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Impacts of the Covid-19 pandemic on the logistics of exporting coffee in containers

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ABSTRACT

For many years, Brazil has held the title of the world's largest coffee producer and exporter. However, despite this, national coffee producers still struggle to access foreign markets due to the bottlenecks and high costs associated with the agro-industrial system's port logistics. The onset of the Covid-19 pandemic only exacerbated these challenges. Issues such as the scarcity of shipping containers and space on ships, cancellation of ship calls, and greater concentration and verticalization of the maritime and port transport sectors have further complicated matters. Furthermore, the regulation of these sectors in Brazil is still in its early stage. This study aimed to enhance the comprehension of the port costs incurred in exporting coffee in containers and the impacts that the Covid-19 pandemic on these costs and export logistics. The research utilized a quantitative and descriptive methodology. Data were gathered through a questionnaire administered to thirteen managers of Brazilian businesses and cooperatives engaged in containerized coffee exports. The study found that the pandemic directly impacted port costs and logistics, leading to more frequent container detention and additional port storage charges. Furthermore, the pandemic resulted in the introduction of new port fees/tariffs and raised the existing ones, such as the "Terminal Handling Charge" (THC), the "Export Logistic Fee" (ELF), the "Bill of Lading Issuance Fee" and the container scanning fee.

Key words: Container detention; Maritime transport; Port fees/tariffs; Port logistics; Port warehousing.

1 INTRODUCTION

Despite Brazil being, for decades, the world's largest producer and exporter of coffee (International Coffee Organization - ICO, 2021), in 2021 Brazilian producers still face challenges in accessing foreign consumer markets due to logistical bottlenecks and high costs in the agro-industrial system (Conselho dos Exportadores de Café - CECAFÉ, 2021).

The inadequate road infrastructure in Brazil – the primary transportation route for moving coffee from farms to ports –, high logistical and port costs, and issues related to loading containers onto ships have always represented challenges to be surpassed by coffee exporters.

The advent of the Covid-19 pandemic, spread by the SARS-CoV-2 coronavirus, has worsened the Brazilian exporters' condition. The inconsistent restrictive measures and closures of businesses, offices, and factories have caused a disruption in the global supply chain's product supply and demand (Dempsey, 2022). As a direct consequence, the port sector and cargo transport have been severely affected, resulting in a decrease in port terminal services and ocean transporters that serve Brazilian exporters. This has caused a significant increase in market prices and worsened port congestion (Hirata, 2021a).

In this scenario, the national coffee sector has been negatively impacted by several factors, including the shortage of containers available for exporting products, challenges with scheduling space on ships, frequent cancellations of ship calls at Brazilian ports, and consequent delays in the delivery of coffee to foreign consumers (Polo, 2022). The situation gets even worse when one adds the concentration of companies engaged in long-haul shipping worldwide and Brazil, incidents of mistreatment by shipping carriers and port terminals – mainly in detention fees and extra storage costs – (Attinasi; Bobasu; Gerinovics, 2021), and the still incipient port and ocean sector regulations made by the National Agency for Waterway Transport (ANTAQ) (Castro Junior, 2021).

Additionally, coffee exporters are faced with various fees including the THC ("Terminal Handling Charge"), the ELF ("Export Logistic Fee"), the "B/L Fee" (Bill of Lading Issue Fee), and containers scanning fee, among others, which add significant costs for the coffee exporters (CECAFÉ, 2021).

In order to counteract the negative effects of the current global logistics situation, Brazilian coffee exporters have been exploring alternative solutions to better serve their customers. One such solution has been the reintroduction of break bulk shipments, a form of fractionated cargo that had fallen out of use since the container became the standard mode of international freight transport in the 1980s (Sanmax, 2022). At the same time, Brazilian coffee exporters, who are typically represented by associations and federations, have been urging ANTAQ and the Judiciary Court to monitor and combat abuses in the port and ocean sectors. They seek to prevent or limit certain behaviours that harm users, including unjustified and inconsiderate excessive charges and cost increases.

However, such measures still need to be improved to resolve the problems faced on a large scale by Brazilian exporters and to significantly improve the condition of the coffee sector in Brazil in this post-COVID-19 pandemic period.

Considering all these circumstances, and the impressive harvest of 63 million bags of coffee in 2020 (Companhia Nacional de Abastecimento - CONAB, 2021), the export of nearly 130,000 containers between July 2020 and June 2021 (CECAFÉ, 2021), and the advent of the Covid-19 pandemic, it becomes relevant to understand the main port costs of coffee exports in containers. Additionally, it is crucial to analyze the impact of the pandemic on port logistics and how it has affected these costs, both in terms of new expenses and as a result of pre-existing challenges.

Therefore, the purpose of this work was (i) to analyze the primary expenses associated with port logistics when exporting coffee in containers, (ii) to investigate the effects of the Covid-19 pandemic on the export logistics of ports – mainly regarding the worsening of problems such as the shortage of empty containers and ship space, as well as the frequent cancellation of ship calls in Brazilian ports –, (iii) to evaluate whether the pandemic caused the emergence of new port fees/tariffs and the increase of those existing in the previous scenario, and (iv) to assess whether there has been an uptick in container overstaying during export (detention) and additional port storage.

