

Article

# Technology-enhanced Auditing in Voluntary Sustainability Standards: The Impact of COVID-19

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**Abstract:** The ongoing COVID-19 pandemic has had a significant impact on the certification and auditing services of Voluntary Sustainability Standards (VSS). The traditional approach to auditing—on-site visits—has been significantly curtailed, and it is unclear when, and under what conditions, it might resume in full. The purpose of this paper is to study the initial responses to COVID-19 of leading VSS—a group of 21 standards that are members of ISEAL, a global membership organization for VSS. This is a qualitative study, and data are collected from publicly-available sources (i.e., official announcements, policy amendments, derogations) in order to inductively analyze how individual VSS have adjusted their certification services in response to travel bans and lockdowns. The emphasis of the analysis was understanding the role of technologies in the VSS responses to the COVID-19 crisis. The findings demonstrate significant uptake of remote auditing and information and communications technology (ICT), even though that uptake is constrained by limiting conditions and it is not currently expected by VSS to extend beyond the crisis. Lessons learned from the crisis are discussed, and the potential for remote auditing during this period to encourage the adoption of more advanced technologies (such as artificial intelligence and satellite monitoring) in certification services is explored. A set of research questions to guide future work grounded in the analysis is also provided.

**Keywords:** remote audits; crisis; technology-enhanced auditing; sustainability; standards; certification; COVID-19

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## 1. Introduction

The COVID-19 pandemic has spread across the globe with devastating human and economic consequences [1]. The pandemic has changed the everyday habits of people around the world, and the new realities of lockdowns and social distancing have accelerated the uptake of technologies. The demand for communication software such as Microsoft TEAMS and ZOOM has been unprecedented [2], as hundreds of millions of people have abruptly been required to work remotely from home.

As countries begin to reopen their economies, the early signs suggest that these business practices have already reshaped the ‘new normal’ in the aftermath of the pandemic. For instance, reports from China after its reopening suggest that the way people work is likely to change; new office designs now accommodate rules requiring “six feet” of social distancing, and more corporations are integrating remote working into their daily operations. Importantly, multinational corporations that operate in China (e.g., VW, Starbucks) are scrutinizing the restart there to adjust their operating practices in countries that have not yet reopened [3]. The responses so far suggest that the pandemic is likely to accelerate the adoption of new operational practices, including the adoption of technologies. In this paper, the impact of COVID-19 on the adoption of technologies is investigated in the context

of Voluntary Sustainability Standards (VSS), focusing specifically on the certification and auditing functions of VSS.

VSS are a “collective of organizations responsible for the activities involved in the implementation of a [sustainability] standard, including standard setting, capacity building, assurance, labelling, and monitoring and evaluation” [4]. VSS are non-state actors that create regulations “to improve the social and/or environmental impacts of multinational business, international trade, and/or global production networks” [5]. VSS operate in many industry sectors such as forestry (FSC) and fisheries (MSC), as well in commodity markets such as palm oil (RSPO) and tropical agro-forestry commodities, such as cocoa, coffee, and bananas (Rainforest Alliance and Fairtrade). VSS play a critical role in the pursuit of sustainability goals: VSS define, monitor, and certify sustainability practices, and also facilitate international trade for sustainable products and commodities. VSS have, in many cases, penetrated mainstream markets and their role and impact are significant. For example, sustainable agricultural products “are growing at a pace that exceeds markets for conventional products” [6]; for instance, 23% of the world’s cocoa area is now certified by four VSS standards [6], the VSS-certified area of the global coffee area is estimated at 35.5% on average (an increase of almost 80% between 2011 and 2016), cotton at 10.8% (a fivefold increase between 2011 and 2016), and soy at 2.5% (the certified soybean area increased by almost 50% between 2011 and 2016) based on the data provided in *The State of Sustainable Markets 2018 Report*.

Unfortunately, however, travel restrictions, as well as the practice of social distancing, that have emerged throughout the COVID-19 crisis have affected the very core of VSS’ operations, i.e., on-site auditing and inspections, which are the foundations of VSS certification and accreditation [7]. These activities are not possible, or, at best, severely restricted, during this pandemic. One example is provided by the Marine Stewardship Council (MSC), which explained in its *Guidance for MSC Fisheries CABs relating to the COVID-19 Derogation* that COVID-19 has impacted “certificate holders’ ability to execute audits and assessments in a safe and timely manner.” The MSC further noted that key challenges include “travel restrictions, access to information, availability of scientists, managers and other stakeholders.” In another example, the Rainforest Alliance explains on its website that it considers COVID-19 “to be a situation of force majeure which affects the normal implementation of our certification program. For this reason, a specific policy has been developed to govern exceptions arising from disruptions to audit activities due to coronavirus or public health measures imposed by the authorities in the country of operation.”

As a result of the challenges and restrictions arising from COVID-19, VSS have had to either postpone audits (and extend the validity of existing certifications) or introduce remote auditing. Remote auditing (or remote assessment) is defined as “the facilitation of assessment of a Conformity Assessment Body from a location other than that being physically present” [8] and is enhanced by using information and communication technology (ICT) “for gathering, storing, retrieving, processing, analyzing and transmitting information” [9]. A similar definition is offered by ISO 19011 [10], which states that “remote audits refer to the use of ICT to gather information, interview an auditee, etc., when “face-to-face” methods are not possible or desired”. Remote auditing is a form of technology-enhanced auditing (TEA), which Castka et al. (2020) define as “employing technologies for the purposes of the audit data collection, recording & sharing, and analysis” [11]. It is important to note that VSS do not directly audit organizations interested in obtaining certification to their standards; rather, audits (whether they are remote or on-site) are conducted by accredited arms-length third-parties that assess whether the organization conforms to the VSS’ requirements.

The purpose of this paper is to study the response of VSS to the COVID-19 crisis. The key research question investigated in this study is: *how have individual VSS adjusted their certification services in response to travel bans and lockdowns?* For the purposes of this paper, certification services are defined as providing formal recognition that an organization’s applicable systems, processes, products, services, and/or performance conform to the requirements specified in the VSS. This recognition typically requires passing a certification audit by an accredited arms-length third-party, as well as passing

periodic third-party surveillance audits to ensure the organization remains in conformance with the requirements over time. The analysis is based on data from a set of leading VSS that was collected from publicly-available sources (official announcements, policy amendments, derogations or similar; up to April 30, 2020). The analysis of the responses serves as a springboard to discuss the research question, focusing on what the crisis will mean for the future of VSS and to what extent the crisis will accelerate the uptake of new practices, such as remote auditing or more advanced forms of technology-enhanced auditing [11].

Studying the impact of COVID-19 in the context of VSS and how those VSS have adopted technologies for auditing in response to the crisis is important for several reasons. First, the idea of remote audits has been developing in accreditation and certification services for some time. Yet the uptake of these practices has been slow [12,13]. VSS are generally seen as lagging behind technological trends [14], and, as Herding and Fischer (2015) observe, the “underlying certification process nowadays remains remarkably similar to 20 years ago.” Some VSS have been exploring technologies, while accreditation bodies have been defining the circumstances and considerations under which ICT may be used. For instance, the International Accreditation Forum produced *IAF MD 4:2018*, a document explaining the use of Information and Communications Technology (ICT) for auditing and assessment purposes [9]. The ISEAL innovations fund has also supported many projects exploring the increased use of technology in VSS [15]. It is interesting to study whether VSS have adopted technologies for auditing in response to the pandemic and whether this is viewed by VSS as a temporary measure or something potentially more lasting. Second, organizational responses during crises (caused by exogenous shocks such as natural disasters [16,17]) provide insights into organizational resilience [18] as well as into the future restructuring of industries and operating practices [19]. Moreover, there is very little research to address the role of IT in organizational resilience [20]. The COVID-19 pandemic therefore provides an interesting empirical setting to study the adoption of technologies in auditing. Third, VSS are representative of other certification and accreditation areas, for instance, the ISO 9001 certification for quality management, which is the world’s most widely-applied voluntary management system standard. ISO 9001 and other ISO standards share many governance principles with VSS, such as a common standard as a reference point, audits by arms-length third parties, and oversight by accreditation bodies. Moreover, in April 2020, ISO and IAF produced guidance on remote audits that aligns with the practices discussed in this paper in the context of VSS [10]. Studies on VSS and their use of technologies in auditing can therefore have implications for a very broad set of standards, certifications, and accreditation that are essential mechanisms for international trade [21]. The paper thus provides important contributions with respect to studying the adoption of remote audits in widely-used VSS in the empirical setting of the emerging COVID-19 crisis.

