Second-party international remote audit in food safety management in the context of post-pandemic developments

Auditoria remota internacional de segunda parte na gestão da segurança alimentar num contexto de evolução pós-pandémico

Auditoría internacional a distancia de segunda parte en la gestión de la seguridad alimentaria en el contexto de la evolución pospandémica

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ABSTRACT  
This study aims to evaluate the post-pandemic scenario regarding to auditing practices in the food safety management, considering the international food supply chains by means of remote or hybrid protocols auditing, as well as such practices impact in the supplier’s qualification efficiency. A bibliographical review of the published scientific articles about the experience of several countries which conducted research in order to capture the stakeholders’ perception involved in remote audits, as well as comparing with Multiple Study Cases of remote auditing carried out by the author, with a descriptive and qualitative statistics in the last twenty-four months are presented. As a result, one hundred per center remote auditing protocols may be effective as part of the process used by companies to qualify international suppliers of food supply chains by following the principles already set in the best practices identified in academic research.

Keywords: management system, remote audits, supply chains, supplier qualification, food safety.

RESUMO  
Este estudo tem como objetivo avaliar o cenário pós-pandêmico em relação às práticas de auditoria na gestão da segurança de alimentos, considerando as cadeias internacionais de suprimento de alimentos por meio de auditoria remota ou de protocolos híbridos, bem como o impacto dessas práticas na eficiência da qualificação dos fornecedores. Foi realizada uma revisão bibliográfica dos artigos científicos publicados sobre a experiência de diversos países que realizaram pesquisas para captar a percepção das partes interessadas envolvidas em auditorias remotas, bem como a comparação com Casos de Estudos Múltiplos de auditoria remota realizados pelo autor, por meio de estatística descritiva e qualitativa nos últimos vinte e quatro meses são apresentados. Como resultado, 100% dos protocolos de auditoria remota podem ser eficazes como parte do processo usado pelas empresas para qualificar fornecedores internacionais de cadeias de suprimento de alimentos, seguindo os princípios já estabelecidos nas melhores práticas identificadas em pesquisas acadêmicas.

Palavras-chave: sistema de gerenciamento, auditorias remotas, cadeias de suprimentos, qualificação de fornecedores, segurança de alimentos.

RESUMEN  
Este estudio tiene como objetivo evaluar el escenario post-pandémico en relación con las prácticas de auditoría en la gestión de la seguridad alimentaria, considerando las cadenas internacionales de suministro de alimentos por medio de protocolos de auditoría a
distancia o híbridos, así como el impacto de tales prácticas en la eficiencia de la calificación del proveedor. Se presenta una revisión bibliográfica de los artículos científicos publicados sobre la experiencia de varios países que realizaron investigaciones con el fin de captar la percepción de las partes interesadas involucradas en las auditorías remotas, así como la comparación con Múltiples Casos de Estudio de auditoría remota realizados por el autor, con una estadística descriptiva y cualitativa en los últimos veinticuatro meses. Como resultado, el cien por cien de los protocolos de auditoría remota pueden ser eficaces como parte del proceso utilizado por las empresas para calificar a los proveedores internacionales de las cadenas de suministro de alimentos, siguiendo los principios ya establecidos en las mejores prácticas identificadas en la investigación académica.

Palabras clave: sistema de gestión, auditorías a distancia, cadenas de suministro, cualificación de proveedores, seguridad alimentaria.

1 INTRODUCTION

Throughout this article, the sequence of factors which have been leading to a significant increase (Gartner, 2021) in the use of remote audit protocols for the last 3 years in a context of post pandemic production, also their justification and propositions will be presented.

In April 2023, the end of the Covid-19 pandemic was declared by the WHO (United Nations, 2023). However, the learning gained in this period by the food supply chain and other organizations’ sectors have not been stagnant to the moment as the World Economic Forum (WEF, 2020) coined as the Great reset. Therefore, such movement continues to develop alongside with the academia and private industries that need to distribute their products in an increasingly global chain as it will be further demonstrated in this research.

The food and service supply chains needed to be quickly inserted into a digital transformation process (Santos et. al, 2022), to the extent of supplying their products to the next link in the supply chain or to final consumer.