2 MATERIAL AND METHODS

2.1 Data collection procedures

To collect data for this study, the authors reached out to managers of Brazilian companies and cooperatives that export coffee in containers throughout Brazil. They utilized telephone calls, email, and direct messages on LinkedIn to invite participation. The data collection instrument, a 28-question online questionnaire created through Google Forms designed to meet the objectives of this study, was later sent via email and LinkedIn direct messages. The questionnaire consisted of 25 closed questions and three open-ended ones, designed to investigate the primary challenges and expenses associated with port logistics for exporting coffee in containers before and after the pre-Covid-19 pandemic.

Participants in the study responded to questions on a five-point Likert scale ranging from "totally disagree" to "totally agree". This approach enabled a comparison of perceptions before and after the Covid-19 pandemic, specifically in relation to the challenges and expenses that Brazilian coffee exporting companies and cooperatives faced in port logistics for coffee export. The goal was to gain insight into the perception of managers regarding the issues and costs that were exacerbated by the pandemic.

Data were collected between September and December 2021 through email and direct messages on LinkedIn to 47 managers of companies and cooperatives. Only 13, all from the export or logistics sectors, responded to the survey. These 13 companies/cooperatives are significant players in the Brazilian coffee market, many of which are among the world's largest coffee exporters.[1]

Furthermore, the authors conducted extensive research by analyzing various sources such as books, articles, reports, and websites related to ocean transportation, port terminals, companies, cooperatives, associations, Brazilian courts, regulatory agencies, state bodies, and other entities associated with long-distance navigation and coffee export logistics.

2.2 Data collection instrument

For the instrument for data collection, a questionnaire was created using the Google Forms Platform. The authors first gathered information to identify the location of the company/cooperative, the city and state where the containers for exporting coffee are stuffed, and which port(s) the company/cooperative uses to export coffee.

Then, the companies and cooperatives representatives were asked about the primary Incoterm used for coffee sales. This was to determine whether the responsibility for contracting international shipping and port services falls on the exporting company/cooperative or by the foreign buyer/importer.

The representatives of the companies and cooperatives began answering the closed questions of the online questionnaire regarding the pre-pandemic period of Covid-19. The focus was on the challenges faced concerning coffee exports in general, port logistics, and the practice of paying extra amounts for detention and storage beyond the contracted amount. These inquiries aimed to understand the Covid-19 outbreak on port export logistics, including associated expenses. The participants' perspectives on the pre-and post-pandemic periods were compared to analyze the findings.

Participants also reported whether it was expected, in the export of coffee before the Covid-19 pandemic, problems such as a shortage of empty containers for transportation, limited space on ships, and cancellations of ship calls at Brazilian ports. The survey also explored whether these issues were related to the concentration of companies providing long-haul ocean transport and port storage services as well as the trend of shipowners' verticalization in the Brazilian port sector where they purchase or establish port terminals, logistics operators, shipping agencies, and other companies to gain full control over the logistics process in Brazil.

Additionally, regardless of the Covid-19 pandemic, the participants were asked to share their views on the effectiveness

[1] According to the managers who answered the questionnaire, the participating companies/cooperatives represent a significant portion of the Brazilian coffee production and export market. However, even in the face of such representativeness, the researched agents could not state the percentage of market share of such companies/cooperatives, claiming that there still needs to be a study in this regard. The authors of this study also did not find such data after extensive literature research.

of regulating of port charges in Brazil by ANTAQ and other relevant governing bodies.

In sequence, the participants were queried about the impact of the Covid-19 pandemic on the port export logistics – making it more difficult –, caused a reduction in the number of exported containers by their company or cooperative, and exacerbated issues related to port logistics, such as container scarcity, space insufficiency on ships, and the cancellations/postponements of ship calls at Brazilian ports.

The participants also answered about the impact of detention, port storage, and port fees/tariffs on the final cost of coffee production. They rated the importance of these fees on a scale of seven items, with intervals ranging from 0% to 10%, 10% to 25%, 25% to 40%, 40% to 60%, 60% to 75%, 75% to 90% and 90% to 100%. Additionally, they were asked whether port costs have increased or new costs have been added during the Covid-19 pandemic.

Finally, the authors inquired about any potential abusive practices regarding the daily charges for detention, port storage and fees/tariffs paid to carriers/agencies and port terminals, and the relationship between these costs and Covid-19 related issues such as scheduling difficulties, ship cancellations, and container shortages impacting the export industry.

To summarize, Table 1, displays the primary focus and objectives of the questions in the applied questionnaire.

2.3 Data Analysis Procedures

Regarding the data analysis procedures, the authors transferred the gathered information from the Google Platform to an Excel spreadsheet. They further evaluated the frequency of responses provided by the participants of the study to determine the extent of issues faced and the expenses incurred while exporting coffee in containers. Furthermore, they compared the similarities and differences between the pre and post-pandemic period of Covid-19.