The article is structured as follows. In Section 2, VSS and the underlying principles of VSS’ operations, including the auditing function and the uptake of technologies for auditing, are discussed. In Section 3, the data collection process and data analysis used in this study are explained. In Section 4, the data analysis is provided. In particular, the analysis focuses on the introduction of remote audits, the guiding principles, and key challenges that emerged during the early stages of the crisis. In Section 5, the paper discusses the long-term implications for auditing practices in VSS and contribution to the literature. This section also provides key questions to guide future research in this area. The paper concludes that the crisis has accelerated the uptake of remote auditing and that VSS need to continue to embrace the principles of technology-enhanced auditing.

## 2. Background

As noted earlier, Voluntary Sustainability Standards (VSS) are a “collective of organizations responsible for the activities involved in the implementation of a [sustainability] standard, including standard-setting, capacity building, assurance, labelling, and monitoring and evaluation.” There are other terms that are used in the literature, such as sustainability standard-setting organizations (SSOs; [14]), eco-labelling schemes [22], or eco-labels [23]. In the literature that focuses on policy

development, the term VSS is used more frequently, as, for example, in a report by the *International Institute for Sustainable Development* [24] or in the report by the *United Nations Forum of Sustainability Standards* [25]. The key attributes of VSS are that they are led by private actors (NGOs, firms, or industry consortia; [5]) and that they use information (typically certification/labelling) to create market incentives for sustainable production [25].

There are many reasons why companies choose to obtain VSS certification or why customers consider them in their purchasing decisions [26,27]. From a theoretical perspective, VSS serve as a mechanism to reduce information asymmetry [28] in the domain of sustainable products and provide a signal of a usually hidden sustainable attribute of a product [29,30]. For instance, the FSC label on outdoor furniture indicates that it was manufactured using wood sourced from a sustainable forest. The critical aspect of signaling is the credibility of the signal [28]. Credibility in the context of VSS is manifested by their governance of standard-setting, implementation, monitoring, and labelling processes [4,31–33]. VSS are typically developed through a multi-stakeholder consultation process, in which “the expertise, skills and finance of non-profit and for-profit organizations are pooled” [34]. Similar to all multi-stakeholder initiatives, the credibility of VSS rests on both their input and output legitimacy [35]. As Mena and Palazzo (2012, p. 536) explain, input legitimacy concerns issues related to stakeholder inclusion, procedural fairness of deliberations, promotion of a consensual orientation, and structural and process transparency. Output legitimacy, on the other hand, is derived from high coverage, high efficacy, and a guarantee of “good enforcement and monitoring of their rules” [35].

Standard-setting is the foundation of all VSS, as their fundamental role is to define the sustainability requirements that organizations have to meet. The credibility of standard-setting is developed through a multi-stakeholder standard development process [35,36], which focuses on building input legitimacy, as well as by formulating reference points that address sustainability in substance focused on output legitimacy. In terms of implementation and monitoring, VSS ensure their credibility by defining the rules of monitoring (auditing) and by creating multiple tiers of governance with other independent institutions. For example, accreditation bodies such as Social Accountability Accreditation Services (SAAS), IOAS (formerly International Organic Accreditation Service), and Assurance Services International (formerly Accreditation Services International) were established in order to oversee organizations that provide certification (i.e., conformity assessment bodies). Moreover, VSS usually determine a set of auditing procedures for an initial audit (i.e., the time when a firm is first certified), surveillance audits (which occur during the period for which a certificate was issued; typically three years), and recertification audits (i.e., when a firm needs to renew its certification for the next cycle). More recently, an increasing number of VSS have started to collect evidence of their impact [37], which is used to further strengthen the credibility of their standards.

The actual governance practices, however, differ across VSS [7], and the credibility of VSS are questioned in academic studies [7,31,38,39]. These credibility concerns are in part related to perceived audit inconsistencies. Although certification bodies typically argue that the audit quality of any of their clients should be similar [40], a number of studies of voluntary standards have shown that this is not the case [41,42]. In studies of widely-used management system standards, such as ISO 9001 and ISO 14001, it has been argued that these inconsistencies can arise, at least in part, from the conflicts of interest between clients and certification bodies [43–45]. A key concern is that the clients serve as the “paymasters” [46] of the certification bodies, meaning that the audits are typically “contracted and paid for by the company that wishes to become certified” [47]. Weak auditing regimes can result in unworthy firms receiving certification and erode the signaling power of the certification. Certified firms that have only “ceremonially” adopted a standard [48] can lead to a “decoupling” between the stated and real practices within a certified firm [49], thus damaging a standard’s credibility. A key focus of the literature on voluntary standards is the issue of “symbolic” vs. “substantive” implementation [48]. These concerns can partially be mitigated by high levels of transparency in the certification process, and several VSS, such as FSC, MSC, and RSPO, make considerable information regarding their processes publicly available. To help strengthen the veracity of audits, and, thus, granting certification to firms that have

only ceremonially adopted a standard, there is a growing stream of literature focusing on the use of technologies to strengthen the credibility of VSS [11,14,50]. Adoption of new technologies is one of the pillars to increase credibility in certification [14].

The certification industry has been pondering the role of information technologies in auditing for a while. For instance, the IAF has included remote auditing in their guidelines on audit time [51], and has also provided a “mandatory document” on the use of ICT in remote assessment [9]. The IAF documents focus on the conduct of a remote audit, where technologies are used in the context of existing audit processes. Essentially, ICT replicates the characteristics of the traditional, on-site, in-person audit process, “where demonstration of evidence, conformity or traceability can be confirmed via electronic means” [8].

There is also a growing interest in the literature on technology-enhanced auditing (TEA). In TEA, technologies are employed to enhance audits rather than replicate traditional auditing processes, with an emphasis on improving the veracity and timeliness of audits [11]. Therefore, TEA aims to improve the mechanics (e.g., improve supply chain tracking) and performance (i.e., consistency of audits) of the traditional auditing process [50]. TEA has emerged as an important issue in managing financial audits [52], non-financial audits in the context of environmental management and social responsibility [11], and as an important strategic resource in supply chain management [53]. It is also increasingly being discussed in the context of VSS [14,54]. At a basic level, remote audits involve technologies such as audio-visual equipment, videoconferencing, or drones, with the desired outcome of essentially replicating an on-site visit. At a more advanced level, technology-enhanced audits can include Big Data and artificial intelligence to enhance what is typically done in a traditional audit. TEA can also help facilitate a shift from retrospective audits to real-time, continuous audits [55]. As part of this study on the response to the COVID-19 crisis, the focus is on remote audits. However, the findings in the broader context of TEA are also discussed.

The above discussion demonstrates that auditing is one of the foundations of VSS credibility. Auditing is particularly critical in enforcing and monitoring the implementation of VSS, such as in distinguishing between certifications that have been substantively vs. ceremonially implemented. There is a growing body of literature highlighting that technology can be used to support and enhance auditing [11,13,14,52]. However, there are few empirical studies that specifically investigate the adoption of remote or technology-enhanced auditing in VSS. Moreover, the COVID-19 pandemic provides an interesting empirical setting to study the adoption of technologies in auditing. During crises, organizations are pushed to their limits to address the crisis and need to demonstrate their ability to resist and respond to a shock and to recover [18]. Often, their response is constrained by restricted resources and under time pressure. In such an environment, novel approaches often emerge [56]. Organizational resilience literature often scrutinizes organizational responses during crises (caused by exogenous shocks such as natural disasters, [16,17]) to provide insights into organizational resilience, as well as into future restructuring of industries. Recent work in the resilience field highlighted the lack of studies on the role of IT in response to disaster [20], which is also addressed in this paper.

