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INFORMATION FLOW IN THE FOODSERVICE SUPPLY CHAIN DURING THE COVID-19 PANDEMIC PERIOD

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ABSTRACT

Periods of interruption of activities, such as the COVID-19 pandemic, directly impact several economic sectors, the flow of goods, services, and information, as well as the supply chains. In this context, this paper aims to analyze the flow of information in the supply chain of pizza restaurants that operate in a certain city in the interior of the state of São Paulo. To this end, a multiple case study was conducted using a qualitative exploratory approach with questionnaires applied to four companies in this sector. The data collected was tabulated and showed that this supply chain suffered a negative impact, considering the comparison between the period before the pandemic and during the quarantine. These companies maintained their normal operations and supply; however, there was a need to readjust the prices of their products. Furthermore, cost and stock management needed to be reviewed, searching for new suppliers and products, agility in delivery, and more favorable payment terms. As a limitation of the research, we point out its qualitative nature and the low number of interviewees. Its value consists in contributing to the knowledge in terms of informational management in the foodservice supply chain in atypical situations such as the current global health crisis.

Keywords: Coronavirus; Demand management; Supply management; Pizzerias; Company/supplier relationship.

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1. INTRODUCTION

Since late 2019, the world has been facing a global health crisis: the COVID-19 pandemic (Souza *et al.*, 2020). Its spread has influenced the supply of several economic sectors and, consequently, the production of the agents in their chains. Trade and logistics restrictions impacted both raw material suppliers and finished product companies, as many factories were closed or operated at lower productivity (Kumar *et al*., 2020).

One of the hardest hit sectors was the service supply chain, which includes activities such as logistics, tourism, and restaurants in general (foodservice), which showed reductions in demand during the pandemic (Kumar *et al*., 2020). The chain in question includes an important component – the human aspect – making it difficult to standardize the work, since this factor imprints strong differentiation. As such, it focuses its efficiency efforts on "capacity management, resource flexibility, information flows, service performance, and cashflow management" (Sengupta, 2006, p. 4).

Occasions of business interruption directly impact all modes of supply chains, influencing the availability and flow of goods and services, as well as reducing the financial results of their agents along the network (Duong and Chong, 2020).

In view of this atypical economic and public health situation, this paper aimed to analyze the information flow in the supply chain of pizza restaurants that operate in a city in the Alta Paulista region, in São Paulo state.

For better understanding, the article has been segmented as follows: theoretical framework – in the second section, dealing with demand management; supplier relations; and the impact of the COVID-19 pandemic on the supply chain. Then, section 3 is presented with the detailed methodology; section 4 lists the survey results applied to the establishments; section 5 presents the pertinent discussions; and lastly, the conclusion is in section 6.

2. THEORETICAL BACKGROUND

Demand Management

The supply chain integrates the relationships between suppliers and final consumers in a flow of goods, services, and information, and its good management reduces costs, optimizes resources, and generates greater agility of delivery to the consumer. Demand management occurs earlier in the supply chain and is of utmost importance, as it strives to anticipate customer demand and thus base its purchasing and investment decisions in a way that effectively meets its customers' needs (Baltacioglu, 2007).

Demand management in any type of supply chain includes sales forecast management and demand planning and management. However, the sales forecast changes according to the chain to which the company belongs, since the intermediate agents of a product depend on the demand of the companies that are suppliers to the final consumers of this chain. Thus, the final consumers dictate the demand for products that flows throughout the supply chain (Mentzer *et al*., 2007; Wang *et al*., 2015).

Demand management requires flexibility from companies, since the environment of uncertainties is a reality: the volume of customers may increase; the demand for orders may change; the needs of the delivery type or the form of relationship with customers and suppliers may need to be revised. All these dynamics happen in the supply chain environment and its agents need to be prepared with a range of possibilities for reorganization. Therefore, it becomes essential to be armed with information to respond quickly and serve customers in a satisfactory manner (Angkiriwang *et al.*, 2014).

The service industry has developed rapidly in the last decades, becoming more and more extensive. However, the characteristics of the service supply chain are essentially different from the manufacturing supply chain modality, and therefore studies focusing on its specificities are needed (Baltacioglu, 2007; Choudhury, 2020).