Researchers conducted thorough desk research to analyze the data and obtain information on the expenses incurred with port logistics for coffee export through containers by Brazilian companies and cooperatives. Based on the information collected, they provided recommendations and guidelines to minimize these costs and help these agents to improve their cost-effectiveness.

3 RESULTS

3.1 Characterization of the companies/cooperatives participating in the research

In the section discussing data collection procedures, it is evident that the 13 companies/cooperatives involved in the survey hold substantial influence in the Brazilian coffee market. These organizations are counted among the largest coffee producers and exporters globally.

All 13 participating companies/cooperatives are located in Minas Gerais, Espírito Santo, and São Paulo, Brazil's three largest coffee-producing states, from 2019 to 2021, accounted for 87%, 86.8%, and 84% of national production, respectively (CONAB, 2021). These companies and cooperatives use the southeast ports of Santos, Rio de Janeiro, Vitória and Sepetiba for their coffee exports due to their strategic location and excellent road infrastructure. In fact, 92.3% of the survey participants confirmed that these ports are the most commonly used for coffee exports.

3.2 The effects of the Covid-19 pandemic on global logistics and the pre-existing problems related to export port logistics

This paper first explores the impact of the Covid-19 pandemic on global logistics, with a specific focus on ocean transport and port operations. After examining this broader context, the paper delves into the effects of the pandemic on port costs for container coffee exports, including detention charges, additional storage fees, and other main fees in port logistics.

The data collected indicates that all study participants agreed that the Covid-19 pandemic had a negative impact on export port logistics, leading to difficulties such as a shortage of available spaces on ships, lack of empty containers for export, and cancellation, postponement, or rescheduling of ship calls. As a result companies/cooperatives experienced a decrease in the number of containers exported.

Table 1: The primary focus and objectives of the questions in the applied questionnaire.

Focus of the questions	Objectives
Sample Characterization	To know the location of the exporter's headquarters and their coffee stuffing methods, as well as the ports they utilize
Pre-pandemic difficulties and costs	To accurately comprehend the extent of the pandemic's impact on export port logistics and expenses
Worsening the scenario with the pandemic	To check whether the pandemic has worsened the issues of port export logistics and expenses
Port Costs	To get information on the primary port expenses, their impact on the coffee exporter, and if the pandemic has worsened these expenses

Source: Original research data.

When the questionnaire presented the statement that "there is a widespread belief that the Covid-19 pandemic has aggravated issues related to port logistics", 76.9% strongly agreed and the remaining 23.1% just agreed, with no dissenting responses.

Although the Covid-19 pandemic has caused many problems, it is not the sole reason for all the issues experienced by coffee exporters. According to the survey data, prior to 2020, a vast majority of participating companies/cooperatives faced obstacles in exporting coffee through containers even prior to the pandemic, accounting for 92.3%.

It's worth noting that the same percentage of respondents experienced difficulties exporting coffee in containers before the pandemic, even if only aspects related to port logistics were considered, as shown in Figure 1.

When discussing the challenges faced by Brazilian exporters in recent years, there was a difference of opinion among the participants regarding the pre-existence of problems such as a shortage of containers for exporting products, limited space on ships, and the frequent cancellation or delays of ship calls. While 38.5% of the participants believed that these problems emerged only after the pandemic, others maintained that these issues have always affected coffee export operations in containers. This is depicted in Figure 2.

The authors have highlighted additional factors that shed light on the obstacles faced in exporting coffee via containers, particularly during the Covid-19 crisis.

When faced with the statement that "it is possible to attribute port logistics problems to the concentration of companies that provide long-haul ocean transport services and port storage", 69.3% of survey participants agreed, while only 15.4% were indifferent and 15.4% disagreed.

Another factor investigated was the verticalization process of ocean transport services for container cargo at terminals and port operators in Brazil. This process allows major economic players in long-haul ocean transport to gain control over port operations, terminals, and companies responsible for internal logistics from ports to importers. The majority of participants in this study agree with this observation, as illustrated in Figure 3.

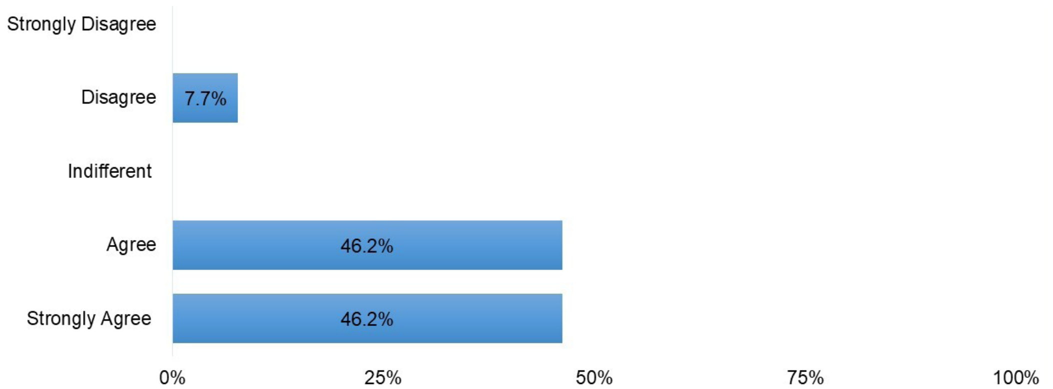

Figure 1: Prevalence of responses to the statement that the company/cooperative already found it difficult to export coffee in containers before the pandemic, considering only port logistics.