### 3. Research Approach

#### 3.1. Sample

There are numerous Voluntary Sustainability Standards (VSS), though an exact count is elusive. For example, the Ecolabel Index (<http://www.ecolabelindex.com>), which self-identifies as the “largest global directory of ecolabels” tracked “458 ecolabels in 199 countries, and 25 industry sectors” at the end of April 2020. At the same point in time, the International Trade Centre’s Standards Map (<http://www.standardsmap.org>) listed over “210 standards, codes of conduct, [and] audit protocols addressing sustainability hotspots in global supply chains”. This study was limited to VSS that are listed as ‘full members’ of ISEAL. As it explains on its website [57], ISEAL is a “global membership organization for credible sustainability standards.” ISEAL’s list of full members includes 22 VSS, which operate in

sectors such as forestry, agriculture, and fisheries, among many others. Assurance Services International (ASI), which is an assurance provider, is excluded from this study, leaving a total of 21 VSS. An overview of the members and a basic description of the scope of their activities is provided in the Table A1 in Appendix A. This sample provides a useful setting for this research as these VSS represent exemplars in the certification industry, whose practices are likely to be followed by others in a crisis like COVID-19. These VSS also have the resources to be able to adopt new approaches, including new technologies to support auditing, to ensure the credibility of their operations.

### 3.2. Data Collection Procedure

The data for each VSS included in this study were obtained from their official websites (the links for each website are available from ISEAL's database of full-members). The websites were searched for any COVID-19 related information. Typically, a "COVID-19 Response" link appeared on the VSS's home page. In every case, those links were followed, but search engines were also used with the keywords "COVID-19" and "coronavirus" to make sure that no relevant information was missed.

The search provided several outputs: basic announcements that informed certified firms about upcoming changes, interim policies, and derogations. Some VSS provided information on the broader impact of COVID-19 on the operations of certified firms. For instance, the MSC reported on Samherji, an Icelandic MSC certified seafood company, which offered their employees extended time at sea as a form of quarantine [58]. Other VSS provided information regarding the impact of COVID-19 on international trade and labor-related issues; for instance, Fair Trade International (FT International) provided reports on the impact on major commodities, such as coffee and bananas. Some VSS opted to create support funds to address their clients' critical needs; e.g., Fair Trade USA reported on the increased flexibility of their Community Development Funds [59].

These examples illustrate the range of data collected; however, it is important to stress that the information provided by individual VSS varied widely. While some of the responses to the COVID-19 crisis went beyond the use of remote auditing, the focus of the analysis is on the research question. In terms of data collection for this paper, the focus has therefore been on the impact of COVID-19 on auditing and how individual schemes adjusted the rules governing the certification services of Certification Bodies (CBs) within the VSS assurance program in response to travel bans and lockdowns. All announcements and related policies were downloaded for the analysis.

### 3.3. Analysis

Qualitative analysis was conducted on all collected data [60]. The focus was on understanding the procedural steps taken by VSS and the role of technologies in their response rather than the narrative around those steps (i.e., the focus was not on how the response was framed in the announcements).

The analysis was initially done on a random sample of eight VSS, followed by the analysis of all 21 VSS. The aim of this pilot analysis of eight selected VSS was to explore the data set and to define an analytical framework. The analytical approach was inductive and used the logic on an emerging coding scheme [61]. The analysis was guided by the research question and notes were taken of instances that explain those adjustments. The initial analysis explored if the response was different across VSS and, therefore, whether a comparative analysis of the responses amongst VSS would be helpful. It was observed from the pilot analysis that (a) there was observable difference between the responses (e.g., some schemes offered remote audits; others not) and (b) the underlying nature of the responses were broadly consistent between VSS in cases where remote auditing was adopted. The data contained details on actions taken, including amendments of rules and guidelines on remote auditing, which was in line with the aims of the study's research question.

After finalizing the pilot analysis, the framework for coding of the data of all 21 VSS in the sample was defined (Table 1). Some data are in quantitative form (e.g., # of VSS that allowed remote auditing), yet most of the data are qualitative (e.g., guidance of remote audits). In line with the usual practices in qualitative research [62], the paper provides examples and quotes from the dataset (for instance,

quotes from interim policies and or website) as part of the discussion of the findings. The findings section also reports the quantitative findings.

**Table 1.** Framework for data collection and data coding.

Area of Interest	Description	Data Collected on
Response	What steps were taken by VSS in response to the COVID-19 crisis?	Did VSS suspend audits? Did VSS permit remote auditing? Timeframe for response (e.g., what length are extensions valid for?)
Principles of remote auditing	Under what circumstances did the VSS allow remote auditing, if it was permitted at all?	What rules and/or advice did the VSS put forward for remote auditing? What were the differences between initial, surveillance, and recertification audits?
Technological guidance	What advice was given about the use of technologies in auditing?	What are the recommended technologies for remote audits? What guidance was provided on the use of technologies? What problems and difficulties were expected?
Policies issued and their content	What policies specific to COVID-19 were produced during the response to the COVID-19 pandemic?	Was there a new policy introduced? What was the validity of the new policy? What were the differences in the content of the policies between VSS?

One observation worth mentioning is that the level of detail provided by VSS varied. For instance, the Forest Stewardship Council (FSC) provided detailed guidelines on remote audits, which were also grounded in IAF Guidelines. The Alliance for Water Stewardship (AWS), on the other hand, provided a short announcement and relied on direct communication with their clients. This is noted in order to highlight that, in this study, the aim was not to evaluate the actions of VSS per se. Moreover, the fact that one VSS provided more (or less) information than another does not necessarily signify the quality of their response. It is possible, for example, that small VSS do not rely on external communication as much as a large VSS, such as the FSC. Another observation worth mentioning is the consistency in the adoption of remote auditing. The overall guidance and underlying principles were fairly consistent. The differences were largely due to the different level of detail that was disclosed. Despite this limitation, the data facilitated the development of an understanding about the response and provided supporting evidence to discuss the impact of the COVID-19 crisis on VSS and, consequently, a discussion of the future adoption of technologies and remote auditing.

#### 4. Findings

The travel restrictions and lockdowns left the VSS with three basic options: (1) suspend all auditing activities until the restrictions are lifted, (2) introduce remote audits during the crisis, or (3) a combination of both. In general, the move towards suspension or remote auditing was impacted by two factors: (1) a client being in an area of a health risk due to COVID-19 (demonstrated through verifiable public sources; e.g., official travel warnings or restrictions) or (2) the auditors were banned from travelling by internal policies or based on restriction of public authorities at their location.

Only one VSS did not provide any statement on COVID-19, nine VSS opted to suspend auditing without offering remote audits, ten VSS offered remote audits, and one VSS stated that they will consider remote audits. A statement from AWS provides a representative example for the VSS that opted to suspend their certification activities, while also offering an extension of the validity of their certification:

*“We are providing a two-month extension period on surveillance and re-certification audits to AWS until 1 June 2020. We are continuously monitoring and reviewing the situation and will keep you updated with the latest developments”.*

In other VSS, the decision to postpone or to audit remotely was considered on a case-by-case basis based on consultations between clients, certification bodies, and the VSS. Overall, 11 VSS permitted remote auditing during the COVID-19 crisis. One additional VSS was open to considering remote auditing on a case-by-case basis, but did not issue a blanket permission for it. The following sub-sections summarize the VSS responses with respect to remote auditing, the use of technologies, and policies amendments during the early stages of the pandemic.

#### 4.1. Remote Audits

Within the subset of VSS that allowed for remote audits, the response was broadly consistent. VSS reacted by developing guidelines and rules for remote audits (some VSS refer to remote audits as “desk audits”) and initiated remote auditing practices. In many instances, the rules were set in new or amended policies. For example, ASC provided the following in their March 18, 2020 version of *ASC Policy for Audits During the COVID-19 Outbreak*:

*“The policy sets out various scenarios including surveillance audits (which must be carried out on an annual basis throughout a farm’s certification) as well as re-certification audits and initial audits. In some cases, audits may be carried out remotely, or partly remotely where some, but not all, auditors are able to attend. In other cases a farm’s certification may be extended if it is not possible to carry out a re-certification audit within the required timeframe. Further details on these scenarios, the possible options, and the requirements for these options, can be found in the full policy document.”*

As in the ASC case noted above, many VSS have accepted that surveillance audits may be conducted remotely. However, not all VSS decided to permit remote auditing in surveillance audits. For instance, the FSC stipulated that under the following circumstances, a remote audit is not possible (*FSC-DER-2020-001*):

*“open major CARs [Corrective Actions Requests], supply chain integrity issues (e.g., integrity investigations involving the certificate holder/production sector or trading species), subcontracting / outsourcing of certified activities in response to the coronavirus outbreak, ongoing complaints”*

Recertification audits were typically delayed through the provision of an extension and/or replaced by surveillance audits. Remote audits, however, have not been deemed acceptable for initial certification and all VSS, with one exception, opted to postpone the initial certification. In the one exceptional case, ASC permitted the conduct of initial and re-certification audits for applicants in countries listed as low and medium risk (based on ASC’s social profile of countries; this is explained on page 8 of the *ASC Policy for Audits During the COVID-19*).

