# *IMPACT OF VIRTUAL SUPPLIER AUDITING ON MITIGATING SOURCING RISK: THE CASE OF FONTERRA BRANDS LANKA*

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# Abstract

The worldwide pandemic scenario has changed how operations are carried out and restricted travel, which has brought focus to virtual supplier auditing. At the same time, Fonterra Brands Lanka, came up with the innovative idea of conducting their supplier audits on virtual platforms. The new process had been tested in 2021, but there was resistance to change based on the risk of sourcing that has been audited virtually as opposed to physically. Accordingly, this research is conducted to identify the impact that virtual supplier auditing has on sourcing risk. The research is carried out in quantitative methodology to gather data on the overall view of the majority staff members on the means of mitigating sourcing risk when suppliers are been audited virtually. The results of the study reveal that the effective preparation, encompassing factors such as the careful assembly of the audit team, the development of well-structured audit schedules, utilization of checklists, and seeking guidance from experts, can serve to alleviate the sourcing risk. Further, the virtual supplier audit is a more effective method in both monetary and time-saving aspects if it is practiced while maintaining standards.

**Keywords:** *Supply Chain Efficiency, Sourcing Risk, Virtual supplier Audits*

# Introduction

The ongoing impact of the Covid-19 pandemic has led to consistent disruptions in business interactions. The rate of infection continues to exhibit unpredictable fluctuations, prompting businesses to explore novel strategies for carrying out their routine operations in the context of the "new normal." This state of affairs is expected to persist in the foreseeable future. Notably, the supply chain industry, a crucial segment of the business landscape, grapples with distinctive challenges in the current climate. Quarantines, travel restrictions, social isolation measures, and other consequences of the pandemic have frequently disrupted supply networks (Guillot, 2020). The dairy industry, like many others, faced significant supply chain disruptions during the height of the pandemic. Lockdowns, travel restrictions, and quarantine measures affected the movement of goods, impacting the sourcing of raw materials and the distribution of dairy products. While these disruptions have somewhat stabilized, there remains a heightened awareness of supply chain vulnerabilities. Consequently, one of the central issues stemming from the enduring pandemic crisis is the decrease, and in certain instances, the complete absence of supplier audits, a situation that has the potential to yield substantial adverse consequences. Customers are now adopting the use of virtual supplier audits, which has been made possible by contemporary technology, in order to reduce the use of physical audits with suppliers and fulfil the parties' contractual responsibilities. Hence, it is significance of the study lies in the aspect that supplier auditing is an essential part of managing sourcing risks for any organization that relies on suppliers for its operations. Hence, the principal objective of this research is to examine the sourcing risk linked to the introduction of virtual supplier audits concerning Fonterra Brands Lanka (FBL) and research on the methods that can be used in mitigating the sourcing risk.

## Research Gap

Discussing on the practice gap, it stems primarily from the nature of the company's involvement in the production of consumable goods, making it paramount that the end product reaching the consumer meets the anticipated quality standards. Consequently, the quality of raw materials must be diligently upheld. Moreover, the primary packaging comes into direct contact with the product, meaning that any flaws in the primary packaging can have a direct impact on the product. Equally crucial is the secondary packaging, as it represents the first impression made on the customer. Even though there has been a certain degree of stabilization in the Covid-19 situation, safety precautions persist. Furthermore, the emergence of other viruses like monkeypox presents ongoing challenges to physically conducting audits.

Hence, conducting audits online has emerged as a viable and innovative approach, offering flexibility that can be adapted to the specific circumstances of application (Pinheiro et al., 2020). However, the primary concern lies in the elevated risk associated with sourcing after conducting virtual audits. Additionally, the practice of virtual supplier auditing has encountered practical challenges related to technological factors, such as inadequate signal coverage, and not all participants being technologically adept.

In terms of the literature availability, the term auditing is a concept that is in common use, and it has been defined by many scholars. Nonetheless, the notion of virtual supplier audits has gained prominence in recent times, and consequently, there have been relatively few studies conducted in this domain. According to Gilbert et al. (2020), audits that employ technological tools and are executed remotely are categorized as "virtual supplier audits." Scholars have acknowledged the need for digitizing various tasks in response to the effects of globalization, but there is limited empirical evidence regarding how audits can be effectively conducted using this approach. Conversely, the dependent variable examined in this research, which is sourcing risk, has been the subject of numerous studies, particularly in pre-Covid contexts. Hence, there exists a literature gap.