Source: Original research results.

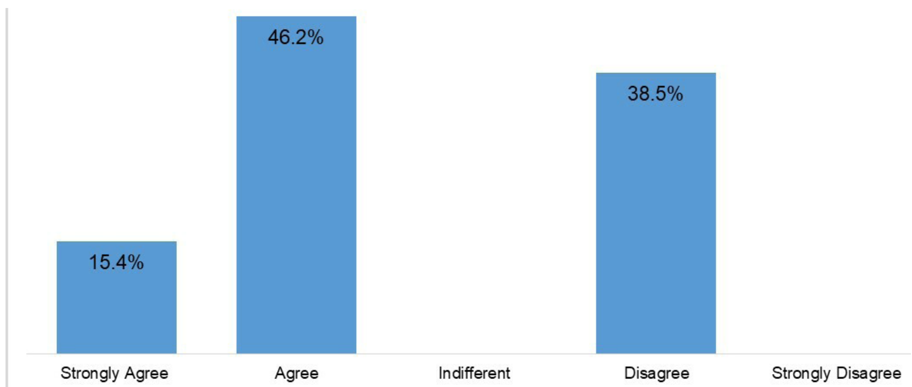

Figure 2: Prevalence of responses to the statement that problems such as lack of containers and spaces on ships and cancellation of ship calls have always been common in exporting coffee in containers.

Source: Original research results.

Regarding the regulation exercised by the National Agency for Waterway Transport about existing port costs in the logistics of coffee exports in containers, only 38.5% of the participants agreed that there is an efficient performance on the part of ANTAQ. Much of the sample does not agree or strongly disagree with this statement (Figure 4).

3.3 Impacts of the Covid-19 pandemic on port export costs

Regarding the impacts of the Covid-19 pandemic on port costs that affect the logistics of exporting coffee in containers, 92.3% of participants agreed that there was an increase in such prices based on the rise in values and the creation of fees and expenses. Only 7.7% disagreed about this worsening.

According to the survey, the Covid-19 pandemic has resulted in a higher frequency of containers overstaying in exports (detention) for all participants. It was mainly due to the challenges in scheduling spaces on ships and the cancellation of ship calls in Brazilian ports, which was strongly agreed upon by 76.9% of the respondents.

Before the pandemic, it was common for 30.8% of participants not to pay detention amounts to transporters, as shown in Figure 5. This information was significant in comparison to the current reality.

One way to gauge the importance of a topic is by looking at how much it reflects the average amount paid for overstaying containers during export by Brazilian coffee exporters. More than half of the companies and cooperatives involved consider this to be a significant cost, amounting to up to 10%. In some cases, this percentage can even go up to 60% of the total cost of each exported container as shown in Figure 6.

It is worth noting that, when answering the questionnaire applied in this study, all participants recognized the harshness of detention values, which holds important implications for the coffee industry (61.5% strongly agreed).

Additionally, a significant majority of survey respondents (92.4%) acknowledged the rise in port storage costs following the Covid-19 pandemic due to cancellations and delays in shipments at Brazilian ports. Only 7.6% disagreed.

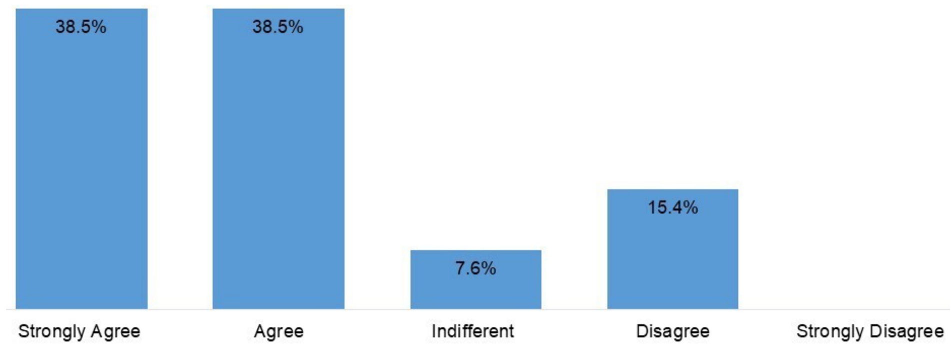

Figure 3: Prevalence of responses to the assertion that it is possible to attribute the problems of port logistics to the process of “verticalization” of the Brazilian port sector.

Source: Original research results.