In some cases, decisions on remote audits were contingent on the types of evidence required to support the audits. For example, the Aluminum Stewardship Initiative defined its rules based on objective and observation evidence (*Interim Policy regarding Audits, Audit-Related Travel and Coronavirus*; p. 2)

*“Objective evidence that can be reviewed remotely includes documentation and some testimonials. For example, interviews of management, staff/workers and stakeholders may be possible and appropriate, depending on access to web-based communications (or similar) and the health of the individuals. General principles for interviewing in the ASI Assurance Manual still apply. Objective evidence that cannot be reviewed remotely is observation evidence. Verification of on-site implementation, process control and risk control where relevant in applicable ASI Standards cannot be audited using remote audit techniques.”*

Several VSS offered explicit direction on the steps auditors and certification bodies would need to take in order to maintain the integrity of their audits while they were conducted remotely. For example, the FSC required that all certification bodies must have a “documented policy, procedure, or both, outlining the process to be implemented in case an audit is affected by the novel coronavirus (COVID-19) pandemic” (*FSC-DER-2020-001*). Moreover, the FSC was explicit that this must include:

*“A method for assessing whether an on-site audit can be replaced with a desk audit, A description of the desk audit methods to be applied in the case of Forest Management and Chain of Custody, A process to implement the reporting and record keeping requirements of this derogation.”*

The Roundtable on Sustainable Biomaterials (RSB) established conditions on granting permissions for remote audits, noting that an explicit request was required and it must address the scope of the certification, including detail on the affected facilities, the inputs and outputs being certified, and the

documents that would be reviewed (*Reactive Guidance on RSB-PRO-70-001: Audit schedule changes due to conditions beyond the control of POs and CBs*). The RSB also required submission of a proposed agenda, as well as clarification on the “systems that the auditors will be able to remotely access”, accompanied by an assessment by the certification body regarding “whether the documentation and systems to be provided by the operator are sufficient to conduct the audit remotely.” Moreover, the RSB noted that, “If the request is granted, and the audit is carried out remotely, the following audit (within 12 months of the issuance of the certificate) shall be an on-site audit.”

Some VSS, such as the FSC and ASC, also established specific provisions for establishing auditors’ competence. In these cases, there appeared to be a recognition that auditor competence was considered transferrable between on-site and remote audits. The ASC, for example, required (*ASC Policy for Audits During the COVID-19 Outbreak*):

*“The auditors (remote or on-site) shall have conducted at least two ASC audits in the standard that they are auditing in the same role (lead or social auditor). These two audits shall have been conducted after auditor’s sign-off by the CAB. Shadow audits for initial approval shall not be considered.”*

Their actions show that many VSS recognized the need for extraordinary action during the early stages of the COVID-19 crisis and that an increased openness to remote auditing was a foundation of their responses. However, the imposition by many of the VSS of conditions on remote auditing may also indicate that they are not yet fully comfortable with it as a replacement for traditional on-site, in-person audits.

#### 4.2. Use of Technologies

There was a broad recognition amongst the VSS that technology could help facilitate the shift to remote auditing during the COVID-19 crisis. The use of information and communications technology (ICT) was frequently cited as a means of collecting and verifying audit evidence. In the *ASC Policy for Audits During the COVID-19 Outbreak*, for example, the ASC noted several potential uses of ICT in remote auditing, including (but not limited to):

*“■ Teleconferencing using video and/or audio ■ Sharing of data ■ Assessment of documents through remote sharing, teleconferencing or other means ■ Video and/or audio streaming from remote locations ■ Records of video and/or audio and/or video stills and/or screenshots.”*

FSC provides another example of a VSS that recognized the need for increased use of ICT, noting the need to use virtual meetings for stakeholder interviews, but also recognizing the possibility of using satellite images where possible. The use of satellite imagery for monitoring forestry coverage, for example, has previously been noted in the literature [63], and underlines that the type of technology used in remote auditing can vary between VSS. Moreover, the VSS generally recognized the possibility of both on- and off-line ICT options.

Notwithstanding those points, the VSS did broadly recognize that technology is not a panacea and a number of technical difficulties were possible. For example, in a question and answer document posted on its website (*FAQs - Coronavirus-related changes in FLOCERT’s [which manages certification for FT International] operations*), FT International acknowledged the potential unavailability of good internet connections, something which may be particularly pronounced in developing countries. This could lead to the postponement of an audit:

*“[Question]: Our Internet connection is not very good and/or we do not have access to all the technology needed. What should we do in case we cannot hold the audit remotely due to these technical problem(s)?*

*[Answer]: Of course, technology and especially a stable internet connection that allows for a transfer of documents and information is key for the remote audit. In the preparation and scoping call with the auditor please raise and discuss all challenges you might face in this regard. Generally, different*

*options to perform the remote audit are possible: The live interaction with the auditor is ideally done via a web-based audio or video tool. In case teleconferencing is not possible due to poor internet connection, a live interaction via telephone is an option or even via an instant e-mail exchange on an agreed date. In any case, the auditor will try to accommodate your preferred option. If the auditor realises that none of the previous options are realistic, we may need to postpone the remote audit, and this decision will then be conveyed to you thereafter."*

In any case, it was also recognized by some VSS that technology would not necessarily provide all of the evidence required for a remote audit. As the representative example from Linking Environment and Farming (LEAF) demonstrates, other forms of evidence that would be gathered during an on-site visit might still be required:

*"The preferred format of a remote audit is a video call supplemented by the business providing documentary evidence. Any technology that can include at least 3 parties can be used in order to enable remote witnessing of audits – for example, WhatsApp Call, BlueJeans, Microsoft Teams, Skype, Zoom. If this is not possible, the audit can involve a phone call supplemented by the business providing documentary and photo/video evidence" (LEAF Marque Remote Audit Protocol).*

One other key concern in the shift to remote auditing raised by several VSS was data security. A strong illustrative example is provided by ASC, which developed a set of data security rules (Table 2). For example, auditors must only record the data they require to complete the audit process and they must take special care in data storage. These rules were accompanied by an understanding that "the technology and tools shall allow auditors to confirm interviewee identity", as well as that those being interviewed "may not record the interview themselves" (*ASC Policy for Audits During the COVID-19 Outbreak*).

**Table 2.** Data Security Rules (excerpt from ASC Policy for Audits During the COVID-19 Outbreak).

Section	Requirement
6.3.2	Only record data with explicit consent of the interviewees. Afterwards the interviewees will verify and sign a checklist provided by the auditor containing at least the medium, date of recording, a short description and duration of storage of all that was recorded as part of the audit
6.3.3	Record only the data needed for the audit process.
6.3.4	Collect and store all data using up-to-date security practices. These measures include access control to the data collected and encrypted transmission of data, for instance when uploading and/or emailing.
6.3.5	Not store data beyond a required timeframe. The CAB shall specify how long each recorded file will be kept on the CAB's servers.
6.3.6	When the CAB and/or implementation of the certificate holder/ applicant are in doubt over these guidelines, the General Data Protection Regulation as released by the EU (May 25, 2018, <a href="https://gdpr-info.eu/">https://gdpr-info.eu/</a> ) shall be referenced.

#### 4.3. Policies Issued by VSS during the Pandemic

Nine VSS developed new policies during the early stages of the COVID-19 crisis. A complete summary of the new publicly-available policies developed in response to the pandemic is provided in Table 3.