There is also a difference between service supply chains and service-product supply chains. The former deals only with intangible services that do not deliver a physical good to the customer, such as air travel, medical services, or education. The second category, meanwhile, deals with intangible services that are complemented by physical products, as is the case with bars and restaurants or various types of retail (Wang *et al.*, 2015).

When dealing with hybrid chains with complementary products and services, the environment becomes complex, as it considers a series of customized service modality next to products with a certain rate of variation in their production. There is a high volume of repeated and identical orders accompanied by services, as well as constancy of new products that require learning efforts by the team. All these particularities make the environment tangled and make it difficult to manage your demand (Maull *et al.*, 2014).

According to Sengupta (2006), building long-term re-

lationships with supply chain suppliers provides administrative efficiency and a collaborative relationship, sharing relevant information on aspects of inventory management, demand forecasting, ordering, and production planning.

Relationship between company and suppliers

As companies do not survive in isolation, the efficient management of their relationship, as well as the coordination of information, generates greater competitiveness to face contemporary challenges. The relationship between companies and suppliers has become more intimate, as organizational agents use a strategic approach to the effective management of this partnership (Baltacioglu, 2007; Krapfel *et al*., 1991). Authors Doyle *et al.* (2006) complement this by stating that the restaurant, bar, and retail sector believes that managing with suppliers seeks to achieve the best supply chain responses.

According to Hingley *et al.* (2015), in recent decades, several academic studies in the field of supply chain management have examined the collaborative relationships arising from the proximity between buyers and suppliers. Such interactions were found to be based on relationships of commitment and trust, shared values, information, and effective communication, turning into profitable relationships. Forslund (2014) and Hamister (2012) showed that the quality of the level of logistics performance also depends on the relationship between the agents, so that these partnerships become positive for both parties, defined in the literature as "key supplier", reinforcing the level of collaboration.

Lambert *et al.* (1996) defined key supplier relationship management as a familiar coexistence between company and supplier, so that both parties share a high level of integration in business processes and are seen as an extension of their companies.

This view enables firms to achieve competitive advantages by being agile, fast, profitable, and performing better, and some key-supplier practices increase the link between supply chain, organizational purchasing orientation and effectiveness (Doyle *et al.*, 2006; Forslund, 2014; Miocevic and Crnjak-Karanovic, 2012). Authors Teller *et al.* (2012) pointed out the relevance of this method to explain supply chain execution and how to improve the level of Supply Chain Management (SCM) implementation within an organization.

According to Daugherty *et al.* (2006) and Frankel *et al.* (2002), there is strategic value in good relationships, but there are also some challenges to be faced in the management of these relationships: (i) wrong choice of partners; (ii) difficulty to adapt the competencies and needs found in the companies; (iii) lack of understanding of the proposed goals; and (iv) when the proposed initiatives do not meet the parties' needs.

One of the main criteria analyzed between suppliers and buyers refers to the partnership and the communication information flow. Thus, it becomes necessary to classify suppliers in order to generate information to establish or implement a supply policy. This procedure helps in the definition of supply quotas, sets up receiving activities, and defines actions for supplier reevaluation. This way, the final classification of the partners is done through their performance and by establishing criteria according to each company (Cheng, 2011).

For a good management, the flow of information must be well handled, organized, distributed, and shared both internally and externally to the enterprises, generating strategic and competitive advantages. Effective information management requires a set of policies that allow access to relevant, accurate, and quality information, distributed in a timely manner, at low cost, and with accessibility (Beal, 2004).

Meanwhile, technology has enabled the sharing of information in an agile and uncomplicated manner, allowing supply chains to be constantly updated and operating in a massively connected environment. These chains have become increasingly dependent on the flow of information pertinent to their activities, as well as on the benefits of this sharing, such as more refined and accurate tracking, cost and inventory reduction, and optimization of their capacity (Colicchia *et al*., 2019).

Despite a satisfactory flow of information, atypical and major situations affect even the most connected supply chains. The COVID-19 pandemic has required resilience and new strategies to reduce business impacts in diverse areas and chains around the world.

Impact of the COVID-19 pandemic on the supply chain

An epidemic outbreak is a risk to supply chains, not only locally, but globally, in situations such as swine flu, SARS, and now during the COVID-19 pandemic. This high-profile phenomenon is characterized by a long interruption period, high uncertainty, and a cascading effect on other players in the chain (Ivanov, 2020).