The digital transformation has allowed non-intrinsically activities associated with the industrial production process of consumer goods to be carried out remotely through information systems and technology, also known and popularized as teleworking (CNI,
2023) not only in Brazil but around the world (International Labor Organization, 2023).

The operations management of industrial processes have also been impacted by new remote management practices as well as digital performance evaluation tools (Mchugh, 2023) those consequently affecting the food safety management systems associated with food production by changing the focus to a more procedure and process-oriented behavior (Maiberger, 2023) that drives the development of an organizational safety culture (FDA, 2022).

To assess the effectiveness of Quality and Environmental Management Systems, the International Organization for Standardization released the latest version of the ISO19011 standard in 2018 – Guidelines for Management Systems Audits. Such standard regulated by Brazilian Association of Technical Standards (ABNT) in May 2019 (ABNT, 2018) in a Brazilian NR (Brazilian National Standards). Hence, this is the protocol authorized by the National Institute of Metrology, Standardization and Industrial Quality (INMETRO) since 2006 through Ordinance No. 027, February 9, 2006.

Although it has not been this standard’s main focus, the ‘Annex A - Additional Guidance for Auditors to Plan and Conduct Audits’ concerns at its core the two guidelines aimed at remote auditing protocols, as it follows: ‘A.15 Visiting the audited person location – Virtual audit activities’ – and ‘A.16 Activities and virtual environments audit’.

Given the post-pandemic scenario and the relevance of maintaining the food supply chain, it is imperative to recognize: Which practices acquired in that period will be replicated or improved by the ones involved in this process in order to obtain a better result in the certification of suppliers and customers management, in a sustainable and socially responsible way?

This article aims at answering the above question by conducted research on the most current information in regard to this topic (Deuss at. al, 2023), in addition to presenting multiple case studies of second-party remote audit protocols carried out by the author located in Brazil; also, exposing the practical results of the applied methods. The Theoretical Framework introduces the regulatory process of remote audits in the pre, during and post-pandemic periods. The Methodology presents the selected cases, evaluation and criteria defined in a 2-year period. The Data Analysis shows a discussion of the results obtained. The Conclusion demonstrates the overall research summary and suggestions of
further steps.

2 THEORETICAL FRAMEWORK

The theoretical framework is distributed in 3 stages in this paper. First, the regulatory context at the beginning of the pandemic in regard to the premises for conducting remote audits were being built as the event progressed. Secondly, the evaluation of the protocols of the application result and the factors which influenced remote audits in several countries and regions. Finally, the development of the protocols being defined by the main global actors for the possibility of a standardization of remote food safety audits in the supply chain.

2.1 PRE-REGULATORY CONTEXT OF REMOTE AUDITS DURING THE PANDEMIC

In Brazil, through Ordinance No. 111 of March 27, 2020, the INMETRO approved the implementation of remote audit activities during the pandemic period:

‘It hereby approves extraordinary conditions for the assessment of the conformity of activities during the COVID-19 pandemic’ (Inmetro, 2020)

This remote audit regulation process has taken place in all countries to maintain safe custody of the food supply chain certification in order to operate with the support of the The International Forum of Independent Audit Regulators which published on 04/16th /2020 the ‘ISO 9001 Auditing Practices Group Guidance on: Remote Audits’. This guide establishes the main guidelines of the remote audit protocols for the globally certification bodies (IAF, 2020).

On one hand, to remotely implement the laboratory accreditation of the food industries in the ISO17025 standard, the INMETRO published the ‘Implementation of Remote Assessments/Inspections Policy of the Conformity Assessment Bodies of Testing in Specific Cases’ which has a series of normative instructions defining criteria, technology, methodology, among other parameters for the protocols of remote audits (INMETRO,
2022), since laboratories are crucial to analyze the need for licensing food products from companies in the food supply chain.

