil quality. We therefore propose the following:

Proposition 3. *ISO standards can contribute to improved productivity of adopting firms and therefore have the potential to address SDG 2.*

4.4. Governance of ISO Standards

Broadly speaking, governance of standards refers to control mechanisms that ensure consistent adoption and monitoring of standards across the world [72]. Governance of ISO standards is ensured by the network of accreditation bodies, certification bodies, and auditors that form an essential part of quality infrastructure across the globe. The development of this infrastructure started after World War II, but the governance of ISO standards has been scarcely covered in the literature [73]. While an increasing number of papers has recently appeared, these studies tend to concentrate on quality or environmental standards rather than standards related to food.

Our search identified 7 papers that discuss the governance of ISO standards in the context of food standards. Panghal, Chhikara, Sindhu and Jaglan [69] argue that the ISO 22000 standard for food management systems provides a framework for an “internationally harmonized system.” Particularly notable is the incorporation of critical hazard points in this standard, which is also an essential element of other standards as well as domestic regulations, and a presence of a global network of conformity assessment services. Both of these elements ensure that food safety and food quality is consistent across the globe. Though ISO 22000 certified firms often show fewer non-conformities in comparison to other non-ISO based standards [74], ISO 22000 audits also report an alarming number of non-conformities—especially in the meat industry and in small companies [74].

Overall, the studies reviewed provide limited insight into the governance of ISO standards and its effectiveness. In particular, there is a lack of understanding of the effectiveness of quality infrastructure related to standards addressing SDG 2 and its effectiveness in developing countries. Furthermore, fraud, conflict of interest, inconsistencies in audits and other ethical issues can sometimes compromise ISO standards’ governance and may result in problematic outcomes, such as certification of substandard firms. However, these widely acknowledged issues should not alone discourage the use of ISO standards as a platform for implementing SDG 2 [34]. After all, the infrastructure behind the governance (i.e., accreditation and certification) provides an important foundation on which to build implementation of the SDG agenda. Finally, small scale producers and indigenous communities also need more attention in the broader question of effectiveness of governance. The governance mechanisms that might be more suitable to larger firms and follow technocratic approaches need to be modified and changed, such as less complex requirements and recognition of unique practices amongst indigenous communities [75]. Notwithstanding those issues, we propose the following:

Proposition 4. *The ISO infrastructure of certification bodies, accreditation bodies, and auditors provides a potential platform to institutionalize the SDG agenda.*

5. Discussion

Understanding the role of ISO standards in terms of standards development, adoption, impact of agricultural productivity, and governance of standards is important in determining the role of ISO standards in the pursuit of the SDG agenda. The systematic review on this topic revealed that, on the one hand, ISO standards provide a global platform to develop standards and to enforce (monitor) processes and performance of firms and industries. On the other hand, the paper also revealed that standards development is industry-centric and that the adoption, impact, and governance patterns are inconsistent. Furthermore, the SDGs and its associated targets are very broad—some targets are associated with improved firm performance, others are very generic (e.g., ending hunger as per

Target 2.1). Given the industry-based nature of ISO standards, targets related to improved firm-level performance are a clear match with existing ISO standards. For instance, Targets 2.3 and 2.4 are clearly aligned with the content of the most important standards, such as ISO 22000 or ISO 14001. On the other hand, Target 2.1, for instance, “end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round” is probably more suited for a policy-based discussion that extends well beyond the industry focused standardization that ISO standards currently provide. The main findings and research gaps from the literature are presented in Table 5.

Table 5. Summary of Research Findings.