Furthermore, Limited theories are directly pertinent to supplier auditing. The primary theoretical foundation for this study aligns with the Theory of Constraints, which posits that the performance of a supply chain is inherently constrained by its weakest component.

In the context of sourcing risk, theories rooted in risk management, when integrated with theories in supply chain management and procurement, can offer valuable insights. Several relevant theories encompass organizational decision-making theory, resource dependency theory, and, from an economic perspective, agency theory, transaction cost analysis, and game theory, all of which exert influence on sourcing risk. Consequently, it becomes evident that a potential theoretical gap exists.

## Problem Statement

Since adopting virtual supplier auditing at FBL is a novel concept, the company is not aware of the level of sourcing risk involved and the different mitigation techniques that can be used to overcome the practical issues like insufficient signal coverage and tech aversion among participants, affecting the audit's effectiveness.

## Research Objectives

The primary objective of this study is to identify the current risks associated with purchasing packaging material from suppliers who have undergone virtual auditing and then to look for risk mitigation strategies in order to maximize the benefits of virtual auditing. The three objectives below are taken into consideration for this reason.

1. **To identify the dimensions of Virtual Supplier Auditing.**
2. **To exploring the dimensions of Sourcing Risk.**
3. **To examine how virtual supplier auditing impact on mitigating sourcing risk.**

# Literature Review

The literature review offers a thorough evaluation of prior works pertaining to the research topic, equipping the researcher with the knowledge and foundation necessary to understand and engage in discourse about that specific field of study.

## Virtual Supplier Auditing

"Remote auditing" denotes the process in which auditors utilize data analytics and information and communication technology (ICT) to assess and report on the accuracy of financial data, internal controls, gather electronic evidence, and communicate with the audited entity, regardless of the physical location of the auditor (Teeter et al., 2010). Future investigations into the technological and behavioral dimensions of remote auditing will be guided by the two primary enabling elements of the virtual audit: ICT and analytics (Eni, 2016), as shown in Figure 2.1. ICT serves as the means through which both on-site and remote audit team members connect with process managers and with each other. To evaluate internal controls and transactions, auditors also employ automated tools to extract and analyze data from the audited entity's systems. Increasingly, internal audit teams are embracing remote audit technologies as technology costs decrease and financial pressures mount (Gepp et al., 2018). Enhanced audit quality, greater interaction time with clients, heightened perceived contact time, broader audit coverage, and reduced travel and entertainment expenses are among the factors encouraging organizations to adopt remote auditing.

The framework for the remote audit function, as presented in this document, is summarized in Figure 2.1. This framework also delineates the prerequisites for and attributes of remote audit teams, activities, communication, documentation, and analytics. These analytical methodologies and communication technologies serve as the cornerstones of remote auditing, enabling its execution. Further research is imperative to comprehend the development and utilization of these components in the realm of internal auditing. Moreover, the drivers and impediments to remote auditing extend beyond technology and encompass human behavior. These factors influence the auditors' confidence in delivering assurance based on remotely acquired and analyzed evidence, as well as the potential evolution of new levels of trust between virtual audit teams and audited entities.



Figure 2.1: Components of remote audit (Source: (Mohd Isa et al., 2022))

Numerous businesses had to modify their operations in response to the Covid-19 pandemic to ensure business continuity while prioritizing the safety of their employees and fulfilling their social responsibility to the community (Cheng & Chen, 2022). To comply with "stay-at-home" orders and social distancing restrictions, organizations turned to virtual audits as a means of qualifying or re-qualifying critical suppliers and vendors (Castka et al., 2021). Virtual audits, also known as remote audits, are conducted electronically without the need for direct in-person interaction between a company and the auditing firm. Instead of exchanging paper documents, all processes are digitized. These audits may occasionally involve activities such as video conferences or virtual tours of facilities, but the majority of tasks are performed remotely, with on-site visits by auditors being infrequent (Eni, 2016).

Consequently, virtual audits have emerged as a practical approach to better address contemporary needs, particularly those brought about by the global pandemic crisis. This approach enables networks of businesses to continue their economic activities while acknowledging the challenges posed by the pandemic (Badulescu et al., 2021). The Covid-19 situation has made physical on-site audits, particularly facility tours, a challenging practice. Therefore, it is imperative to establish a method that can facilitate the necessity and be executed remotely, with remote supplier monitoring being favored (Marques et al., 2021).