On the other hand, the certification schemes awaited the accreditation bodies, for instance, the GFSI (Global Food Safety Initiative) which on 06/20/2020 published some guidelines on what extent 100% remote audits should be carried out (GFSI, 2020). The aforementioned guidelines were updated in 2022 (GSFI, 2022). GMP+ International, the largest food product certification body for the slaughter and pet food supply chain, published decrees for certification bodies to execute the remote audits in 2020 (GMP+, 2024). In spite of that, on 04/21/2021, the GMP+ published a Q&A guideline on remote audits in its supporting documents (GMP+ 2024a).

BRCGS (Brand Reputation Compliance Global Standards), a certification body based on GFSI standards, published and updated in January 2023 the guidelines for remote audits (AIB, 2023). In the option 3 of the certification guidelines, the BRCGS informs that it can implement 100% remote certification to the ‘Gluten-free, Storage and Distribution, Packaging and Food Safety, Start!’ standards. FSSC22000, an acronym for ‘Food Safety System Certification 22000’, released the guidelines for 100% remote audits during the pandemic in October 2020 (FSSC22000, 2020).

At that time, the guidelines presented how to perform a risk assessment of the certified company, general principles and remote audit planning. The FSSC22000 is an important reference in remote audits in our region due to the fact that it holds more than 50% of the food safety management systems certifications market in Brazil.

The audit protocol of remote audits once regulated by the National Institute of Metrology, Standardization and Industrial Quality (INMETRO), the International Accreditation Forum (IAF), the Accreditation and the Certification Bodies, the certifying companies altogether with SGS, DNV, Intertek, BSI, LRQA, among others, were able to establish the rules for the maintenance and certification audits of food safety management systems (SGS, 2020).
2.2 THE CONTEXT OF THE RESULTS OF THE REMOTE AUDIT PROTOCOLS APPLICATION

The remote auditing protocols identified in academic research presented below shows the challenges faced by many countries and institution to keep the supply chain working out during the pandemic period with the usage of this evaluation mechanism which were effective in fulfill the proposed goal.

Brazil. Barretto et. al., (2022) published an article on a systematic approach to planning and conducting remote audits using the Microsoft Teams digital platform for environmental and safety audits on oil platforms. The system was approved by The Brazilian National Agency of Petroleum, Natural Gas and Biofuels and included the ISO9001 quality management system.

Iraq. (Al-taee, 2023) conducted a virtual survey on risk management and risk assessment with 27 companies and 127 audit offices in the country. The consensus established that the auditing would be one of the biggest challenges for auditors, remote audit protocols might nonetheless be introduced by external auditors and customized so it may meet unique demands of their customers.

United States. (Carlisle, 2021) analyzed the role of virtual and personal communication among the accounting auditors of the American Auditory Society. The obtained results showed no preference among auditors. This is a fundamental information given that the digital systems currently provide virtual interaction through video conferences. In his article (Raphael, 2023), from Delloite company, registered his main research observations with thousands of audit firms, considering: Focus on real matters, make work possible beyond space and time inside the company and look at the human side of working remotely.

Romania. (Farcane, 2023) evaluated the different factors influencing the adaptations of activities for remote auditors. Auditors note that audits are significantly influenced by the digitization degree and meanwhile companies adopt emerging technologies in the workplace, the remote audit protocols effectiveness are improved, as well as this work being possibly minimized.
Australia. (Gehrmann, 2021) demonstrates his surveyed research outcomes under a remote evaluation assistive technology for 33 health bodies analyses as well as economic, environmental, and social benefits of remote protocols in comparison with 2020 and 2021, respectively. However, 60% of the remote audit assistive technology users have approved the results and the efficiency of the used method.

Serbia. (Jakovljević, 2022) registered in his publication his findings result regarding remote work in auditing in the public and private sectors in the Republic of Serbia. The main conclusion of the article is that most auditors choose hybrid work (remote and face-to-face), although the government and private companies have different behaviors as employers, one as being more flexible while the other determined 100% face-to-face work.

Indonesia. (Harsanto, 2022) described his research under the implications of the technology on the performance of business management by addressing the issue of the remote audit protocols quality. The one investigated concluded that the investments in information technology play a crucial role in improving the company’s environment for managing remote audits and business roundtable.