Research Unit of Analysis	Findings	Research Gaps	Propositions
ISO Standards Development	Standards Committees operate based on clearly defined processes and based on the expertise and consensus of nominated experts Standards committees are dominated by industry with relatively low levels of involvement of other stakeholders	Lack of research of the effectiveness of standards development processes of standards that are central to the pursuit of SDG 2 and its targets (as per the list Appendix A) Lack of research on the inclusion and influence of underrepresented stakeholders as well as developing countries that are most affected by malnourishment or low levels of agricultural productivity	The standards development processes are well established and could provide a platform to develop new standards to achieve the SDG 2 targets.
Adoption of ISO standards	Global uptake of ISO standards yet low adoption in developing countries Small firms find adoption difficult and burdensome	Lack of research on factors that mediate the adoption of ISO standards in small farms and agribusinesses Lack of research on adoption of sustainability and resilient practices and how ISO standards enable adoption of sustainable practices (Target 2.4) Lack of research on the role of ISO standards on adoption of practices that enable maintaining of genetic diversity, plant banks and other targets (Target 2.5)	ISO standards are less adopted by small firms, and in developing countries, adoption of standards (at the moment) amongst these groups limits the potential of ISO standards to contribute to the SDG agenda
Agricultural productivity of firms that adopt ISO standards	The research suggests (on average) that there is improved productivity	Lack of research that addresses the role of ISO standards in improving agricultural productivity specifically Lack of evidence on the impact of standards on average income of small-scale producers	ISO standards can contribute to improved productivity of adopting firms and therefore have the potential to address SDG 2
Governance of ISO Standards	ISO standards are widely adopted across the globe and are supported by a complex quality infrastructure that is harmonized across the globe The quality infrastructure is suited for larger firms Ethical issues are raised and seen as problematic	Lack of research on the role of ISO standards and quality infrastructure in achieving SDG 2 or SDGs in general Lack of research to address the ethical and effectiveness of quality infrastructure in the developing world Lack of research of how the governments, NGOs and other institutions can collaborate with ISO to institutionalize standards for the benefit of the SDG agenda	The ISO infrastructure of certification bodies, accreditation bodies and auditors provides a potential platform to institutionalize the SDG agenda

At the outset of the paper, we anchored our analytical approach in normative and institutional perspectives. Throughout the analysis, we have demonstrated how these two perspectives assist in understanding of the potential of ISO standards to address the SDGs. The normative perspective is in particular important in the discussion on the targets. The ongoing discussion on whether the targets are conceptually clear, quantifiable, and universally relevant suggests that the normative development of the SDGs is still being challenged [14]. Such discussion is, however, similarly challenging in the domain of ISO standards [73], as well as other policy setting environments, such as crime prevention standards [76]. In the context of ISO Management System Standards, for instance, standards determine key elements of ‘a system’ and often lack the concept of ‘targets’ altogether. On the one hand, such an approach could be seen as innovative: lack of particular targets (and focus on elements of a system) allows for a general applicability and the setting of context specific norms [77]. On the other hand,

lack of specific targets also allows for free-riding and using standards for legitimizing purposes. Clearly, the normative processes behind the setting of targets and standards are far from conclusive and will be subject of further discussions. The institutional perspective is important for explaining the processes that lead to the institutionalization of the principles of the SDG agenda and in embedding the changes necessary for achieving SDG goals. Similarly, the parallels between ISO standards and the SDG agenda are striking. In both cases, the institutionalization processes are complex and challenging at several levels. For instance, institutionalization of a standard and/or a policy is accompanied by its 'translation' or 'interpretation' [11,76], which often leads to modifications and variations [78]. Such variation is also observable in the monitoring of standards and targets [79,80] even with the improvements in monitoring approaches and technologies such as Big Data [81].

Given the abovementioned challenges and uncertainties, there are numerous avenues for future research on the role of ISO Standards in the pursuit of SDG 2 and the other SDGs. First, the research needs to explore the role of ISO standards in the pursuit of the SDGs at three levels: global, national, and industry. The studies can consider for instance, how various stakeholders (individually or in partnerships) use ISO standards to drive, institutionalize, and report on the SDG agenda. Limited evidence suggests that ISO standards already play a role in reporting on SDG progress [82], yet more focused work is needed in this area, especially in distilling the role of ISO standards in the institutionalization of the SDG agenda. Second, there is need to focus on the role of ISO standards in achieving specific SDG targets.

For instance, target 2.4 aims to enhance the adoption of sustainable and resilient agricultural practices. Future research might scrutinize the role of ISO standards in achieving this target, as well as others, while also considering contextual factors, such as achieving the targets in different industries and in developing countries. Achieving SDG 2 requires policy coherence and respect for the rights, needs, and demands of vulnerable groups—which might be problematic in authoritarian regimes and countries with a long history of famines, high levels of malnutrition, and vulnerable domestic economies [1]—also an area for future research. Future research should also explore contingencies such as underdeveloped quality infrastructure and its impact on the influence and effectiveness of ISO standards in advancing the SDG agenda. An overarching question guiding such research could be: To what extent should the role of ISO standards differ in different contexts? This might lead to questions such as: How should the quality infrastructure be developed so as to further support the SDGs and their associated targets? It is also important to acknowledge that achieving any SDG targets would not be the role of ISO standards alone. More informed discussion and empirical evidence is needed on the role of multiple standards and multiple stakeholders in achieving the SDGs and their targets.