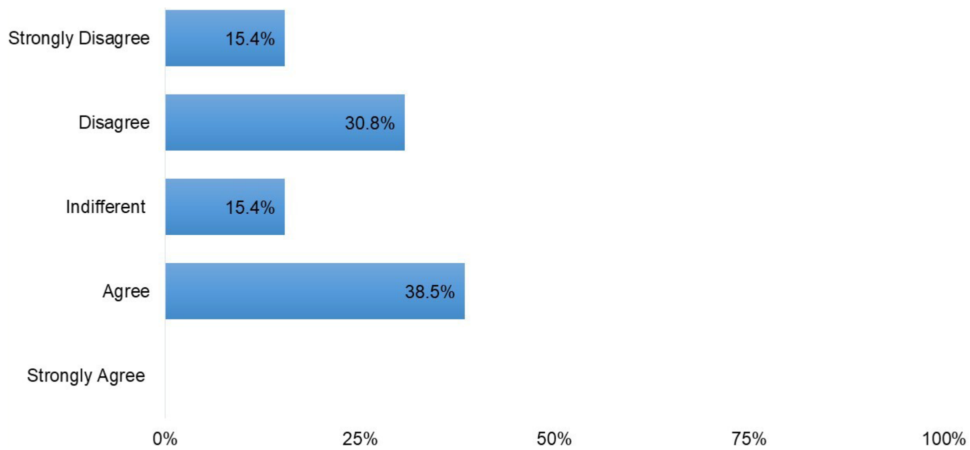

Figure 4: Prevalence of responses to the statement that, about port costs, there is an efficient regulation by the National Waterway Transport Agency (ANTAQ).

Source: Original research results.

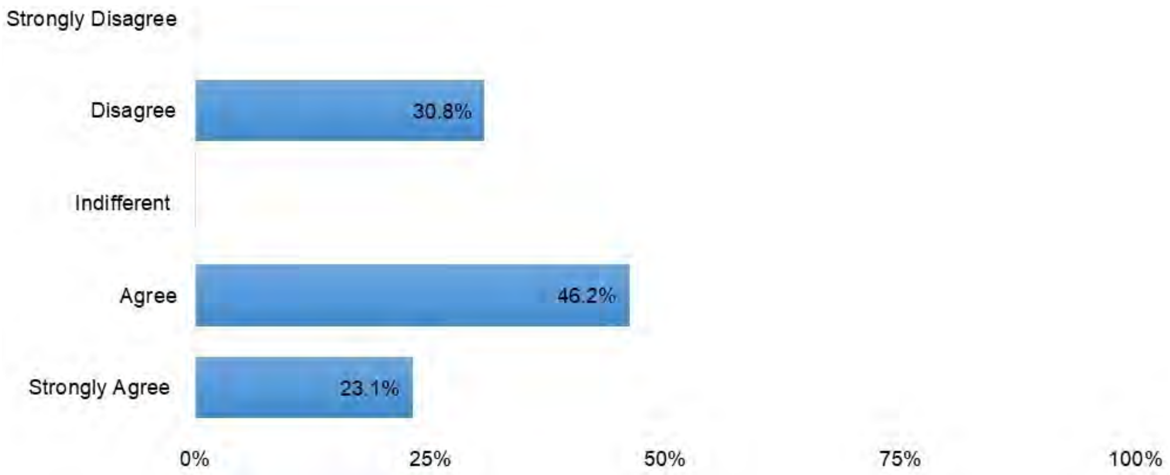

Figure 5: Prevalence of responses to the statement that, before the pandemic, the company/cooperative used to pay container detention amounts.

Source: Original research results.

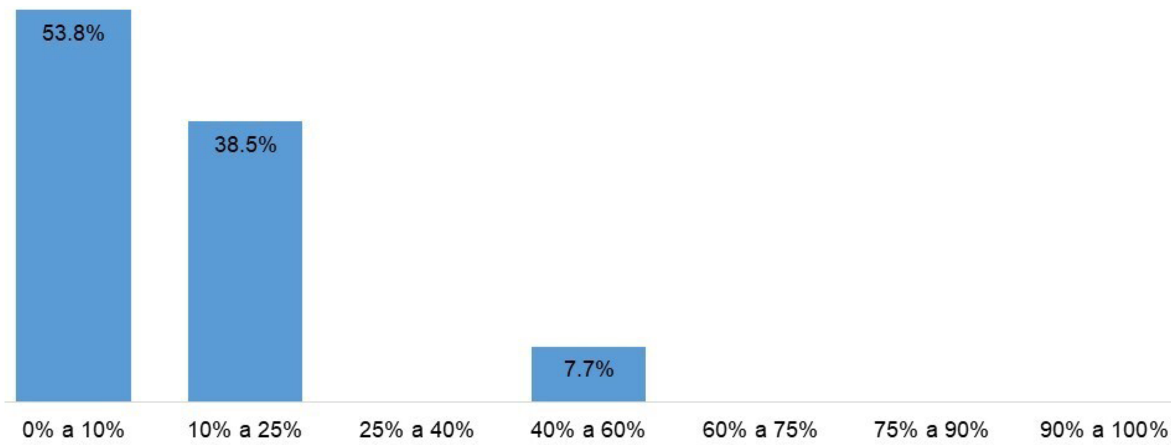

Figure 6: Prevalence of responses on how much, on average, the value of detention paid is regarding the total cost of each container exported

Source: Original research results.