China. (Jin, 2021) carried out his research on Field Evidence about remote audits. It could be identified that junior auditors unfamiliar with the location to be audited had a negative impact on audits. Furthermore, the authors recommend adjusting audit procedures, better risk assessment and data analysis, as well as the exploitation of information and communication technologies as they might improve the effectiveness of remote auditing.

Poland. (Prasalska, 2021) investigated the remote inspections chain of custody for the management systems certifications maintenance during the pandemic. The remote inspections have been positively approved and are measurable for decision-making related to keeping the expiration of certificates issued by the certifying bodies. In his findings, Wiśniewska, 2022, recorded the lessons learned from the external and internal remote audit process, among the main ones are: the relevancy documents or records should be readily available; to verify in advance to what extent the applied information technology is efficient, effective and accessible to all stakeholders during the audit and to make sure in advance that all tangible and intangible resources are available during the audit.
Considering all countries where remote audit protocols have been applied, lessons were learned regarding the principles and practices of auditing, the use of technology, digitization of information, information system, remote communication applications and all these factors evaluated reinforce the need of advancing in new models of maintaining the food supply chains for the qualification of suppliers in an innovative way.

2.3 THE CONTEXT OF THE POST-PANDEMIC EVOLUTION OF REMOTE AUDIT PROTOCOLS

In June 2022, the World Trade Organization held a Thematic Session on the Use of Remote (Virtual) Audit and Verification in Regulatory Frameworks. Representatives of several countries attended this event as well as institutions such as the Organization for Economic Cooperation and Development, the Global Food Safety Initiative, CODEX/Food and Agriculture Organization focusing on sanitary and phytosanitary measures. A summary of the established consensus is in Annex B of the document generated at event G/SPS/R/107 (WTO, 2022).

In the week of April, 2023, the GFSI Conference, currently the global largest event driving trends in the food safety scenario, was held with the following theme: ‘2023: Delivering Safe Food in Turbulent Times: The Need for Agility & Resilience’ (GFSI, 2023). One of the lectures was given by Dr. Annelies Deuss with the topic: ‘Public-Private Partnerships Collaboration Track - The Efficiency and Effectiveness of Remote Audits for International Food Safety’. It was developed with the information from his study on ‘Costs, benefits and effectiveness of remote audits for international food safety’ which represents the best developed research and general guidelines on the subject currently sponsored by the OECD (Deuss, 2023) as well as a guide for the elaboration of public policies on the subject.

On 06/23rd/2023, the FAO through its Codex Committee on Food Import and Export Inspection and Certification Systems (CCFICS) of the Codex Alimentarius published the 5/8 step of the process of a guide elaborated for remote inspections and auditing in the regulatory context (FAO, 2023).

In this paper, one of the steps registered by these institutions focused on global
trade, while another focused on the private sector and on the technical structuring of requirements for remote audits, all recognized worldwide, demonstrating that very soon, remote audits will be part of the daily processes of conformity assessment of food safety management systems of the companies involved in this supply chain by customers and suppliers, certification bodies and governments of each country.

3 METHODOLOGY

The methodology framework used in this article presented the descriptive qualitative research (Carvalho et al., 2020; Fortunati et al., 2020) with the following steps: 3.1) Case Selection, 3.2) Case Study Model, 3.3) Data Collection, 3.4) Evaluation Methodology, and 3.5) Limitations of Case Studies as a Research Method.

3.1 CASE SELECTION

The remote/hybrid audits selected for the case study identified in Table 1 below met the following requirements:

a) Performed by the same food safety auditor in order to avoid professional bias in telework in the municipality of Uberlandia, Minas Gerais, Brazil.

b) The food safety management systems were certified and audited by certifying companies for more than 5 years, which demonstrates maturity.

c) Providing products for a distinct Customer/Market from its country, which increases the remote auditing complexity.

d) There were 2 selected companies with the final consumer product (RTE – higher risk for food safety) and 2 selected companies for the next link in the supply chain (B2B – lower risk for food safety), considering each Research group.

e) All selected companies are human or animal consumption food producers.