Third, future research could study gaps in existing standards, and the extent to which such gaps could be addressed through modification of existing standards and/or the development of new standards. A key question in the modification or development of any standard will be where and how stakeholders should be involved in those processes. The expected performance to be achieved through the implementation of any standard will also need to be considered. For example, research might explore whether ISO standards can assist in the achievement of performance-based outcomes, such as ensuring incomes of small-scale food producers? Standards for nutrition and malnutrition might also need further revision to support SDG 2, particularly since it assumes an increased attention to healthy and sustainable diets. Most countries face some form of malnutrition and sub-optimal diets, which are a major cause of various forms of hunger [1]—researchers might explore if ISO standards are best positioned to address such issues? Finally, technology plays an increasingly important role in everyday life (e.g., Internet of Things) and industrial development [83]. Technologies are also increasingly important in facilitating standardization and certification [84,85]. For instance, blockchain innovations are used to increase data security and transparency to facilitate many difficult aspects of (international) law enforcement, which in turn, support international climate finance transfers [86]. Researchers might

explore how such technologies can enhance the effectiveness of ISO standards and the pursuit of the SDG agenda, as well as investigating the use of Big Data in reporting on the SDG targets [81].

6. Conclusions

ISO standards are globally adopted standards that significantly influence international business. ISO standards therefore could play a significant role in achieving the SDGs. In this paper, we have discussed the role of ISO standards in relation to SDG 2 in terms of ISO standard development, adoption of ISO standards, agricultural productivity, and governance. We have also discussed gaps in the research to encourage the research agenda on understanding of the role of ISO standards in the pursuit of UN SDGs.

The paper highlights a great potential for ISO standards to play a significant role in pursuing the SDG agenda. Yet for that potential to materialize, some key aspects of ISO standards and the ISO infrastructure need to be modified to fit the SDG agenda or need to be combined with other institutional mechanisms. The ISO standards development process, for instance, is industry dominated and lacks consultation and stakeholder mobilization beyond the existing committees and beyond existing participating institutions [48]. If ISO standards are to play a more significant part of the UN SDG agenda, this issue would need to be addressed. Lack of transparency and lack of inclusiveness are, of course, non-congruent with the spirit of the SDG agenda. At the same time, it might be unrealistic to expect that the ISO standards development processes can be changed and perhaps, other mechanisms (outside of ISO) can be used to provide wider stakeholder platforms for a dialogue.

Our research also has implications for practice and for any stakeholders that are involved in the SDG agenda, being individual firms, industry consortia, policy makers, or NGOs. All of these stakeholders can build on the interlinkages of ISO standards and the SDGs discussed in this paper. The paper explains the role of ISO Standards and clearly demonstrates the importance of these standards in industrial processes (locally and in international trade). This is particularly important for policy makers that are drafting policies which aim to meet the SDG goals and targets. Policy makers might find ways to encourage the use of ISO standards to enhance collaboration in global supply chains and bring small producers (especially from developing countries) into those supply chains. As we discuss in Sections 4 and 5, however, such policies need to consider the limitations of ISO standards and be accompanied by investments that help small producers adopt the requirements of the standards. The existing infrastructure of auditors, certifiers, and accreditors can also play a role in reporting progress towards the SDG goals and targets, though it is clear that further development to align such infrastructure needs to be explored. Finally, we would also like to encourage the main actors (i.e., the UN and ISO) to fund future research in the areas outlined in this paper.

The main contribution of this paper is in providing an analytical approach to determine the potential of ISO standards to address SDG 2. The key limitation of our work is that we have not addressed the full spectrum of standards for all SDGs. We have also limited our research to standards developed by ISO, though we acknowledge a combination of standards from other standards developers could further deepen the analysis. At the same time, we envisage that a similar approach can be used to address the role of ISO standards (or standards from other developers) for the entire SDG agenda. We have also listed a number of research questions that are needed to further shift our understanding of the linkages between ISO standards and the SDGs. These questions are broadly linked to the main units of research analysis (Table 5). Most importantly, we call for future research at the global, national, and industry levels, which is dearly needed to form more nuanced approaches for embedding ISO standards to the SDGs.

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Appendix A

Table A1. List of ISO Standards Related to SDG 2.