**Table 3.** Key Documents from VSS during the COVID-19 pandemic (up to April 30, 2020).

VSS	Example Key Documents
Aluminium Stewardship Initiative	Interim Policy regarding Audits, Audit-Related Travel and Coronavirus This Policy was adopted by the ASI Board on 6 March 2020 (V1) and updated on 23 March 2020 (V2) and again on 3 April 2020 (V3)
Aquaculture Stewardship Council (ASC)	ASC POLICY FOR AUDITS DURING THE COVID-19 OUTBREAK VERSION 18 MARCH 2020 Update 19 March 2020: Change on the Table Annex 1: ASC Country Social Profile
Forest Stewardship Council (FSC)	FSC derogation (FSC-DER-2020-001) and auditor requirement derogation (FSC-DER-2020-004)
Linking Environment and Farming (LEAF)	Interim Policy regarding LEAF Marque Audits, Audit-Related Travel and Coronavirus LEAF Marque Remote Audit Protocol
Marine Stewardship Council (MSC)	Covid-19 pandemic derogation, March 2020 Guidance for MSC Chain of Custody CABs relating to the COVID-19 Derogation Guidance for MSC Fisheries CABs relating to the COVID-19 Derogation
Rainforest Alliance	AUDIT EXCEPTION POLICY FOR COVID-19 MARCH 2020 REVISED 17 AND 30 MARCH 2020 SUPPLY SHORTAGE POLICY DURING COVID-19 PANDEMIC PERIOD Effective April 2020
Roundtable on Sustainable Biomaterials (RSB)	Reactive Guidance on RSB-PRO-70-001: audit schedule changes due to conditions beyond the control of POs and CBs 26th March 2020, version 2.1

In all cases, the new policies were framed as interim policies, derogations, or exceptions, which was frequently indicated in the title of the new policy. For example, both the Aluminum Stewardship Initiative and the Linking Environment and Farming (LEAF) VSS included the word “Interim” in their new policies regarding audits, travel, and the coronavirus. A close review of the complete text of all key documents showed that no VSS indicated that the new policies would extend beyond the duration of the COVID-19 pandemic. A representative example is provided by ASC, which provided an expected end date for its exceptions during the pandemic in its *Policy for Audits During the COVID-19 Outbreak*:

*“This Policy is valid from publication date until September 30th 2020 or until further notice whichever comes first . . . [The policy] is to provide some flexibility to CABs and ASC Certificate Holders affected by the global COVID-19 pandemic.”*

Although some VSS were not as explicit on the end date and most VSS left open the possibility of extensions if necessary. The statement from Bonsucro provides a representative example:

*“We are considering requests for desktop auditing and postponement of audits. All requests must be discussed with your certification bodies and they will contact Bonsucro. For Bonsucro members and potential members due to be audited after June 2020, we expect audits to be carried out as normal, however, we will continuously monitor the situation and act accordingly.”*

These statements suggest that VSS expect that the remote practices are temporal. The decision to temporarily suspend audits only makes sense if there is an expectation that the regular auditing protocols will soon resume, while all of the decisions to permit remote auditing were accompanied with a specific end date or implication that they were permitted only during the pandemic. No VSS provided any indication that the new allowances made for remote auditing would be extended following the resumption of “business as usual.”

The focus of the interim policies, derogations, and exceptions were broadly consistent. The primary emphasis was on recognizing the need for flexibility in audit delays and the use of remote audits, all principally the result of travel-restrictions and the impossibility of conducting on-site audits.

Given the different areas of focus of the individual VSS, some of the amendments were also specific to the industry the standard covers. For example, the MSC provided guidance specific to the fisheries industry on chain of custody, while the Rainforest Alliance developed a policy focused on supply shortages arising from the pandemic specific to agricultural crops.

On balance, the VSS demonstrated a recognition of the extraordinary circumstances caused by the COVID-19 pandemic, but their initial responses have focused on the crisis at hand, rather than the longer-term implications that might arise from the crisis. These longer-term implications could include, for example, a greater openness to remote auditing even under “normal” business conditions. Beyond that issue, it is clear that the governance of the VSS was impacted by the COVID-19 policies,

as many long-held practices were quickly modified and typical processes for standards development and modification were temporarily suspended. It is unclear from the publicly-available information if the VSS were concerned about whether these changes might hamper the credibility of their systems over the long-term, though it is important to note such concerns might be merited given the relative lack of stakeholder consultation in making the changes. These concerns must be balanced by the need to react quickly to an emerging crisis. It is fair to note that several VSS considered existing IAF requirements on force majeure and ICT when making their temporary amendments, and the credibility of VSS also rests, at least in part, and their ability to quickly react to crises so that their requirements reflect the realities faced by organizations and their auditors.

## 5. Discussion on Adoption of Technologies for Auditing

The results show that VSS were active in responding to the early stage of the COVID-19 crisis. Many VSS took unprecedented steps in rapidly modifying their governance regimes; foremost amongst those steps was a broad acceptance of remote auditing. That acceptance of remote auditing was, however, not universal, nor was it accepted for all types of audits.

Nine of the 21 VSS studied chose not to modify their existing auditing protocols to accommodate remote auditing options. It is possible that it will change if the COVID-19 crisis persists into mid-2020 or longer, but there is no indication that is the case at the time of this writing. Even in cases where remote auditing was permitted, that typically came with conditions. The use of remote auditing was typically limited to surveillance audits, an option provided by 11 VSS. Only one VSS was prepared to consider the possibility of a remote audit for an initial certification, and that came with a number of caveats. In the case of recertification audits, the solution was rather to extend the certificate until such time it was expected it would be possible to complete an on-site audit. Remote auditing was permitted with a number of requirements that were typically imposed, such as documenting changes to the audit protocol, ensuring that auditor competence could be established, and increasing provisions for data security. These requirements show that remote auditing is subject to strict oversight even in times of crisis.

All VSS expected that the modifications to their assurance systems would be temporary. All VSS either provided explicit time periods during which a remote audit would be acceptable or otherwise indicated that they expected normal auditing protocols to resume after the COVID-19 crisis. It is currently unclear when normal auditing protocols will resume across the world, and it is similarly unclear whether remote auditing will become a more established practice under normal conditions or whether it will remain as optional as part of crisis management of VSS.

### 5.1. Long-Term Implications for Remote Auditing

The shift to remote auditing during the pandemic also raises several long-term questions concerning remote auditing. For example, even during the early stages of the crisis, Fischer (2020) had already recognized that the experience with remote auditing could either exacerbate existing concerns or drive even more wide-reaching and lasting change in the auditing of VSS [12]:

*"So, does remote auditing sound too good to be true? Perhaps, but let's clarify what it means here. If remote means "trying to do the same thing from far away" – the truthfulness of the audit will inevitably drop overtime. It simply means that auditors won't even be able to smell that the paint is fresh. In other words, they would get less 'hints' if what they see is real and representative of a well performing company – or just a 'cover up', as this is what good auditors do. They would even be further confined in choosing where to look and what to audit. Under this scenario, after COVID-19, the auditing sector would likely move back to "traditional auditing", no matter what its well-known limitations are. By contrast, if remote means real time direct access to information (the way the term is used in IT and telecommunications), the COVID-19 crisis may create the innovations boost that the rather conservative audit sector has been in need of."*

There are several implications of the experience with remote auditing obtained during the COVID-19 crisis. First, it will be interesting to see whether the openness to using remote auditing during the crisis will mean that VSS are more open to using it in the future during “business as usual” conditions. This could depend, at least in part, on perceptions of the use of remote auditing during the crisis, particularly whether it is perceived to be as effective as on-site auditing. There are trade-offs in using remote auditing; although it means clients and their auditors do not need to incur the time and expense of an on-site visit, it can also be difficult or impossible to pick up cues that can inform important audit conclusions, such as body language, smells, noise, unplanned interactions, and interpersonal behavior. Prior to the COVID-19 crisis, VSS had demonstrated a clear preference for on-site audits for these, and other, reasons and it is not yet clear if the use of remote auditing during the pandemic will in any way alter those preferences. The future use of remote auditing could also depend on whether VSS are subjected to new pressures from their users and/or other stakeholders to show greater flexibility in the form of audits. These implications lead to several potential questions for future research, such as:

- Has the experience with remote auditing during the COVID-19 crisis changed VSS’ views on its applicability to their certification processes?
- To what extent do VSS users and other stakeholders prefer on-site auditing to remote auditing (or vice versa)?