In accordance with Ghobakhloo and Fathi (2020), modern technology offers opportunities to replace conventional practices. However, digitalizing a company in the present context demands the integration of processes across its value chain, utilizing contemporary technology to achieve digitalization efficiently, and enhancing transparency between suppliers and buyers to strengthen supply chain governance.

## Dimensions of Virtual Supplier Auditing

***Preparation***

The initial groundwork for the audit is deemed a fundamental task aimed at ensuring audit accuracy. Supplier profile data is systematically collected through pre-audit questionnaires (Castka et al., 2021). Allowing the supplier sufficient time for feedback is pivotal during this phase because the precision of data received from the supplier regarding their processes and current practices must be guaranteed, as it serves as the primary input for subsequent stages (Guillot, 2020).

The composition of the audit team is contingent on factors such as the audit type, the team's proficiency in prospective audits, and its availability post-documentation. This phase also encompasses the allocation of essential resources for the audit process, which may involve arranging equipment and formulating the audit checklist. The subsequent phase in the preparatory process involves disseminating the audit notification. At this juncture, the team is apprised of the formal notice that will be issued in advance, containing information about schedules, the audit baseline, the lead auditor's identity, and so forth. It's worth noting that this aspect may differ based on the audit type, as certain situations may necessitate notifying the supplier ahead of time to prepare for the audit, while in other cases, anonymous audits conducted in real-time may require the supplier to receive the same notification regarding timelines (Gilbert et al., 2020).

***Communication***

The auditing tool remains a valuable means of communication even in the absence of physical presence. To foster enhanced supplier engagement, it's crucial to maintain transparency about expectations and engage in proactive planning. This step entails granting suppliers access to necessary documents well before response deadlines, affording them ample time to make their contributions. Suppliers often operate under the pressure of fulfilling orders, sometimes with limited manpower. Therefore, the precision of communication between the parties must be upheld, as audits serve as a valuable instrument for assessing a supplier's performance in terms of quality, the risks associated with their manufacturing processes, and the level of sustainability maintained.

Moreover, audits play a pivotal role in enhancing communication between the supplier and the buyer, promoting mutual understanding (Handa et al., 2019). Ensuring business continuity and supplier compliance, while maintaining flexibility, becomes an essential factor to address, especially in uncontrollable circumstances.

***Data Exchange and Security***

The primary concerns of contemporary businesses revolve around the risks associated with digitization, with cyber security and privacy following closely. Embracing a solution that ensures compliance with national and international legal requirements, while implementing various access levels and sharing protocols on a strict need-to-know basis, is paramount. Remarkably, this aspect of auditing allows for the development of closer relationships with suppliers by sharing information that might have been hesitated to convey in person. The utilization of confidentiality agreements serves as a means to protect both your interests and the rights of all parties involved (Source Intelligence, 2021). It's noteworthy that you can obtain all the necessary information without the need for physical presence. Moreover, the evolution of mobile devices has greatly facilitated the ability to connect people while maintaining a safe physical distance, should visual inspections or information clarification still be required.

In light of all these considerations, the decision to embark on the journey of virtual supplier audits should not be taken lightly. Instead, it should be viewed as an integral component of your supply chain procedures, underpinned by an intelligence-based approach that can enhance compliance and ethical sourcing efforts across the board (Handa et al., 2019).

The initial data exchange typically transpires during documentation exchanges and is succeeded by the execution of a plant audit. Traditionally, this phase of the process involves a physical visit to the supplier's premises. During this stage, the supplier's procedures are audited, spanning from the input to the output of their products, and the extent to which they adhere to established standards is assessed based on the available data.

***Compatibility***

## To ensure the accuracy of financial statements and meet the requirements for operating in a regulated and well-supported environment, the role of auditing is a pivotal function within any organization (Komneni, 2009). The rapid integration of new technological tools within today's businesses has significantly impacted the auditing profession. This technological adoption aims to create a secure, well-governed, monitored, and supported ecosystem for accounting data. This presents a notable challenge for working auditors. Experienced auditors are increasingly incorporating business intelligence tools, which play a vital role in making informed business decisions, especially when emerging technology tools become available (Handoko et al., 2018).