And confirming that the Covid-19 pandemic aggravated this cost for Brazilian coffee exporters, while 61.6% of respondents reported that they had already paid for additional port storage before the pandemic, the other 38.4% disagreed with the statement that the company/cooperative used to pay for this extra storage.

In addition, according to the responses obtained from the questionnaire, 92.3% of participants find port storage prices unreasonable, and the overall container cost ranges from 0% to 10% for 69.2% of companies/cooperatives, but it can be as high as 40% for 23.1% of them.

Finally, regarding port fees/taxes, 76,9% of survey participants noticed that the Covid-19 pandemic gave rise to new port fees/taxes and increased those already in place before the pandemic. Few participants (15,4%) disagreed with this statement.

The cost highlighted in Figure 7 is significant for the Brazilian coffee exporter. The graph indicates that 30.8% of participants may incur a cost of 10% to 25% per container, while 15.4% may face a cost between 25% and 40%

Regarding the high port costs, 84.7% of the companies and cooperatives surveyed perceived them as abusive, while only 7.7% disagreed with this statement.

4 DISCUSSION

According to the survey results, every participant concurred that the Covid-19 pandemic impacted the logistics of exporting, making it more challenging. Additionally, it worsened issues like the shortage of space on ships, difficulty scheduling spots on boats, lack of available empty containers for export, and the cancellation, postponement, or rescheduling of ship calls. As a result of these conditions, the number of containers exported by companies and cooperatives decreased.

It accurately reflects the situation widely reported by the main communication vehicles worldwide. It includes the direct and indirect effects of the pandemic and the resulting disruption of the global supply chain on international logistics. Dempsey (2022) specifically cites the impact on the ocean transport market for goods, port operations and land modes that connect ports to the respective importers and exporters.

Restrictions on movement and commerce have affected various sectors, including commercial establishments, industries, warehouses, and ports leading to a change in the overall logistics strategy (Attinasi; Bobasu; Gerinovics, 2022).

According to Plimmer (2021), the closure or limited access to roads and ports, as well as reduced hours and staff at port facilities, have caused a decrease in the productivity of operators and terminals, obstacles for land transporters delivering and removing cargo, accumulation of cargo in ports and user premises, and longer wait times for ships to load and unload. These issues are among the many challenges posed by the current situation.

Added to all this came, mainly, the increase in demand for products around the world and the disharmony between countries in facing the pandemic, with the adoption of dissonant measures in an attempt to contain the new coronavirus (Dempsey, 2022).

The pandemic also has led to a shift in sea freight prices, a shortage of containers for product transportation (Hirata, 2021a), prioritization of high-value goods, and more profitable routes preferred by sea carriers. These issues have been observed worldwide and have also affected Brazil, in which coffee exporters have already encountered container logistics challenges in the past (Polo, 2022).

According to the survey data, Brazilian coffee exporters who transport their goods in containers were already experiencing port logistics issues before 2020. Their challenges include inadequate road infrastructure, cargo theft, high costs, and other obstacles that arise between their premises and the ports. These difficulties are compounded by the longstanding challenges that exporters face in Brazilian ports.

However, as already seen, with the advent of the coronavirus crisis, the situation of Brazilian coffee exporters became even worse, with the worsening of issues such a shortage of containers available for shipping products, limited space on ships, the frequent cancellations or postponements of scheduled ship calls, and a concentration of companies offering long-haul ocean transport and port storage services.

Regarding the risk of concentration of the ocean transport industry in recent years, this issue has already been addressed by several countries, including the US. In February 2022, the US government announced an agreement between the Department of Justice and the Federal Maritime Commission (FMC) to monitor the performance of companies that provide transportation services long-distance seafaring in that country. The objective is to prevent unfair practices against US companies and citizens, such as increased export expenses and a reduction in competitiveness in the worldwide cargo transport industry (The White House, 2022).

In 2018, a study by the National Confederation of Industry (CNI) focused on the concentration of the maritime supply of container shipping. The study examined the market consolidation trends over the years, the increase in container ship capacity, the growth of agreements between shipowners for the joint use of vessels, the formation of global alliances, among other issues (2018).

Newly updated data from Alphaliner (2022) reveals that the world's top ten ocean container cargo carriers belong to the three global alliances that control over 84% of container ship capacity. These alliances are named "2M Alliance", "THE Alliance" and "Ocean Alliance." Due to