In specific, the spread of epidemics is more serious, because they cause unique situations in the market: (i) long shutdown period and unpredictability of resumption;

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(ii) unfolding of the effect along the supply chain and dissemination of the disease in the population; and (iii) interference in supply, demand, and logistics (Ivanov, 2020). To meet the challenges of this time, the management of organizations must adopt strategies to increase the consumption of existing assets, as well as minimize costs and inventories. It is also a favorable time for supply chains to become more digital, assisting in the management of activities and promoting health protection for their users (Kumar *et al.*, 2020).

With the closing of bars, restaurants, and hotels and the orientation for the population to stay at home, food retailers suddenly felt the pressure on product demand and its efficiency. These businesses were used to expected seasonal changes; however, the pandemic situation demanded a quick response. Retailers initially sought to solve the problem by serving customers with rationing in the amount of products and specific schedules for risk groups. The increase in product prices was a consequence of the tension exerted in this link of the food supply chain (Hobbs, 2020).

3. RESEARCH METHODOLOGY

Object of study

To achieve the desired objective, a qualitative multiple case study was conducted in which four pizza restaurants in a city in the interior of the state of São Paulo were investigated. This methodology is relevant because it involves research into a recent phenomenon, in which the relationship between the situation and its context has not been clarified; in particular, the analysis of multiple cases was chosen because it examines more than one research subject and investigates its similarities and differences (Yin, 2001).

In 2017, the city of Alta Paulista registered a Gross Domestic Product (GDP) per capita of R$32,816.72 and, currently, its population is estimated at 240,000 inhabitants (IBGE, 2020). As of March 24, the municipality in question followed the state decree that determined quarantine, closing commerce and other activities, “except essential food services, supply, health, banking, cleaning, and security” (São Paulo, 2020a).

The present research had an exploratory character, in order to answer the following problem: in what way has the pandemic period influenced the information management in the foodservice supply chain?

Data Collection Procedures

The sample was selected according to the requirements of (i) establishments that remained open during the pandemic period, and (ii) availability to participate in the research. We maintained the anonymity of the companies studied in order to protect their organizational information and not to generate burden to the participants. Semi-structured questionnaires (Appendix) were applied to the owners or managers of the companies by means of messaging applications or e-mail.

The researched period comprised the events of the months of March to September 2020. Since June, the São Paulo state government has outlined a strategy called the “São Paulo Plan” for safe economic recovery during the pandemic: a category of five phases was followed with a view to the gradual reopening of activities according to the type of establishment (São Paulo, 2020b).

On a weekly basis, the regions and their comprised municipalities were classified according to the health agencies’ criteria and either went backwards or forwards in the relaxation (São Paulo, 2020b), as can be seen in Figure 1.

During the data recording period, the pizzerias studied were able to resume face-to-face service (Phases 3 and 4) following several restrictions, such as serving in ventilated areas, and reducing customer capacity and operating time, in addition to social distancing measures, use of masks, and cleanliness of the location (São Paulo, 2020b).

Data Analysis Procedures

The data collected were organized by gathering the answers of all subjects to each question and were tabulated using Microsoft Excel® software, resulting in three figures (3, 4, and 5), which grouped the information by categories. The analyses were made observing the similarities and differences between the respondents and comparing their answers in light of the theoretical reference studied.

4. RESULTS

After collecting and organizing the data, we had the results and analysis of the relationship between suppliers and the four pizza restaurants surveyed. Initially, we observed the differences between the surveyed establishments regarding their form of conventional service (non-pandemic period) in Figure 2.