## The preservation of the integrity of automated systems is becoming increasingly reliant on the IT and auditing expertise of professional auditors (Adeyemi et al., 2014). Manual auditing has undergone a visible transformation among auditors due to the latest technological advancements. Stakeholders are now engaging in online business transactions, leveraging cloud services, quick communication channels, and the availability of electronic data that auditors and boards of directors can access thanks to modern and innovative enterprise resource planning (ERP) systems (Byrnes et al., 2018).

## This transformation is also substantiated by the findings of (Giotopoulos et al., 2022), which indicate that during the Covid-19 crisis, investments in information and communication technology (ICT) infrastructure are vital for the digital growth of small and medium-sized enterprises (SMEs), while creative activities are driving the digitization of large-sized corporations.

## Concepts of Sourcing Risk

The sustained viability of the supply chain relies on effective risk management across each segment, with sourcing being of particular importance. Consequently, the sourcing process should prioritize comprehensive planning, encompassing factors such as market risk, demand risk, and performance risk (Silva et al., 2021).

The widespread challenges brought about by the pandemic crisis have necessitated comprehensive adaptations in nearly every facet of organizations to acclimate to the "new normal." Moreover, the pandemic has significantly disrupted global sourcing, resulting in considerable complexities in procuring essential products (Altuzarra et al., 2023). Consequently, finding alternatives or substitutes often becomes imperative, yet there is a quandary regarding the extent to which these alternatives can adequately fulfill the original purpose (Gereffi, 2020). The extended supplier network may experience instability due to the cascading effects of factory closures and supply shortages. The inherent vulnerabilities in the current global supply chain have been exposed, leading to challenges like delays, supply inadequacies, labor shortages, and fluctuating demand (Duong et al., 2022). These supply chain risks exert a significant influence on key performance metrics, and their magnitude continues to grow due to globalization and the Covid-19 pandemic. Hence, supply chain managers must carefully weigh cost-effectiveness when considering risk mitigation strategies for significant contingency risks (Duong et al., 2022).

The Covid-19 pandemic coincided with widespread travel restrictions in 2019 and 2020. Companies engaged in sustainable practices have recognized this and are proactively stockpiling to ensure an adequate supply of materials during pandemic periods. Consequently, novel business approaches come into play, with virtual supplier audits emerging as an alternative to mitigate the risk associated with sourcing from unaudited sources. Nonetheless, the process of restoring streamlined supply sources may entail some time (Nasir et al., 2021).

Numerous factors, including natural disasters, conflict, foreign legal complications, economic and political instability, social and cultural conflicts, and diseases, are currently contributing to disruptions in global supply chains. These disruptions have highlighted the existing vulnerabilities in global supply chains, leading to delivery delays. These supply chain risks significantly impact supply chain performance metrics, with their magnitude on the rise due to globalization and the Covid-19 pandemic. Research findings (Duong et al., 2022) indicate that the proposed risk models are associated with variance in supplier performance (25.5%), innovation and learning (21.2%), internal business (61.9%), customer service (39.4%), and finance (39.7%).

A study conducted by Christopher et al. in 2011 revealed that most businesses lack a structured supply chain risk management and mitigation system, highlighting a research gap in managers' approaches to assessing and mitigating global supply chain risk. However, organizations employ a variety of informal strategies to handle risk. The study underscores the necessity of a multidisciplinary approach to managing risks associated with international sourcing. Four risk categories are presented, including supply risk, process and control risk, environmental and sustainability risk, and demand risk.

## Mitigating of the Sourcing Risks

Extensive research is often necessary to identify potential risks and vulnerabilities within a business, enabling the organization to establish safeguards. This process involves comprehensive mapping of the entire supply chain, encompassing distribution centers and transportation hubs, and extends well beyond the initial and secondary tiers (Willy, 2020).

One of the five key strategies outlined by Philip Marc for rapidly mitigating the impacts of sourcing issues involves the formation of a cross-functional team that maintains daily communication for real-time sourcing risk coordination. Another strategy involves maintaining substantial reserves of raw materials and stockpiles in areas outside those affected, thereby creating worst-case scenarios that can aid in aligning supply and demand. Furthermore, it is vital to establish procedures for addressing various sourcing risks as they arise. In addition, to minimize the risk of transportation delays, it's essential to explore alternative delivery routes within targeted regions and relocate available goods to alternative ports. Collaborating with retailers and third-party platforms to bolster their essential product inventories is also a proactive measure (Philipp, 2020).