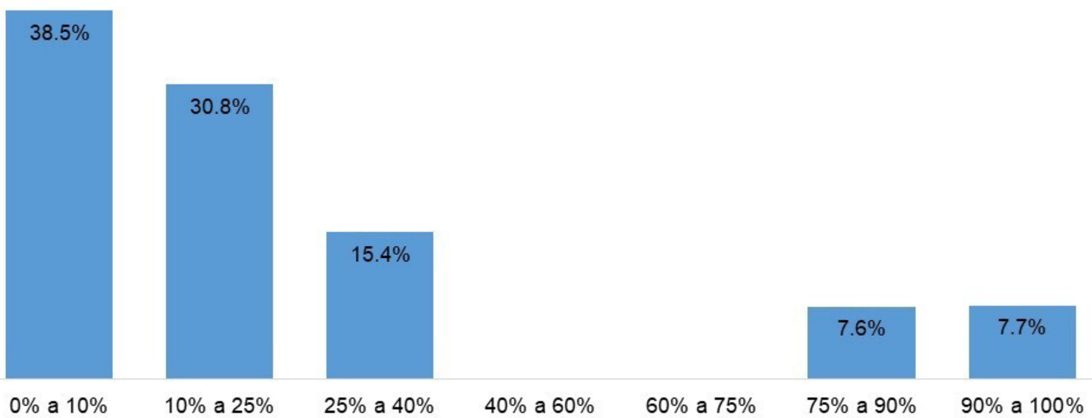

Figure 7: Prevalence of responses on how much represents, on average, the value of port fees/tariffs paid concerning the total cost of each exported container.

Source: Original research results.

this high concentration, there has been a noticeable decrease in competition, a decrease in supply, higher prices, additional fees, and cancellation of scales, among other behaviors. These actions have been brought about by the significant market consolidation (Hirata, 2021b).

Another important issue that has been studied is the vertical integration of ocean transportation services for containerized cargo at terminals and port operators in Brazil. This process allows large economic entities that specialize in long-haul ocean transport to also take control of port operations, terminals and companies responsible for internal logistics from ports to importers. The majority of those involved in the study are in agreement with this finding.

Many shipowners operations around the world are emphasizing on vertical integration as a means to broaden their ocean transportation activities, cut down expenses, and enhance their hold over port services as per (Confederação Nacional da Indústria - CNI, 2018). Nevertheless, the dominance of firms involved in the ocean transport of containerized cargo implies that vertical integration in port operations might compromise competition in the industry, which could prove to be a hazard to the users.

The debate in Brazil is centered around the auctions for new container port terminals, specifically the STS10 in Santos. Some are questioning whether A.P. Moller – Maersk and MSC Mediterranean Shipping Company, the world's two largest shipowners who already operate some container terminals in the country, should be allowed to participate. The Ministry of Infrastructure has already prohibited them from bidding together in the STS10 auction, but they may still participate with other groups.

There are diverse opinions regarding the theme. Some are concerned about the possibility of more market domination by established ocean companies. Others are in favor of increased competitiveness, revenue generation, and private investment for port development. It is important to note that the auction is still in the public consultation phase, and there is much to be discussed and considered (Hirata, 2022c).

When it comes to regulating the costs of exporting coffee in containers through ports, most participants do not perceive an efficient performance by ANTAQ. Many participants believe that ANTAQ needs to improve its efficiency in addressing the concerns of those who use maritime transport services. This is due to a delay in focusing on user needs during its early years, until the enactment of Law 12,815/2013 (New Law of Ports). ANTAQ's agenda was primarily focused on developing Brazilian ports, addressing port bottlenecks, attracting private investment, improving management, reducing costs, increasing productivity, among other demands.

ANTAQ was established under the provisions of Law nº 10.233/2001 to perform various tasks, including conducting studies on the demand for waterway transport and port activities, defining tariffs, prices, and freight, comparing the costs and economic benefits transferred to users, and preparing regulations for transport services provided by shipping companies, among other duties (Brasil, 2001).

Although ANTAQ has been in operation for over two decades, it was only in the last eight years that the agency has increased its outreach to users of ports and ocean transport services. ANTAQ has primarily achieved its outreach by implementing Resolution 3.274/2014, which mandates the inspection of port services (ANTAQ, 2014), and Normative Resolution 18/2017 – which outlines the rights and responsibilities of users, intermediaries, and shipping companies (ANTAQ, 2017).

Normative Resolution 18/2017 and Resolution 62/2021 – which replaced and updated the latter (ANTAQ, 2021) – are considered a step forward in ANTAQ's inspection activities, as they provide definitions, principles, and rules on the rights and duties of companies of the sector as well as users, including fees, stays, storage expenses, and forecasts of infractions and administrative sanctions in cases of harmful practices to anyone.

This progress in inspections in recent years can be illustrated by data made available by ANTAQ itself (2022), demonstrating that scheduled and extraordinary inspections effectively began in 2014, with 1,044 processes. In 2013, there were only 79 processes. Likewise, between 2011 and 2013, there were 81 sanctioning processes. In 2014 the number already rose to 638, following this pattern in the following years.

ANTAQ has been regulating Brazil's ocean and port sectors more efficiently, as shown by its scheduled and extraordinary inspections. The agency has achieved this by developing specific norms, conducting research to support its policies, and inspecting companies operating in these markets.

However, users must bring to ANTAQ the issues faced by service providers so that it can monitor the facts and plan and program more effective actions.