f) 50% of the cases are of companies that received 100% remote audit without the presence of the auditor at any time during all phases of the audit protocol (due to the period of travel restrictions by the sanitary rules of isolation set in the covid-19 pandemic in the evaluated places). Moreover, 50% of the cases are of
companies with the presence of the auditor in the premises for a period of the audit time defined in the table ‘Duration’ (by the reduction of sanitary isolation travel restrictions in the end of the pandemic period).

g) For all cases, it is a remote audit for the scope of only one product supplied (various packaging and in bulk configurations) and 1 HACCP plan evaluated.

h) 100% remote audits meet the following requirements (Gartner, 2022c; ISO19011, 2018; GFSI, 2020):

1. Visit the facilities by means of synchronous video broadcast or recorded video before and during the audit.

2. Synchronous video interviews with the companies’ representatives.

3. Documents and registers presentation by means of synchronous video.

4. Execution of real-time product traceability exercise during the audit execution period.

5. Auditor located in the same physical location, similar Internet quality and Microsoft Teams and/or WhatsApp applications.

i) Taking into account all the study cases audit, the written and digital communications with the audit company were carried out in the country’s native language, where the company was located.

Table 1: Audited Companies

<table>
<thead>
<tr>
<th>Audited Language</th>
<th>Country of supply</th>
<th>Country of the Customer</th>
<th>SGIA Certificate</th>
<th>Audit Type</th>
<th>Type of Supplied Product</th>
<th>Duration</th>
<th>Used Protocol</th>
<th>Report</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Portuguese</td>
<td>Brazil</td>
<td>Europe</td>
<td>GMP+ 2010</td>
<td>100% Remote</td>
<td>16 hours</td>
<td>FSSC22000</td>
<td>Portuguese</td>
<td>2021</td>
</tr>
<tr>
<td>B</td>
<td>Portuguese</td>
<td>Brazil</td>
<td>Europe</td>
<td>BRCGS</td>
<td>100% Remote</td>
<td>16 hours</td>
<td>FSSC22000</td>
<td>English</td>
<td>2021</td>
</tr>
<tr>
<td>C</td>
<td>Spanish</td>
<td>Italy</td>
<td>Brazil</td>
<td>IFS</td>
<td>100% Remote</td>
<td>8 hours</td>
<td>FSSC22000</td>
<td>Spanish</td>
<td>2022</td>
</tr>
<tr>
<td>D</td>
<td>Spanish</td>
<td>Argentina</td>
<td>Italy</td>
<td>FSSC22000</td>
<td>100% Remote</td>
<td>8 hours</td>
<td>FSSC22000</td>
<td>Portuguese</td>
<td>2022</td>
</tr>
<tr>
<td>E</td>
<td>Spanish</td>
<td>Honduras</td>
<td>USA</td>
<td>BPM and BAP</td>
<td>Hybrid</td>
<td>24 hours</td>
<td>FSSC22000</td>
<td>Spanish</td>
<td>2022</td>
</tr>
<tr>
<td>F</td>
<td>Spanish</td>
<td>Chile</td>
<td>USA</td>
<td>BAP, BRCGS</td>
<td>Hybrid</td>
<td>16 hours</td>
<td>FSSC22000</td>
<td>English</td>
<td>2022</td>
</tr>
<tr>
<td>G</td>
<td>Spanish</td>
<td>Argentina</td>
<td>United Kingdom</td>
<td>BRCGS</td>
<td>Hybrid</td>
<td>16 hours</td>
<td>FSSC22000</td>
<td>English</td>
<td>2023</td>
</tr>
<tr>
<td>H</td>
<td>Portuguese</td>
<td>Brazil</td>
<td>USA</td>
<td>HACCP + BPF</td>
<td>Hybrid</td>
<td>16 hours</td>
<td>FSSC22000</td>
<td>English</td>
<td>2023</td>
</tr>
</tbody>
</table>

Source: Author.

3.2 CASE STUDY MODEL DESIGN

The study case design based in Greiner (2019), 6 steps for certification auditing are included in accordance with the IAF by utilizing technologies for the remote auditing.
In addition to that, Prasalska (2021) compared the remote auditing protocols with the face-to-face ones through a satisfaction survey questionnaire.