One of the most effective strategies for mitigating the risk of supply chain disruption is through digital transformation. This study seeks to identify and provide empirical evidence regarding the drivers of digital supply chain transformation, taking into consideration the interplay of environmental dynamism, technology, and organizational capabilities, particularly in the context of the pandemic era.

# Methodology

## Research Approach

## This study employed a deductive approach, as initially indicated by a literature review. Consequently, it involves the formulation of a theory as the focal point of extensive research. The deductive method entails generating hypotheses or conjectures grounded in a preexisting theory, culminating in the development of a research strategy to empirically assess these hypotheses (Woiceshyn & Daellenbach, 2018).

## The Research Strategy

The data for this research study was obtained by administering a questionnaire survey. In addition to this, the author engaged in an extensive survey of practitioners within the chosen population. This involved reaching out to a specific group of individuals related to the research topic. To select this group, a non-probability sampling method was employed. Non-probability sampling means that the individuals were chosen not based on random selection but rather because of their relevance and expertise in the subject matter.

The survey of practitioners aimed to collect in-depth insights, experiences, and opinions from professionals who have a significant connection to the topic under investigation. This comprehensive data collection approach allows for a more thorough understanding of the subject and facilitates the exploration of real-world perspectives, adding depth and context to the research. Further details regarding the precise procedures and methodologies involved in these data collection processes will be provided in the subsequent sections.

## The Choice

A quantitative method was selected for this study, with the purpose gaining a broad understanding of virtual supplier audits from the view points of the auditing staff.

## Data Collection

Primary data for the study was gathered through the structured questionnaire survey

## Population and Sampling

The population of the study was the employees in the departments of manufacturing, procurement, and FSQ at FBL. In this research, a non-probability sampling approach was employed, specifically opting for convenience sampling. The rationale behind this choice was to create a general sample from the available pool of potential participants. Convenience sampling was deemed suitable for the study as it permits the researcher to continue selecting samples until the desired sample size is achieved.

As a result, the researcher selected a sample size of 103 employees from the entire population. This sample size was determined using guidelines provided by the Morgan table, ensuring that the chosen sample is statistically representative for the quantitative aspect of the study. Convenience sampling, in this context, allowed for a practical and manageable way to gather data from the population, considering the study's goals and available resources.

## Conceptualization

**Independent Variables Dependent Variable**

**Virtual supplier auditing**

**Preparation**

**Mitigation of Sourcing Risk**

**Communication**

**Data Exchange and Security**

**Compatibility**

Figure 3.1.: Concepts and structure of the Literature review

## Hypotheses Development

The Hypotheses shown below was developed on a hypothetical basis and was tested by using multiple regression analysis using the statistical tool SPSS.

H1: There is an impact of preparation on mitigation of sourcing risk

H2: There is an impact of communication on mitigation of sourcing risk

H3: There is an impact of data exchange and security on mitigation of sourcing risk

H4: There is an impact of compatibility on mitigation of sourcing risk

## Data Analysis Strategy

The analysis of the quantitative data was conducted using the Statistical Package for the Social Sciences (SPSS). SPSS was selected for its capabilities in providing a robust statistical analysis and data organization framework through a graphical user interface. The analytical process commenced with an initial evaluation, including a reliability analysis and a normality test applied to the dataset. Subsequently, the analysis encompassed a correlation analysis followed by a multiple regression analysis to assess and scrutinize the study's hypotheses. This comprehensive approach was adopted to ensure a rigorous and methodical examination of the quantitative data.

## Operationalization of Variables

The operationalization process was established by systematically deriving a framework based on the core variables identified within the research study. This process involved the delineation of concepts that exhibit direct connections and associations with the variables under investigation. In particular, the procedure necessitated the identification of concepts that are interrelated with the variables being examined.