Second, if there is a greater openness to using remote auditing in VSS in the future, it will be important to establish the conditions under which it does and does not make sense. For example, there may be cases where it is too risky to rely exclusively on remote auditing. Would VSS, and customers relying on the signal certification to that VSS provides, be comfortable with using remote auditing to ensure conformance on issues related to food safety? Moreover, as discussed in the Background section, VSS certification is intended to provide a signal of a process, system, or product attribute [28–30]. If there are any concerns with, for example, the credibility of remote audits, these could undermine the credibility of the VSS certification and, over time, erode the strength of the signal that certification provides [4]. Moreover, any weakening of the signal provided by the certification could further exacerbate concerns about information asymmetry arising from a widening gap in knowledge about the certified process, system, or product between the parties making decisions based, at least in part, on that signal [29,34]. Even in cases where remote audits are deemed to not compromise safety, the question of whether they should be used for all types of audits (e.g., initial, surveillance, re-certification) will remain. This highlights that, even in cases where remote auditing is permitted, it might be restricted to certain uses. Based on the discussion above, example questions for future research could include:

- Under what conditions is remote auditing appropriate?
- What is the perceived effectiveness of remote auditing relative to on-site auditing? How and under what circumstances can risks to integrity of remote audits (e.g., risks specified in the ISO 9001’s *Auditing Practices Group Guidance on: REMOTE AUDITS*) be addressed?
- What are the strengths and limitations of using remote auditing for different types of audits and in different industries? What are the detection rates of non-conformances in remote auditing in comparison to on-site audits?
- To what extent does the use of remote auditing change stakeholder views on credibility of the certification?

Third, it is unclear how a shift to remote auditing could impact the input and output legitimacy of VSS [34,35], another key contributor to the credibility of VSS that was discussed in the Background section. From an input legitimacy perspective, it is notable that the evidence gathered did not indicate that VSS undertook much, if any, stakeholder consultation regarding the shift to remote auditing during the COVID-19 crisis. It is possible that informal consultations with VSS’ multi-stakeholder constituencies

did occur in some cases, but these were not reported in the publicly-available data. Moreover, although the need to rapidly respond was understandable and necessary, the modifications were a departure from established norms for change within VSS, which emphasize thorough consultation. Consultation with VSS stakeholders, such as representatives from industry, non-governmental organizations, consumer groups, and government, is often one of the foundations of a VSS' credibility and is a precursor to procedural fairness, a consensual orientation, and transparency [64]. It will be interesting to see if the responses to the crisis have any lasting impact on the input legitimacy of the VSS or if there is a need to establish new protocols for consultation or where it might be suspended in response to future crises. In terms of output legitimacy, it will be interesting to observe the potential impact of remote auditing on views of rule enforcement and performance monitoring. For example, it will be interesting to explore whether a shift to remote auditing had any positive or negative effect on perceived audit inconsistencies, which was noted in the Background section as another key concern with respect to credibility [65]. Any concerns regarding reduced rule enforcement or lowered vigilance in performance monitoring could adversely impact the output legitimacy of VSS. These issues lead to questions such as, under what conditions are VSS and certified firms prepared to recognize that the quality of a remote audit is equivalent to, or possibly even better, than that of an on-site audit?

There are potentially other long-term ramifications of the rapid shift to remote auditing during the pandemic. Consider that some of the assurance practices that were relaxed during the crisis can potentially affect the integrity of certification services, especially if the crisis continues beyond six months (as was expected during the writing of this paper). For instance, as some VSS acknowledged, a reduction of unannounced audits was considered acceptable during the pandemic; moreover, little evidence was publicly available about witness/shadow assessments by of assurance bodies. It is worth considering whether remote auditing has weakened the governance regimes of VSS over both the short- and long-term. In any case, more development is needed to embed remote auditing as a regular practice within the certification services eco-system. With the above in mind, example questions to guide future research could include:

- To what extent will the changes made during the pandemic impact stakeholder views of the procedural fairness, consensual orientation, and transparency of the VSS?
- To what extent did the use of remote auditing change stakeholder views of rule enforcement and performance monitoring in VSS?
- To what extent has the COVID-19 crisis caused VSS to re-evaluate their requirements?

## 5.2. Long-Term Implications for Technology-Enhanced Auditing

Notwithstanding the potential concerns raised above, there is the question of whether the experience gained with remote auditing during the crisis will create the opportunity and/or demand for increased use of technologies in auditing. In other words, it is as yet unclear whether this experience will open the door to increased use of technology-enhanced auditing (TEA). Apart from the question of demand, there is also the question of integrity of the current on-site auditing approach that is perceived as lacking veracity and timeliness [11,12,14]. As Gale et al., (2017) assert in the following quote:

*“With forest management, the audit is very much focused on management systems and processes. . . . The actual data collection of outcome and output is very limited, and whatever the forest manager says, as long as it looks reasonable, it's taken as agreed. You know, you are trying to audit 100,000 hectares in a week. The reality of you seeing anything on site is very, very limited. So you're very much reliant on the forest manager producing a map, or you produce a map, and the forest manager says, “This is what we've harvested. This is what we've restocked. Here are some timber figures.” And that's pretty much trusted—99.9 percent of the time that's taken as correct.”*

Therefore, the shift to TEA is also driven by the increased expectations in terms of input and output legitimacy of VSS. Technologies provide a different approach to create transparency and credibility [14]. Modern technologies can be used, for instance, for spot check audits of labelled

products [50]. An existing example is provided by MSC, which conducts biannual DNA tests on a random sample of labelled products to confirm their origin [66]. DNA testing is also picking up in forestry to address illegal logging [67]. Drones or satellite imagining can be used to monitor remote areas or areas that are difficult to audit (as per the earlier example from forestry auditing) or that pose a health and safety risk [10]. Adoption of these practices thus has apparent benefits not only for the credibility of VSS, but also enhances emergency preparedness of VSS in times of crisis like the COVID-19 pandemic, as most of these technologies can be managed remotely. Further work is needed to embed these practices into current auditing practices.

However, the transition to TEA is challenging. An illustration of the key characteristics of TEA, compared to other forms of auditing, is provided in Table 4. In terms of approach, the key difference between TEA and other forms of auditing is in the role of technology: in TEA, technologies are a part of an auditor's decision making [52]. For instance, an auditor might use Big Data, text mining and AI as analytical and decision-making tools in TEA [68]; by contrast, in remote auditing, technologies make off-site auditing possible but do not play a role in the analysis. Another major difference between remote auditing and more advanced TEA is in challenges associated with data management: electronic data exchange (EDI) requires VSS to address data security and privacy; this is especially challenging in TEA where data can be exchanged amongst multiple parties. Furthermore, whilst remote audits (or assisted remote audits) rely primarily on ICT, TEA employs various technologies that are interlinked. The reliance on technologies is high in a TEA environment. Lastly, the competence of auditors differs significantly as well. Current rules for auditor's competence are well-established and during the crisis, VSS used this competence in remote auditing without much difference. However, in TEA, the auditor's competence differs significantly as auditors are seen as primarily analysts and must be comfortable working with a greater volume of data generated at speeds not possible in other forms of auditing [11]. As Castka et al. (2020) previously argued, research is needed to determine the impact of TEA on auditors' skills.

The potential adoption of TEA thus presents a substantial shift for VSS. Consider, for example, that VSS often operate globally and the capacity to implement TEA can vary widely. This could include issues as basic as poor internet connections in some areas, but could also include challenges such as a lack of access to capital to invest in TEA or an inability to recruit local experts to support the implementation and maintenance of the needed technologies. The fundamental point is that TEA requires a high level of technical sophistication, which could introduce challenges for both VSS and their clients. Closer collaboration between VSS stakeholders may be needed to broadly adopt TEA. Moreover, if VSS move towards greater acceptance of TEA, they may need to change aspects of their governance regimes and possibly may even need to rethink the requirements of their standards. The need to reconsider auditor competence has already been mentioned, but other issues could include considering whether existing stakeholder consultation approaches remain valid, audit frequencies should be changed, or product and process performance expectations should be modified, among other possibilities. VSS would need to make these decisions in light of potential concerns regarding the input and output legitimacy of their standards. There are many research possibilities for TEA, and many of those have been identified in a recent paper by Castka et al. (2020) [11]. Potential questions arising from the COVID-19 pandemic could include:

- To what extent has the use of remote auditing during the COVID-19 pandemic changed stakeholder perspectives on the possibility of adopting technology-enhanced auditing?
- What has the COVID-19 crisis revealed with respect to potential changes in requirements for auditor competence for remote and technology-enhanced auditing?
- How does technology-enhanced auditing facilitate emergency preparedness?