IWA 29:2019	Professional Farmer Organization—Guidelines
ISO/IEC WD 3532-2	Information technology—3D Printing and scanning—Medical image-Based modelling—Part 2: Segmentation
ISO/AWI 4214	Determination of amino acids in infant formula and other dairy products
ISO/WD 4907-1	Plastics—Ion exchange resin—Part 1: Determination of exchange capacity of acrylic anion exchange resins
ISO/WD 4907-2	Plastics—Ion exchange resin—Part 2: Determination of water content for anion exchange resins in hydroxide form
ISO/WD 4907-3	Plastics—Ion exchange resin—Part 3: Determination of exchange capacity of anion exchange resins in hydroxide form
ISO/WD 5020	Waste reduction and treatment on fishing vessels
ISO/AWI 7851	Fertilizers and soil conditioners—Classification
ISO/WD 8157	Fertilizers, soil conditioners and beneficial substances—Vocabulary
ISO/DIS 8196-3	Milk—Definition and evaluation of the overall accuracy of alternative methods of milk analysis — Part 3: Protocol for the evaluation and validation of alternative quantitative methods of milk analysis
ISO 14001:2015	Environmental management systems—Requirements with guidance for use
ISO/WD 14068	Greenhouse gas management and related activities—Carbon neutrality
ISO 16075-1:2015	Guidelines for treated wastewater use for irrigation projects—Part 1: The basis of a reuse project for irrigation
ISO 16075-2:2015	Guidelines for treated wastewater use for irrigation projects—Part 2: Development of the project
ISO 16075-3:2015	Guidelines for treated wastewater use for irrigation projects—Part 3: Components of a reuse project for irrigation
ISO 16075-4:2016	Guidelines for treated wastewater use for irrigation projects—Part 4: Monitoring
ISO/DIS 16075-5	Guidelines for treated wastewater use for irrigation projects—Part 5: Treated wastewater disinfection and equivalent treatments
ISO/DIS 16075-5	Guidelines for treated wastewater use for irrigation projects—Part 5: Treated wastewater disinfection and equivalent treatments
ISO/CD 16119-5	Agricultural and forestry machinery—Environmental requirements for sprayers—Part 5: Aerial spray systems
ISO 16541:2015	Methods for sea lice surveillance on marine finfish farms
ISO/DIS 18363-4	Animal and vegetable fats and oils—Determination of fatty-acid-bound chloropropanediols (MCPDs) and glycidol by GC/MS—Part 4: Method using fast alkaline transesterification and measurement for 2-MCPD, 3-MCPD and glycidol by GC-MS/MS
ISO 18,400-205:2018	Soil quality—Sampling—Part 205: Guidance on the procedure for investigation of natural, near-natural and cultivated sites
ISO/WD TS 19124-1	Geographic information—Calibration and validation of remote sensing data and derived products—Part 1: Fundamentals
ISO 19144-1:2009	Geographic information—Classification systems—Part 1: Classification system structure
ISO/AWI 19144-2	Geographic information—Classification systems—Part 2: Land Cover Meta Language (LCML)
ISO 19144-2:2012	Geographic information—Classification systems—Part 2: Land Cover Meta Language (LCML)
ISO/AWI 19144-3	Geographic information—Classification systems—Part 3: Land Use Meta Language (LUML)
ISO/AWI 19152-1	Geographic information—Land Administration Domain Model (LADM)—Part 1: Fundamentals
ISO 19152:2012	Geographic information — Land Administration Domain Model (LADM)
ISO 19747	Fertilizers and soil conditioners—Determination of monosilicic acid concentrations in nonliquid fertilizer materials
ISO 19867-1:2018	Clean cookstoves and clean cooking solutions—Harmonized laboratory test protocols—Part 1: Standard test sequence for emissions and performance, safety and durability
ISO/TR 19867-3:2018	Clean cookstoves and clean cooking solutions—Harmonized laboratory test protocols—Part 3: Voluntary performance targets for cookstoves based on laboratory testing
ISO 19869:2019	Clean cookstoves and clean cooking solutions—Field testing methods for cookstoves
ISO 20400:2017	Sustainable procurement—Guidance
ISO 20419:2018	Treated wastewater reuse for irrigation—Guidelines for the adaptation of irrigation systems and practices to treated wastewater
ISO/DIS 20468-4	Guidelines for performance evaluation of treatment technologies for water reuse systems—Part 4: UV Disinfection
ISO/DIS 20468-5	Guidelines for performance evaluation of treatment technologies for water reuse systems—Part 5: Membrane filtration
ISO/DIS 20468-6	Guidelines for performance evaluation of treatment technologies for water reuse systems—Part 6: Ion exchange and electro dialysis
ISO/DIS 20468-7	Guidelines for performance evaluation of treatment technologies for water reuse systems—Part 7: Advanced oxidation processes technology
ISO/CD 20480-3.2	Fine bubble technology—General principles for usage and measurement of fine bubbles—Part 3: Terminology and methods for the generation of fine bubbles
ISO/AWI 20631	Infant formula and adult nutritionals—Determination of total folates content by trienzyme extraction and ultra performance liquid chromatography tandem mass spectrometry (UPLC-MS/MS)
ISO/AWI 20670	Water reuse—Vocabulary
ISO/TR 21276:2018	Clean cookstoves and clean cooking solutions—Vocabulary
ISO 21543:2020	Milk and milk products—Guidelines for the application of near infrared spectrometry
ISO/WD 21,928-2	Sustainability in buildings and civil engineering works—Sustainability indicators—Part 2: Framework for the development of indicators for civil engineering works
ISO/TS 21929-2:2015	Sustainability in building construction—Sustainability indicators—Part 2: Framework for the development of indicators for civil engineering works
ISO 21931-2:2019	Sustainability in buildings and civil engineering works—Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment—Part 2: Civil engineering works