Table 3.1: Operationalization of variables

|  |  |  |  |
| --- | --- | --- | --- |
| **Model Concept** | **Variable** | **Indicator** | **Source** |
| **Independent variable** |
| Virtual supplier auditing  | **Preparation**  | * Documentation setup
* Expert Advice
* Selection of Audit team
* Audit Checklist
 | (Gilbert et al., 2020) (Castka et al., 2021) |
|  | **Communication** | * Accuracy
* Flexibility
* Clear and Understandable
 | (Teeter et al., 2010) (Byrnes et al., 2018) |
|  | **Data Exchange and Security**  | * Protect & Privacy
* Trust & Ethics
* Connection between Video conferencing applications
 | (Handa, Pagani, & Bedford, 2020) |
|  | **Compatibility** | * Technology
* Challenge
* Cost factor
 | (Yang et al., 2021) (Gepp et al., 2018) |
| * Dependent Variable
 |
|  | **Mitigation of Sourcing risk** | * Type of risk
* Magnitude of risk
* Management of sourcing risk
 | (Willy C. Shih , 2020).  |

# Findings and Discussion

## Results of Hypothesis Testing

The results of the hypothesis testing, as illustrated in the table below, reveal an R-squared value of 0.816. This figure serves as an indicator of the collective capacity of the independent variables to elucidate variations in the dependent variable, which, in this context, pertains to the mitigation of sourcing risk. Consequently, it can be deduced that the combined influence of all four independent variables namely, preparation, communication, data exchange, security, and compatibility accounts for a substantial 81.6% of the explanatory power.

Table 4.1: Regression results for the model fit

|  |  |
| --- | --- |
| R square  | 0.816 |
| Significance value of ANOVA  | 0.000 |

Moreover, the regression analysis revealed a significant and positive association between the dimensions of virtual supplier auditing under investigation and the mitigation of sourcing risk. This assertion is supported by the positive beta values, as presented in the table below, and the fact that the significance (sig.) values for all variables exceed the threshold of 0.05. This outcome validates the acceptance of all hypotheses and the rejection of the null hypotheses.

Table 4.2: Summary of Hypotheses testing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Factors** | **Standard beta co-efficient** | **Sig.**  | **Relationship between Variables** | **Decision for the Hypotheses** |
| Preparation | .407 | 0.000 | positive | H1: Accepted |
| Communication | .191 | 0.000 | Positive | H2: Accepted |
| Data Exchange and Security | .168 | 0.001 | Positive | H3: Accepted |
| Compatibility | .351 | 0.000 | Positive | H4: Accepted |

## Identification of the Dimensions of Virtual Supplier Auditing

Virtual supplier auditing seems to be an untapped area and very less number of articles were present to emphasize on both these aspects. However, the identified dimensions of virtual supplier audit; preparation, communication, data exchange and security and compatibility are statistically proven to be highly impacting through the model coefficients depicted under the below formula,

**Mitigation of = 0.218 + 0.340 (Preparation) + 0.153 (communication)**

**sourcing risk +0.130 (Data exchange & security) + 0.349 (compatibility)**

A significant proportion of the survey respondents underscored the recurring issue of disrupted or lost connections within the virtual supplier audit system, a practical challenge notably prevalent in the Sri Lankan context. This predicament emerged as a primary reason for the perceived diminished efficacy of virtual supplier audits when compared to their physical counterparts. To illustrate this point in terms of the virtual supplier audit's capability dimension, prominent clients such as McDonald's extended a longer validity period for the supply of goods following physical audits as opposed to virtual supplier audits. Additionally, the research revealed that practitioners of virtual supplier audits at Fonterra Brands Lanka (FBL) are relatively inexperienced in using the system, thereby navigating a learning curve. Consequently, frequent training sessions and further research efforts are essential to address the bottlenecks within this process.

Furthermore, the technical quality of virtual supplier audits is found to fluctuate based on the type of audit conducted. Documentation audits tend to be more effective in the virtual environment due to their enhanced efficiency and reduced paperwork. However, the technical quality of plant audits poses a conundrum, as suppliers can primarily showcase well-functioning areas. Presently, the audit process relies on the supplier's floor plan and an employee's real-time walkthrough of the factory premises with a live camera.

The perspectives on virtual supplier audits are akin to the two sides of a coin, encompassing both favorable and unfavorable aspects, with the respondents' thought patterns significantly influencing their stance. Given Fonterra Brands Lanka's production of Fast Moving Consumer Goods (FMCG) and the organization's dynamic and change-driven culture, respondents who viewed virtual supplier audits positively emphasized the potential to accurately identify system-related issues and devise effective strategies for mitigation. In light of this, it has become imperative for businesses to embrace innovative approaches that allow them to continue their operations with minimal disruptions, mitigating the risk of an organization-wide failure. Advanced technological interactions, such as the Internet of Things, have made this feasible in the contemporary landscape, with virtual audits representing a prominent strategy. However, the critical consideration lies in gauging the extent to which this virtual adoption can indeed prove effective.