**Table 4.** Characteristics of On-site, Assisted Remote, Remote, and Technology-Enhanced Auditing.

	<b>On-site Auditing</b>	<b>Assisted Remote Auditing<sup>1</sup></b>	<b>Remote Auditing</b>	<b>Technology-Enhanced Auditing</b>
Approach	Auditor determines compliance based on the evidence that is primarily collected on-site	Same as on-site; on-site auditor is assisted by technical experts or others that operate remotely	Technology is used to replicate on-site auditing	Technology is used to assist in auditor's decision-making
Data collection	Data exchanged between clients and auditors on-site (e.g., review of hard copies, review of electronic files/databases, in-person interviews)	Data exchanged between clients and auditors on-site (e.g., review of hard copies, review of electronic files/databases, in-person interviews)	Data exchanged between clients and auditors remotely (e.g., review of scanned documents, review of cloud-based platforms, review of satellite imaging, interviews through videoconferencing)	Data exchange amongst multiple parties exchanged remotely (e.g., review of cloud-based platforms, review of social media platforms, review of data collected by technology in real-time, interview through videoconferencing)
Type of technology	Technology is secondary to the audit process (though it may be used to facilitate the process)	ICT used to communicate between on-site and remote-based auditors	ICT, such as audit/video conferencing, screen sharing is used to replicate on-site audit	Various technologies (e.g., machine learning to identify patterns, make predictions, guide decision-making; sensors collecting real-time information) are used to assist an auditor with an audit
Reliance on technology	Low Audit can be essentially performed without technology	Low/Medium Remotely based auditors need to be able to connect with on-site auditors	Medium Relies predominantly on ICT; off-line (e.g., desktop review), or real-time (e.g., e-interviews) or a combination of thereof	High Audit relies on multiple technologies
Auditor competence	Auditing competence (as specified in IAF Guidelines)	Auditing competence and ICT competence	Auditing competence and ICT competence	Auditing competence, ICT competence, and competence in Big Data Analytics

Note: <sup>1</sup> Assisted Remote Audit definition by ASC: "An audit that is conducted partly remotely and partly on-site. It typically occurs when at least one auditor (not technical expert or interpreter) of the audit team is able to be on site while the rest of the team are not due to travel restrictions. The remote auditor shall coordinate and guide the collection of evidence with the auditor on-site".

### 5.3. Contributions of the Paper

The key contribution of the paper is in exploring the adoption of remote audits in VSS in the empirical setting of the emerging COVID-19 crisis. The data were collected during the relatively early stages of the crisis and responses may evolve over time, but the analysis showed a range of VSS views on adopting technologies for auditing. The analysis provided the basis for identifying numerous potential research questions on the future of remote auditing and, more broadly, technology-enhanced auditing in VSS. It also raises a number of implications for the VSS themselves, particularly with respect to the increased use of technology in their certification services and what that might mean for the long-term credibility of their efficacy, coverage, and enforcement and monitoring.

The paper contributes to the growing body of literature on VSS, specifically to veracity and timeliness of auditing and to governance of VSS, which are particularly understudied areas of VSS in the literature [7,47]. The paper provides an understanding of the uptake of technologies that can address the problems of inconsistent audits [65,69,70] and discusses the constraints in adopting these practices. It therefore adds to important theoretical perspectives that are employed in the context of VSS – such as signaling theory, institutional theory (symbolic and substantive adoption), or diffusion of innovation theory [71]. Among all these theoretical perspectives, the paper contributes by providing contextual understanding of the role of IT as an intervening variable to enhance signaling, reducing symbolic adoption, and enabling diffusion of organizational practices. The previous literature has often stated the need to address the veracity and timeliness of auditing practices, but most often this is framed from a conceptual perspective [11,13] rather than providing empirical evidence—with a few

notable exceptions [14,50]. The paper also contributes to the organizational resilience literature [72,73] by providing an account of the role of IT as part of a response to an on-going crisis. In particular, it demonstrates the importance of industry preparedness in managing exogenous crises. VSS responses have shown that industry guidelines (in the context of this paper, the guidelines by IAF [8,74]) contributed to a consistent response of the VSS that chose to adopt remote auditing.

#### 5.4. Limitations

At the time of this writing, COVID-19 is in its early stages and is still developing. It is possible that VSS responses to the crisis will continue to evolve. The policies and actions reported in this study, for example, are subject to ongoing review and revision in response to rapidly changing circumstances and the impact of the pandemic on operating environments around the world. This study presents a snapshot of VSS responses during the initial phases of the COVID-19 crisis (up to April 30, 2020) and is instructive in showing how VSS reacted to a crisis that threatened the foundation of the effectiveness of their assurance model, but the complete story has yet to be written.

The study also relies on publicly-available sources. Although most VSS included in this study were proactive in communicating through their websites, it is possible they took other actions that were not publicly-reported. For example, it was not possible to access any private communications VSS may have sent directly to their clients and stakeholders. This could have included some form of consultation with their stakeholders on the temporary modifications they made in response to the COVID-19 crisis. It is also acknowledged that the focus of this study was restricted to the actions VSS took with respect to remote auditing. Many VSS responded to the pandemic in other ways, such as recognizing the implications of potential supply shortages (e.g., Rainforest Alliance), acknowledging the potential social impacts arising from the crisis (e.g., FT International), and recognizing other actions taken by companies certified to their standards, such as product donations (e.g., Bonsucro).

Finally, it was rarely possible to determine what types of technologies were used to complete remote auditing. Cases have been shared where that information was available, but further work will be needed to determine how technology was used to support the maintenance of certification services in different VSS. This could further inform ideas regarding the potential long-term implications for remote auditing and technology-enhanced auditing (TEA). Moreover, the lack of information on the use of specific technologies limits the conclusions that may be drawn regarding the future of TEA. Thinking on this issue has therefore been framed in the form of research questions, rather than propositions. Additional details on TEA are available elsewhere, particularly a report produced for ISEAL by Herding and Fischer (2015), and VSS have invested quite considerably into their capabilities alongside the ISEAL innovations fund workstream [15]. The report addresses the recent level of adoption of technologies in the context of VSS, as well as the technical and competence challenges related to adoption of TEA [54]. Castka et al. (2020) provide a comprehensive research agenda for TEA, which was developed prior to the pandemic [11]. The suggestions provided in this study may be viewed as complements, rather than replacements, for the research agendas proposed in earlier work.

### 6. Conclusions

The paper provides an early insight into the COVID-19 crisis that rapidly developed during the early months of 2020. The impact of the crisis on human lives and economic well-being has been significant and often tragic. In the context of VSS, for example, early reports suggest devastating consequences on farmers. FT International estimates that the price of cocoa will continue to drop, which will affect the entire sector. FT International also reports widespread job losses in the flower industry throughout the developing. The focus in this paper has been on the implications for remote auditing of VSS requirements, but it is important to remember the much bigger context in which the rapid transition to remote auditing occurred.

Despite the overwhelming challenges COVID-19 has created, people and organizations across the globe have demonstrated that they can take collective action to address aspects of the situation,

rapidly implement previously inconceivable change (e.g., social distancing and remote work), and, hopefully, learn from the crisis and re-evaluate what is most important. At the time of the writing of this paper, VSS were still heavily impacted by world-wide lockdowns, but it is important to stress that they have worked hard to maintain their certification services during this difficult period. This paper has provided evidence of the efforts implemented by VSS during the early stages of the pandemic. It is hoped that this work will serve not only as an account of the early actions taken to address the crisis but also as an inspiration for further adoption of technologies for remote auditing and technology-enhanced auditing in VSS. Under the right conditions, increased adoption of TEA will ensure more efficient and effective processes of certification services—and hand in hand with these improvements—increased credibility and trustworthiness that consumers have in sustainable products.