	Phase 1 Red	Phase 2 Orange	Phase 3 Yellow	Phase 4 Green	Phase 5 Blue
On-site consumption - Bars, restaurants, and the like	Prohibited	Prohibited	Open with restrictions	Open with restrictions	Open with restrictions

Figure 1. Quarantine reopening phases in the state of São Paulo
Source: Elaborated from São Paulo, 2020b

Subjects	Conventional attendance
Pizza restaurant A On-site (all-you-can-eat and à la carte) and delivery	
Pizza restaurant B	Delivery
Pizza restaurant C	On-site (all-you-can-eat and à la carte) and delivery
Pizza restaurant D	On-site (à la carte) and delivery

Figure 2. Distinctions about the type of service in pizzerias in normal period
Source: The authors themselves

During the pandemic, all pizza restaurants operated only via delivery; however, under normal conditions, 75% of the respondents (pizzeria A, C, and D) operated in person; thus, the atypicality of the period caused changes in this aspect for three of the respondents mentioned. After the relaxation of the protective measures (Phase 3 - Yellow), the in-person meetings started to take place again following the restrictive determinations (São Paulo, 2020b).

Figure 3 illustrates a comparison between the similarities and differences of the research participants regarding their supply relationship. The first analysis presents the purchase relationship before the pandemic period, in order to verify through which category of suppliers the purchases were made (representatives, wholesalers, supermarkets, direct purchases in the industry, open markets, or rural producers). The second analysis in Figure 3 corresponds to the relationship of purchases during the pandemic period, and it is possible to find differences between the respondents' answers (Appendix).

Period	Purchasing Relationship	Pizza restaurants
Before the pandemic	Diversified purchasing through industries, wholesalers, and supermarkets	A B C D
During the pandemic	Intensification of quotations in supermarkets	A C
	Reduction of quotations in supermarkets	B
	Maintenance of the relationship with suppliers	D

Figure 3. Comparison of purchasing relationships before and during the pandemic period
Source: The authors themselves

Figure 3 shows that in the period before the COVID-19 pandemic, there was a high degree of similarity in the form of supply among those surveyed, since all of them made purchases directly from the industries with deliveries to the stores and they complemented these purchases with a small part in person at wholesalers and supermarkets.

During the pandemic, pizzerias A and C intensified their visits to the supermarket for price quotations and to maintain low stocks. Pizzeria C also reports that, in order to remain competitive, they redoubled their attention to price quotations and started visiting wholesalers almost every day, and some specific products were found at lower prices when compared to buying directly from the industry.

Conversely, pizzeria B sharply reduced its visits to these establishments, as a protective measure against the disease, and intensified purchase with the industry via app/e-mail. Pizzeria D maintained its purchasing relationship; however, it reported difficulty in acquiring some products, such as pizza packaging, and limited purchases at supermarkets.

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Figure 4 confronts the relationship of the suppliers and pizzerias interviewed before and during the atypical pandemic period.

Period	Relationship between pizza restaurants and suppliers	Pizza restaurants
Before the pandemic	Satisfactory relationship	A B C D
During the pandemic	Difficulty of payment and partnership breakdown	A
	Difficulty in negotiating with incumbent suppliers	B
	Proximity via application and increase of suppliers	C
	Relationship maintenance allied with prevention protocols	D

Figure 4. Comparison of relationship with suppliers before and during the pandemic period
Source: The authors themselves

In Figure 4, it is possible to see a significant change in the agents' supply relationship. In the period before the pandemic, all interviewees said they had a good purchasing relationship with their suppliers, even following a predetermined weekly consumption with the agents, as was the case of pizzeria C. Meanwhile, pizzeria B considers that in-person contact brought them closer to their suppliers, facilitating negotiations. Pizzeria A reported satisfaction with the payment terms provided by the supplier companies, and pizzeria D emphasizes the quality of the products and the satisfactory logistics.

When asked about the current scenario, the subjects stated that measures are being taken to prevent COVID-19 on occasions of face-to-face relationships with suppliers and at delivery times. Regarding care, all pizzerias follow Law No. 14.019/20 (BRASIL, 2020), which provides for the mandatory use of face masks and asepsis of the premises as a measure to confront the pandemic.

Pizzeria A reports that during the pandemic period it had difficulty paying its suppliers and that, as a result, some of them discontinued their partnership. In the meantime, pizzeria B maintains its opinion of difficulty in negotiating due to the physically distant relationship, while pizzeria C considers that frequent contact via messaging app brought agents closer in this period and increased its range of suppliers. Pizzeria D maintained its relationship with its suppliers, protecting itself with the measures indicated for prevention.

Figure 5 depicts the supply situation during the pandemic as to the main challenge faced: the repercussion of the health crisis on the supply of these businesses, and the current supply of products compared to the menu offered before the COVID-19 outbreak.