3.3 DATA COLLECTION

As a data collection tool, it was defined a structured checklist according to the FSSC22000 version 5 standard (FSSC22000, 2019) with a total of 96 questions about the management system, prerequisite program and HACCP plan.

The collected data verification method was a triangulation by use of:

a) Direct observation as mentioned in item 2.1.h.i, ii, iv;
b) Interviews as mentioned in item 2.1.h.ii
c) Document analysis as mentioned in item 2.1.h.iii

3.4 EVALUATION METHODOLOGY

An evaluation methodology of the company investigated was defined in this structured research according to the critical, major and minor non-compliance criteria (NC) of FSSC22000 (2021).

Level of risk: The capacity of the 100% remote and/or hybrid audits results to quantify the level of risk of the audited companies through scores obtained in the standardized questionnaires applied in high, medium or low to produce products unsuitable for the final consumer or near link in the chain.

a) Disqualified -> 1 or more NC Criticisms
b) High -> More than 2 NC major and/or 8 minors
c) Medium -> More than 1 NC higher and/or 8 lower
d) Low -> Zero NC major and/or > 5 minor

3.5 LIMITATIONS OF THE MULTIPLE STUDY CASES IN THIS RESEARCH

Not all the certifying auditing companies pursue the total defined requirements in the FSSC22000 check-list, which is considered as a disadvantage for the A and F
companies of Table 1, and also a situation with the impossibility of harmony in this study. The amount of SGSA workers, the certifying time and the company foundation must not be equalized due to the fact that it differs from each business management.

The produced products, whether human or animal consumption, as well as the percentage of face-to-face and remote audit carried out in hybrid auditing could not be selected considering that they were defined by the company surveyed.

4 RESULTS AND DISCUSSIONS

The audits of this case study are described in Table 1, thus in this section including the following features: language, the country where the company is located, total employees, total food safety employee’s management, foundation period, certifying period, HACCP total plans, scope total products, target public, workload, auditing report language, used data collection methods.

4.1 AUDIT TYPES OF PROTOCOLS

4.1.1 100% Remote Auditing

**Company A:** Portuguese, Brazil, 209 employees, 5 SGSA employees, + 20 years in the market, +5 certifying years, 1 HACCP plan, 1 product in the auditing scope, animal consumption, 16 auditing hours, Portuguese, synchronous video broadcast, photos, synchronous video interview, synchronous and asynchronous document analyses.

**Company B:** Portuguese, Brazil, +1.000 employees, 38 SGSA employees, + 19 years in the market, +5 certifying years, 1 HACCP plan, 1 product in the auditing scope, animal consumption, 16 auditing hours, English, synchronous video broadcast, photos, synchronous video interview, synchronous and asynchronous document analyses.

**Company C:** Spanish, Italy, +47 employees, 4 SGSA employees, 15 years in the market, +5 certifying years, 1 HACCP plan, 1 product in the auditing scope, animal consumption, 8 auditing hours (divided into 4-hour sections due to time zone), Spanish,
synchronous video broadcast, photos, synchronous video interview, synchronous and asynchronous document analyses.

**Company D:** Spanish, Argentina, 240 employees, 3 SGSA employees, +20 years in the market, +5 certifying years, 1 HACCP plan, 1 product in the auditing scope, animal consumption, 32 auditing hours, Spanish, synchronous video broadcast, photos, synchronous video interview, synchronous and asynchronous document analyses.

### 4.1.2 Hybrid Auditing

**Company E:** Spanish, Honduras, +250 employees, 6 SGSA employees, +20 years in the market, +5 certifying years, 1 HACCP plan, 1 product in the auditing scope, animal consumption – slathering and pet, 24 auditing hours, Spanish, face-to-face data collection (50% remote, 50% face-to-face).

**Company F:** Spanish, Chile, +1300 employees, +60 SGSA employees, +25 years in the market, +10 certifying years, 1 HACCP plan, 1 product in the auditing scope, human consumption, 16 auditing hours, Spanish, face-to-face data collection (20% remote, 80% face-to-face).