One of the most relevant logistical costs for coffee exporters – and which has been included by ANTAQ in its resolutions and recent decisions – concerns the detention of containers, as it is an amount to be paid to the maritime carrier in the event of delay in delivery of the container stuffed for shipment.

After booking space on the ship, the ocean transporter tells the exporter where to where to pick-up the empty container. The exporter then fills the container with coffee and returns it to the port terminal to be loaded onto the ship.

The ocean carrier allows the exporter a certain number of days, known as "free time," to pack the container and deliver it for shipping. If the exporter fails to meet this deadline, they may be charged for each additional day (detention), in dollars, until the load is returned.

Due to the lack of containers for exporting products – one of the effects of the Covid-19 pandemic –, while free periods have decreased, daily detention values have increased disproportionately. In addition, there are detention charges for periods after the delivery of containers at export port terminals, even when the container loading delay is at the ocean carrier's option due to cancellation of that scale or postponement of shipment.

For this reason, users and maritime transporters in the Judiciary and ANTAQ have discussed the topic of abusive charges. It includes charging demurrage for periods after the stuffed containers are delivered to the terminal port, short periods of free stay, high daily rates and progressive tables due to the long delays.

Regarding port storage, 92.3% of the survey participants agreed with increased costs after the Covid-19 pandemic due to cancellations and postponements of shipments in Brazilian ports. As port storage is calculated for periods of five, seven, ten, or fifteen days, any delay in shipping the container may trigger the start of an additional storage period – in addition to the initial period already contracted – and harm the exporter, even that the responsibility for the postponement rests with the ocean carrier.

The impact of this cost on the Brazilian exporter is significant. Indeed, it reduces the competitiveness of the Brazilian coffee producer in the international market.

Finally, regarding port fees/tariffs, it is essential to be clear that the terminology used by ocean carriers (oceanic agencies) and port operators is diverse for each value. It precludes an accurate comparison between service providers and between ports. Considering that the participating companies and cooperatives use the services of different carriers and port operators, it would be impossible to treat each fee/tariff individually.

Therefore, for a better understanding of the answers obtained with the applied questionnaire, the present work gathered all these costs under the expression "port fees/tariffs," just exemplifying the most known ones, such as THC (Terminal Handling Charge), ELF (Export Logistic Fee), "B/L Fee" (Bill of Lading Issuance Fee), and the fee for scanning the containers.

THC is a fee paid by the ocean carrier to the port terminal, for handling the container between the storage location and the ship's side for shipment. Later, the carrier (or its ocean agency) charges it directly from the exporter as a reimbursement. In other words, the THC fee is configured as a container handling expense inside the port operator's yard to load this container onto the ship. The definition is present in Law 12.815/2013, the new regulatory framework for the port sector, dealing with foremanship as the activity of handling cargo within the port, including loading and unloading on ships, internal transport in the port terminal, and the opening of volumes for checking, and others (Brasil, 2013).

The ELF is an "export logistics fee" that was recently charged from exporters by ocean carriers but is now prohibited by ANTAQ through Resolution n. 62 (2021), as it does not match a specific service.

The fee for issuing or releasing the bill of lading (BL) is considered valid by ANTAQ (2021), although any abusive practice is prohibited. It is the cost of issuing/releasing the original copies of the bill of lading by the ocean carrier or its ocean agency and delivering them to the exporter or importer.

The fee for scanning containers is charged from exporters by port operators due to the mandatory installation of equipment for non-invasive inspections (scanners) of vehicles, containers, pallets, luggage and others, according to Ordinance 143, of February 11, 2022, of the Brazilian Federal Revenue (Brasil, 2022). Ordinance 143 revoked Ordinance 3,518 of September 30, 2011 (Brasil, 2011). This fee can vary between BRL 80.00 to BRL 1,000.00 per exported container and is being contested before ANTAQ and the Justice, with decisions that allow the collection and others that understand that it is illegal to pass on this cost to the user of the port services, as highlighted by Rosa (2020).

5 CONCLUSIONS

The Covid-19 pandemic has significantly impacted the export logistics and port costs of shipping coffee in containers at Brazilian ports. The data collected in this study indicates that the Covid-19 pandemic has led to difficulties such as a shortage of available spaces on ships, lack of empty containers for export, and cancellation, postponement, or rescheduling of ship calls. Additionally, the pandemic has increased port costs, caused more frequent container detention, and led to additional port storage fees and new tariffs. The costs associated with THC, ELF, the Bill of Lading Issue/Release Fee, and container scanning have also increased. It must be considered that the results of this study could be improved if there were a greater number of participants. However, it is important to highlight that the 13 companies/cooperatives involved in the survey represent a significant portion of the Brazilian coffee production and export market and are counted among the largest coffee producers and exporters globally. Furthermore, while this study only focuses on coffee exporters, it will be of interest for other sectors as a foundation for future investigations into the impact of Covid-19 pandemic or other similar global crises on the logistics of exporting goods in containers.

6 AUTHOR'S CONTRIBUTIONS

RSF wrote the manuscript, designed and performed the experiment and analyzed the data. RPA supervised the research, analyzed the data, review and approved the final version of the work.

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