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## Appendix A

**Table A1.** Voluntary Sustainability Standards (Source: <https://www.isealliance.org/>).

VSS	Description (as Provided by ISEAL Website)	Website
Aluminium Stewardship Initiative	Standard setting and certification organisation that recognises and fosters the responsible production, sourcing and stewardship of aluminium	<a href="https://aluminium-stewardship.org/">https://aluminium-stewardship.org/</a>
Alliance for Water Stewardship (AWS)	AWS is a global multi-stakeholder initiative whose mission is to lead a global network that promotes responsible use of freshwater that is socially and economically beneficial and environmentally sustainable. AWS achieves this through a global water stewardship system, centred on the International Water Stewardship Standard, that drives, recognises and rewards good water stewardship performance.	<a href="https://a4ws.org/">https://a4ws.org/</a>
Aquaculture Stewardship Council (ASC)	ASC is an independent, international non-profit organisation that manages the world's leading certification and labelling programme for responsible aquaculture. ASC recognises and rewards responsible aquaculture through the ASC aquaculture certification programme and seafood label; promotes best environmental and social choice when buying seafood; and contributes to transforming seafood markets towards sustainability.	<a href="https://www.asc-aqua.org/">https://www.asc-aqua.org/</a>
The Better Cotton Initiative (BCI)	BCI exists to make global cotton production better for the people who produce it, better for the environment it grows in and better for the sector's future. BCI aims to transform cotton production worldwide by developing Better Cotton as a sustainable mainstream commodity. BCI works across the cotton supply chain to promote measurable and continuing improvements.	<a href="https://bettercotton.org/">https://bettercotton.org/</a>

**Table A1.** *Cont.*

VSS	Description (as Provided by ISEAL Website)	Website
Bonsucro	Bonsucro is a not-for-profit initiative dedicated to reducing the environmental and social impacts of sugar cane production. The Bonsucro Standard defines a set of globally applicable principles, criteria and indicators for sugar cane production. It aims to reduce the impact of sugar cane production on the environment in measurable ways and contribute to social and economic benefits for all concerned with the sugar supply chain.	<a href="https://www.bonsucro.com/">https://www.bonsucro.com/</a>
Fair Trade USA	Standards and certification cultivating a more equitable global trade model by certifying and promoting Fair Trade products in the United States.	<a href="https://www.fairtradecertified.org/">https://www.fairtradecertified.org/</a>
Fair Trade International (FT International)	Fairtrade International is the organisation that coordinates Fairtrade labelling at an international level. Its standards are designed to tackle poverty and empower producers in the world's poorest countries. FLO also helps producers to gain Fairtrade certification and develop market opportunities. Locally based Liaison Officers provide training, guidance on certification and facilitate relationships with buyers.	<a href="https://www.fairtrade.net/">https://www.fairtrade.net/</a>
Forest Stewardship Council (FSC)	The Forest Stewardship Council International Center is an international not-for-profit organisation established to promote the responsible management of the world's forests. FSC is a certification system that provides internationally recognised standard-setting, trademark assurance and accreditation to companies, organisations, and communities interested in responsible forestry.	<a href="https://fsc.org/en">https://fsc.org/en</a>
GEO Foundation	The GEO Foundation is a global non-profit organisation whose main activity areas include advocacy for sustainability in and through golf, guidance and standard setting, capacity building and certification. Working in close collaboration with the industry and wider stakeholders, the GEO Foundation addresses a gap in the market where cross cutting social and environmental issues for golf are addressed in a systematic way.	<a href="https://sustainable.golf/">https://sustainable.golf/</a>
Global Coffee Platform (GCP)	The Global Coffee Platform is a membership organisation of coffee farmers, trade and industry and civil society. Members work jointly towards improving economic, social and environmental conditions for all who make a living in the coffee sector. The Global Coffee Platform is founded on a voluntary Code of Conduct comprising basic social, environmental and economic practices in coffee production, processing and trading.	<a href="https://www.globalcoffeeplatform.org/accelerate-your-coffee-sustainability">https://www.globalcoffeeplatform.org/accelerate-your-coffee-sustainability</a>

**Table A1.** *Cont.*

VSS	Description (as Provided by ISEAL Website)	Website
GoodWeave	GoodWeave is a non-profit organisation that seeks to end exploitative child labour in the carpet industry and offer educational opportunities to children and support to communities affected by exploitative practices by certifying carpets and rugs free from exploitative production. To earn the GoodWeave label, rug exporters and importers must be licensed under the GoodWeave certification programme.	<a href="https://goodweave.org/">https://goodweave.org/</a>
Linking Environment and Farming (LEAF)	LEAF is a registered charity based in the UK which promotes sustainable food and farming and aims to 'inspire and enable prosperous farming that enriches the environment and engages local communities'. It designs and operates the LEAF Marque Standard—a global environmental assurance system recognising sustainably farmed products, which focuses on core economic, environmental and social requirements.	<a href="https://leafuk.org/">https://leafuk.org/</a>
Marine Stewardship Council (MSC)	MSC is a certification and eco-labelling program for sustainable seafood from wild fisheries. The council works with fisheries, seafood companies, scientists, conservation groups and the public to promote the best environmental choice in seafood globally. MSC's standards cover sustainable fishing and seafood traceability. They ensure that MSC-labelled seafood comes from, and can be traced back to, sustainable fisheries.	<a href="https://www.msc.org/home">https://www.msc.org/home</a>
Rainforest Alliance	The Rainforest Alliance is an international nonprofit organization working to build a future in which nature is protected and biodiversity flourishes, where farmers, workers, and communities prosper, and where sustainable land use and responsible business practices are the norm. We envision a world where people and nature thrive in harmony. In January 2018, the Rainforest Alliance merged with UTZ, a global program and label for sustainable farming. Our head offices are in Amsterdam and New York, with regional offices around the world.	<a href="https://www.rainforest-alliance.org/">https://www.rainforest-alliance.org/</a>
Responsible Jewellery Council (RJC)	The Responsible Jewellery Council is a not-for-profit, standards setting and certification organisation. It has more than 1,000 Member companies that span the jewellery supply chain from mine to retail. RJC Members commit to and are independently audited against the RJC Code of Practices—an international standard on responsible business practices for diamonds, gold and platinum group metals.	<a href="https://www.responsiblejewellery.com/">https://www.responsiblejewellery.com/</a>
Roundtable on Sustainable Biomaterials (RSB)	The mission of RSB is to ensure that the use of biomass and derived bio-products, including biofuels, delivers on their promises of climate change mitigation, economic development and energy security without causing environmental or social damage. The standard developed by the RSB consists of a set of normative documents and guidelines. It covers the entire biofuel value chain from "farm to tank".	<a href="https://rsb.org/">https://rsb.org/</a>

**Table A1.** Cont.

VSS	Description (as Provided by ISEAL Website)	Website
Roundtable on Sustainable Palm Oil (RSPO)	RSPO is a non-profit association that unites stakeholders to develop and implement global standards for sustainable palm oil. The RSPO has developed a set of environmental and social criteria which companies must comply with in order to produce Certified Sustainable Palm Oil (CSPO) and help to minimise the negative impact of palm oil cultivation on the environment and communities in palm oil-producing regions.	<a href="https://rspo.org/">https://rspo.org/</a>
Sustainable Agriculture Network (SAN)	SAN is an international network of NGOs focused on helping companies, producers and donors to move forward with their sustainability agenda in a practical and efficient way. SAN provides innovative, practical and credible agricultural solutions to some of the most pressing environmental and social problems of our time.	<a href="https://www.sustainableagriculture.eco/">https://www.sustainableagriculture.eco/</a>
Textile Exchange	Textile Exchange is a global non-profit that works closely with our members to drive industry transformation in preferred fibers, integrity and standards and responsible supply networks. We identify and share best practices regarding farming, materials, processing, traceability and product end-of-life in order to reduce the textile industry's impact on the world's water, soil and air, and the human population.	<a href="https://textileexchange.org/">https://textileexchange.org/</a>
Union for Ethical BioTrade (UEBT)	UEBT is a non-profit association that promotes the sourcing of natural ingredients with respect for people and biodiversity. UEBT advances practices for biodiversity innovation and sourcing that promote sustainable business growth, local development and conservation. UEBT promotes Ethical BioTrade by offering members independent verification, technical support and networking opportunities.	<a href="https://www.ethicalbiotrade.org/">https://www.ethicalbiotrade.org/</a>
UTZ	UTZ is a global program and label for sustainable farming. In January 2018, we merged with the Rainforest Alliance, an international nonprofit organization and certification program, taking the Rainforest Alliance name. Together, we are working to build a future in which nature is protected and biodiversity flourishes, where farmers, workers, and communities prosper, and where sustainable land use and responsible business practices are the norm. We envision a world where people and nature thrive in harmony. Our head offices are in Amsterdam and New York, with regional offices around the world.	<a href="https://utz.org/">https://utz.org/</a>

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