**Company G:** Spanish, Argentina, +1200 employees, +20 SGSA employees, +25 years in the market, +10 certifying years, 1 HACCP plan, 1 product in the auditing scope, human consumption, synchronous video broadcast, photos, synchronous video interview, synchronous and asynchronous document analyses (in relation to a system outage in the audit company during face-to-face visit), (50% remote, 50% face-to-face).

**Company H:** Portuguese, Brazil, +200 employees, +4 SGSA employees, +40 years in the market, +10 certifying years, 1 HACCP plan, 1 product in the auditing scope, human consumption, 16 auditing hours, Portuguese, face-to-face data collection (50% remote, 50% face-to-face).
4.2 100% REMOTE AND HYBRID AUDITING RESULTS

The auditing results are registered according to Table 2 below:

<table>
<thead>
<tr>
<th>Company</th>
<th>Criteria</th>
<th>Level of Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 Critics NC</td>
<td>1 Major NC</td>
</tr>
<tr>
<td>B</td>
<td>0 Critics NC</td>
<td>0 Major NC</td>
</tr>
<tr>
<td>C</td>
<td>0 Critics NC</td>
<td>0 Major NC</td>
</tr>
<tr>
<td>D</td>
<td>0 Critics NC</td>
<td>1 Major NC</td>
</tr>
<tr>
<td>E</td>
<td>0 Critics NC</td>
<td>2 Major NC</td>
</tr>
<tr>
<td>F</td>
<td>0 Critics NC</td>
<td>0 Major NC</td>
</tr>
<tr>
<td>G</td>
<td>0 Critics NC</td>
<td>0 Major NC</td>
</tr>
<tr>
<td>H</td>
<td>0 Critics NC</td>
<td>0 Major NC</td>
</tr>
</tbody>
</table>

Table 2 – The auditing results according to the 3.4 item established criteria.

When showing the results on Table 2, the issues raised by the international surveyed authors listed in the 2.2 of this research was the same like audit customization (AL-TAEE, 2023) for all companies; digitalization degree as stated by Farcane (2023) on company H which made available before audit day all information on a google drive locked to the auditor; available resources in place during the audit recorded by Wiśniewska (2022) on companies C and G, one due to all procedures to be in Italy language, the other for lost of time to interview a person which was not programmed by the quality team.

As part of the limitations of the registered research in the 3.5 item, it is confirmed that, by the use of defined criteria, it was possible to qualify the companies in their level of risk, respectively, (Deuss, 2023), while providing inappropriate products for consumption, as well as evaluating the remote auditing results in accordance with ISO19011(2018) and GFSI (2020), such criteria defined by FSSC22000 (2021).

Gartner (2022a) illustrates the sequence of steps to be followed in order to perform the remote management auditing to suppliers. Step 2 - To prepare the supplier for the remote auditing process - 4 steps specifically followed by the research company in all the 8 selected cases.

All the video technology resources cited by Gartner (2022b) were utilized in companies A to H. The 100% remote group companies (A - D) took a virtual tour inside industrial facilities through a live broadcast of productive operations. The restricted areas
were not accessed due to the risk of explosion (classified areas), or the ones in case of force majeure were video recorded and photographed during the auditing. The required documents by the auditor were scanned and visualized by video technology or sent via WhatsApp or E-mail in company A. For every auditing company include, a confidentiality agreement was issued by e-mail requesting the audit.

The remote auditing may be part of a process of qualification of suppliers in the food supply chain as stated by Howlett (2019), while listing the used mechanism during the evaluation procedure, as it follows: GFSI certification, food fraud records, products collection records, the volume of the acquired products, food defense plan, food fraud, quality certification emission and food contaminants analysis, among others.

The surveyed company uses a weighting system and a similar method in order to qualify the final supplier, including a remote auditing and a verification system which may be described as the auditing itself or evaluation (Camerini, 2019). Altogether with such qualification of the method, the result discrepancies among the declared and non-declared auditing will be minimized, also, it is presented more reliable outcomes than the ones found by Kosola et. al, (2022), in Finland.