## **Identification of the Dimensions of Sourcing Risk.**

The researcher has achieved the objective of identifying the dimensions of sourcing risk through a comprehensive process that combines insights from the literature review with data gathered from the questionnaire responses and face-to-face interviews. As a result, this research has successfully pinpointed four primary dimensions of sourcing risk that hold relevance for the case of FBL. These dimensions encompass supply chain disruptions, quality control, ethical concerns, and financial risk.

Within the context of this research, the predominant dimension of sourcing risk under scrutiny is supply chain disruptions. These disruptions stem from the challenges posed by conducting timely supplier audits, particularly in light of the ongoing Covid-19 situation. Such disruptions can ultimately lead to a lower quality of raw materials or even a complete absence of essential supplies. Consequently, the quantitative aspect of this research contributes significantly to the exploration of how virtual supplier auditing can serve as a mitigation strategy for sourcing risk. The research findings affirm a positive relationship between virtual supplier auditing and the mitigation of sourcing risk.Another significant dimension of sourcing risk unveiled through this research pertains to quality control. This dimension revolves around the risk of receiving subpar products from suppliers, potentially resulting in customer dissatisfaction and reputational harm to the organization. This aspect takes on added importance within a context where much of the work at FBL has shifted to virtual modes. As the research delves into the specific supplier components, it becomes evident that the types of packaging materials, such as outer packaging, inner packaging, and foils, may vary depending on the products in use and the corresponding supplier. Consequently, the sourcing strategy must adjust accordingly. While supplier audits effectively curtail the level of risk, sourcing risk remains an inherent element throughout the process. Respondents point out that the level of non-compliance, measured in terms of NCR (Non-Conformance Report) occurrences, can be employed as an indicator to assess the risk associated with a particular provider, particularly with reference to HACCP (Hazard Analysis and Critical Control Points) principles.

The dimension of ethical concerns constitutes yet another facet of sourcing risk. This dimension alludes to the risk of suppliers engaging in unethical practices, such as forced labor or environmental violations, potentially resulting in reputational damage and legal and financial repercussions for the organization. FBL, known for its robust corporate culture emphasizing people and sustainability, ensures that its suppliers adhere to these standards, thereby establishing a green supply chain with minimal environmental impact. Audits are conducted to address these specific areas and minimize this category of risk.

Lastly, the dimension of financial risk has been discerned, with particular relevance in the context of contemporary economic challenges catalyzed by the Covid-19 situation. In essence, this dimension relates to the risk of suppliers encountering financial hardships or bankruptcy, which can disrupt the supply chain and lead to financial losses for FBL if the suppliers are unable to deliver goods in a timely manner.

## The impact of Virtual Supplier Auditing Impact on Mitigating Sourcing Risk.

Given that the presence of sourcing risk is an inescapable aspect, shaped by a multitude of variables, the remote execution of supplier audits carries considerable influence over the determinations concerning sourcing and the ongoing business interactions with the supplier. Consequently, this research has effectively accomplished this specific objective. By discerning the direct ramifications of virtual supplier auditing, this study has facilitated a comprehensive grasp of the situation, further enriched by the practical implementation at FBL. In alignment with this, the researcher has identified three pivotal findings, as delineated below:

**The major dimension of virtual supplier auditing contributing to mitigation of sourcing risk is preparation, while the second major factor is provisions for compatibility”**

According to the outcomes of the correlation analysis, statistical evidence supports the assertion that preparation ranks as the most significant contributor to the mitigation of sourcing risk. Conversely, insights derived from the face-to-face interviews provide valuable perspective on the shift from physical audits to virtual audits. Respondents commonly expressed the view that the initial documentation preparations for virtual supplier audits were comparatively straightforward. This ease arises from the facility of sharing documents online and the simplified review process. Nevertheless, a few aspects related to preparations were highlighted, including the necessity of ensuring the readiness of technological equipment and acquiring accurate site maps from the suppliers.

Furthermore, from a quantitative standpoint based on questionnaire responses, a consensus emerged among the majority of respondents. They concurred on the need for a meticulous approach in selecting the most suitable audit team and crafting the audit checklist. This practice aligns with the established procedures during physical audits. However, it is worth noting that the requisites and context of virtual audits differ from those of their physical counterparts. Consequently, respondents emphasized the critical role of expert team guidance right from the preparation phase of the audit.