Table A1. Cont.

IWA 29:2019	Professional Farmer Organization—Guidelines
ISO 21939-1:2019	A method to calculate and express energy consumption of industrial wastewater treatment for the purpose of water reuse—Part 1: Biological processes
ISO 22000:2018	Food safety management systems—Requirements for any organization in the food chain
ISO/AWI 22171	Soil quality—Determination of potential cation exchange capacity (CEC) and exchangeable cations buffered at pH 7, using a molar ammonium acetate solution
ISO/AWI 22371	Security and resilience—Urban resilience—Framework, model and guidelines for strategy and implementation
ISO 22519:2019	Purified water and water for injection pretreatment and production systems
ISO/AWI 22519	Purified water and water for injection pretreatment and production systems
ISO/DIS 22948	Carbon footprint for seafood—Product category rules (CFP-PCR) for finfish
ISO/DIS 23043	Evaluation methods for industrial wastewater treatment reuse processes
ISO 23056:2020	Water reuse in urban areas—Guidelines for decentralized/onsite water reuse system—Design principles of a decentralized/onsite system
ISO/FDIS 23070	Water Reuse in Urban Areas—Guidelines for reclaimed water treatment: Design principles of a RO treatment system of municipal wastewater
ISO/DIS 23970	Milk, milk products and infant formulae—Determination of melamine and cyanuric acid by liquid chromatography and tandem mass spectrometry (LC-MS/MS)
ISO/FDIS 24081	Ground cassava leaves (Isombe)—Specification
ISO/AWI 24142	Safety requirements for dry and semi-dry single feed machine, processing systems and complete production line
ISO/DTS 24217-2	Fine bubble technology—Guideline for systematic standardization of fine bubble technologies—Part 2: Assignment of sustainable development goals (SDGs) to fine bubble applications
ISO/CD 24223	Cheese—Guidance on sample preparation for physical and chemical testing
ISO 24261-1	Fine bubble technology—Elimination method for sample characterization—Part 1: Evaluation procedure
ISO/DIS 24261-2	Fine bubble technology—Elimination method for sample characterization—Part 2: Fine bubble elimination techniques
ISO/CD 24,378	Feed machinery terminology
ISO/WD 24683	High fructose syrup—Specifications and test methods
ISO 26000:2010	Guidance on social responsibility
ISO/TS 26030:2019	Social responsibility and sustainable development—Guidance on using ISO 26000:2010 in the food chain
ISO/WD 32210	Framework for sustainable finance: Principles and guidance
ISO 34101-1:2019	Sustainable and traceable cocoa—Part 1: Requirements for cocoa sustainability management systems
ISO 34101-2:2019	Sustainable and traceable cocoa—Part 2: Requirements for performance (related to economic, social and environmental aspects)
ISO 34101-3:2019	Sustainable and traceable cocoa—Part 3: Requirements for traceability
ISO 34101-4:2019	Sustainable and traceable cocoa—Part 4: Requirements for certification schemes
ISO 37101:2016	Sustainable development in communities —Management system for sustainable development—Requirements with guidance for use
ISO/WD 59004	Circular economy—Framework and principles for implementation
ISO/WD 59010	Circular economy—Guidelines on business models and value chains
ISO/WD 59020	Circular economy—Measuring circularity framework

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