The management of food safety systems are verified in a virtual form (Suraj, 2023), and, the FSSC22000 standard merges the requirements as exemplified by Kenner (2022), in which the evaluation results of other third-party auditing were carried out in four main requirement groups, according to the company research. It may be incorporated in a 4-level management group, and consequently, the mitigation measures for the risks will be taken considering its level of risk.

4.3 COMPARISON WITH THE 100% REMOTE AUDITING RESULTS VERSUS THE HYBRID ONES

The factor affecting level of risk to be at least compared is the proportion of food safety (FS) and quality (Q) responsible people number versus total employee task force of the companies. It seems that companies with better percentage of FS/Q person have a better level of risk evaluation results like companies B, C, F and G when compared to others.
The research findings demonstrate the lack of distinction between the 100% remote and hybrid audits, regarding their evaluation of efficiency by visualizing the degree of risk and effectiveness of audits taking into account the perception of the auditor and the ones audited for the multiple cases study analyzed. A similar result was found by Eulerish (2022) in his research on assessing remote internal audits.

The fact is that 100% of remote auditing during the pandemic period were sufficient as a guidance for the company’s decision and taking mitigating measures in the perspective of food safety for each evaluated company, in conformity with its level of risk. The auditor independence in the qualification of supplier’s process in the case studies were also stated as a key factor for the remote auditing efficiency process, as claimed by Ta (2022) in his research in Vietnam.

The 100% remote auditing, in comparison with the hybrid ones, require a major recognition by the auditor in a productive environment, so that it might facilitate the observations of real-time or recorded videos. Such factor observed by Amudsen (2019) while examining the distance between the sustainability standards and the productive environment. In order to minimize the situation, the surveyed company relies on experts in the risk of produced products for all companies from A to H, and also, during the auditing, the last supplier results are evaluated, customer compliances are recorded, as well as collections, governmental inspections’ results, recall and withdrawal and other documents.

The 100% remote auditing requires an improved skilled auditor for dealing with the communication applications, enabling him to register the evidences and confirmations within the time set, as declared by Indudewi (2023) in his research in Indonesia. In all selected cases, the Microsoft Teams application was used for interviews broadcast, document register and analyses, real-time filmmaking of the supplier’s installations.

Mahmud et. al, (2023) found a way of signing the video broadcast during the agricultural remote auditing in order to avoid fraud and hacker attacks during the process. Although being of main concern, both parts are informed in advance and there is no information leakage to any other third parties. To complement the collected information during remote audit, one might use the images in the Closed-circuit television system of
the supplier, also use the Google Earth images for being able to visualize the facility’s perimeter and its surroundings.

Some protocols are important when it comes to second-party international remote audits, including those referring to the time zone and communication application (Moti-Otiwalla, 2022). For the cases studied in this research, the audit was defined according to the time zone of the audited supplier country and the communication tested a week in advance. Suppliers also performed a video broadcast testing before auditing in order to reach areas of the company where with no data transmission coverage, also providing alternative means of recording footage.

To conclude, another essential activity to ensure the effectiveness of a remote auditing is to conduct the real-time traceability activity (Agroknow, 2022; BRCGS, 2022; Burke, 2020). Such activity might be completed by using the invoice of a product sent by the supplier or a raw material, as well as an input used in the productive process.

5 CONCLUSIONS

The research presented the practical protocols results of the international second-part remote audits carried out on a telework basis from the city of Uberlandia, in Minas Gerais - Brazil, during a pandemic of global scale. The 100% remote auditing protocols may be effective whether used as part of a qualification process of international suppliers from the food supply chain, following the pre-established principles in the best identified practices and academic research, also the practical experience gained from the multiple cases studies surveyed in this article to evaluate the degree of risk of GFSI and GMP+ certified suppliers. This research contributes to the development of risk management practices in the international food supply chain in relation to the qualification of suppliers with food safety management systems, including the best standards application protocol of remote audits research, which have been built by the stakeholders involved in this process. On the other hand, this research might be extended with the sample of news auditors from other countries using other technologies like artificial intelligence to quantify results of 100% remote audits, as well as the calculation of reduced greenhouse
gas emissions on trips saved.

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