Regarding the dimension of compatibility, a pivotal factor that surfaced pertains to the judicious utilization of appropriate technology to align with the audit requirements.

**Virtual supplier audit is been perceived as an innovative approach to mitigate sourcing risk.**

FBL acknowledges the challenges encountered during the pandemic crisis. However, the organization has effectively transformed these challenges into opportunities. Empirical evidence demonstrates that diligent preparations, effective communication, and proficient data exchange, aided by suitable technology, can significantly contribute to the reduction of sourcing risk.

Delving deeper into this context, it is essential to recognize that the primary objective of conducting an audit, whether in the physical or virtual realm, remains consistent: the mitigation of sourcing risk. However, the specific categorization of risks may vary from one scenario to another. For instance, one audit may predominantly focus on evaluating the quality of raw materials employed in the production of packaging materials, while another may center on assessing the hygienic processes used in the manufacture of packaging materials, given their direct contact with consumable products at FBL. Consequently, virtual supplier auditing emerges as an innovative opportunity to consistently conduct audits and effectively manage sourcing risk.

# Conclusion

As per the study's findings, it is evident that technological challenges represent the primary impediment in the execution of virtual supplier audits. Consequently, it is advisable to embrace contemporary technological applications and equipment. Several potential applications and equipment are enumerated below;

iAuditor: The Fonterra New Zealand team employs the iAuditor platform for remote audits. iAuditor is an inspection application designed to empower field workers. When utilized in conjunction with the web platform, iAuditor offers visibility and insights that contribute to elevating safety and quality standards across an organization.

iCAM: iCAM is recommended as a replacement for conventional camera phones. Given the diverse materials used in packaging processes, each with its unique surface properties, camera systems for quality inspection face substantial demands. iCAM is optimally designed to address a broad spectrum of inspection tasks, including code reading, print control of plain text, and inspection of Ultraviolet ink. This system excels in identifying defective products, even at high flow rates, and can recognize various types of printed materials, both with matte and glossy surface finishes.

Furthermore, it is advisable to implement effective change management techniques to ensure the alignment and accuracy of results between virtual supplier audits and on-site audits. This can encompass knowledge-sharing sessions with industry experts or consultants experienced in the successful application of virtual supplier audits on an international scale. A critical aspect of change management is the provision of training sessions to familiarize staff members with the virtual audit process. Moreover, all teams affected by virtual supplier audits should be kept well-informed. For example, the finance team, although not directly involved in the execution of virtual supplier audits, plays a crucial role in supporting the acquisition of funds for the procurement of necessary technology.

Lastly, it is recommended to initiate a strategy for the promotion of virtual supplier audits within FBL. This promotional strategy should encompass both internal and external facets. Internally, the message should be disseminated to FBL's various teams, while externally, it should extend to the supplier network. Consequently, when new suppliers join the vendor base, their capability to facilitate virtual supplier audits should be considered as an additional qualification during the initial vendor reviews.

## Limitations of the Research

Conducting data collection within a limited timeframe posed a significant challenge to the research, primarily due to the company's recent return to uninterrupted operations and full functionality following the strenuous pandemic crisis.

The second challenge pertained to the absence of publicly available data concerning FBL. More specifically, as virtual supplier audits represent a relatively novel concept in both the Sri Lankan and global contexts, the scarcity of existing research in this specific area made it challenging to locate pertinent literature. Nevertheless, this challenge was surmounted by leveraging existing literature related to supplier audits and integrating it with the innovative application of cutting-edge technology within the supply chain to enhance and optimize supply chain operations.

## Directions for Future Research

This study has maintained a specific focus on FBL; however, it is recommended that future research endeavors extend their scope to encompass diverse companies spanning various industries. The rationale behind this recommendation lies in the understanding that sourcing risks may exhibit considerable variation between industries. Furthermore, the limited existing literature connecting virtual supplier auditing with sourcing risk implies a promising avenue for subsequent research.

Additionally, it is advisable that future research initiatives investigate the supplier perspective, aiming to discern the advantages and disadvantages of conducting virtual audits from their standpoint. This approach would provide valuable insights into the supplier's experience with virtual audits.

The research has revealed a statistically unexplained 18% of explanatory power, suggesting that other potential factors impacting sourcing risk remain unaccounted for in this study. Thus, future research endeavors should explore these unidentified factors, considering the context that audits are being carried out in a virtual manner.

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