Pandemic framework	Consequence	Pizza restaurants
Main Supply Challenge	Lower cash flow and safety stock management	A
	Increased input prices and impact on profit margin	B
	Absence of face-to-face service, reduced billing, and difficulty in maintaining staff	C D
Changes in the supply of pizza restaurants	Increased input prices and changes in the payment terms, resulting in increased final product prices	A B C D
Offering products to end customers	Supply was not affected; inevitable pass-through in the final price due to increasing input prices	A B C D

Figure 5. Current scenario regarding the supply and offering of products to end customers during the pandemic of COVID-19
Source: The authors themselves

Some specific differences in the supply relationship can be seen in Figure 5. Pizzeria A needed to manage the balance between safety stock and the amount of raw material available for operation, as its biggest bottleneck was related to cash flow. Pizzeria B, in turn, points out as a challenge the issue of increasing input prices, which impacted the profit margin of their product. The closing of the establishments for in-person service caused a reduction in revenues and made it harder for two of the interviewees, pizzerias C and D, to maintain their staff.

Responses on changes in the supply of these establishments are similar. The increase in raw material prices was cited by all the interviewees, directly affecting the final sales value of their products. Moreover, the payment terms to suppliers have changed – certain items that could be paid in installments to the industry are now paid in cash at the wholesaler.

Pizzeria A exemplified that mainly the mozzarella, which is its most consumed product, caused an increase of up to 40% in the Cost of Goods Sold (COGS) of some pizzas. Product reception was also pointed out by pizzerias B and C as one of the adverse factors during this period, as well as the limited purchase from supermarkets and wholesalers, a factor mentioned by all the interviewees.

Unanimously, the interviewees claimed that their menus were not affected; however, they reaffirmed the substantial price increase of their raw materials, the inevitable passing on to their consumers, and an extra effort in stock and purchase management.

5. DISCUSSIONS

The results corroborate Ivanov's (2020) view on periods of disruption characterized by high-profile events, such as the current moment of the COVID-19 pandemic crisis: lengthy downtime, repercussions in the chain and, above all, interference in supply, demand, and logistics - all of these situations were mentioned by the responding pizzerias.

As indicated by Kumar *et al.* (2020), measures were identified among the respondents aimed at minimizing inventories, maintaining their assets, impacting cash flow as little as possible, and avoiding waste. All these actions were provided for an efficient management in this period of crisis, including digital mechanisms pointed out by the interviewees. Some started to adopt a greater frequency of requests via messaging apps, websites, and e-mail, in order to promote convenience and health protection to users.

However, not all establishments were satisfied with the physical distance from their suppliers, suggesting that personalized and in-person relationships are relevant in their supply management. Lambert *et al.* (1996) support this view when they state that the close relationships between suppliers and customers make the environment more familiar and conducive to negotiations.

For one of the interviewees (pizzeria C), the purchasing reports were made in a pre-set manner, following a supply pattern with few changes in quantity. This partnership between the establishment and the supplier was reinforced by the trust relationship between the agents, given their long-time relationship, as also demonstrated by Lambert *et al.* (1996).

Most of the establishments (pizzerias A, C, and D) needed to take cost-cutting measures, researching several suppliers, even in person at retailers and wholesalers. Although this contributes to a more efficient cost management, it must be carefully executed, always maintaining the protective measures for preservation of customers, employees, and even the buyers themselves.

Ultimately, despite the increase in quotations and the search for alternatives to reduce costs, the prices of their final products have increased. Hobbs (2020) substantiated the increase in retailers' prices by justifying the pressure on demand from these agents. Even with this situation, one of the interviewees reports that retailer and wholesaler prices on certain specific products were lower when compared to buying directly from the industry.

6. FINAL CONSIDERATIONS

After analyzing the questionnaires applied to this foodservice sample, the results conclude that this chain has been highly impacted by the COVID-19 pandemic regarding its supply relationship. From the considerations, it is seen that the article has met its purpose of analyzing the information flow in the supply chain of pizzerias in the studied municipality.

In view of the answers from the owners and managers, a brief comparison was drawn between the period before and during the pandemic. The information on demand, price, supply, and logistics was unstable and constantly changing. This new management model required additional effort for the pizzerias to keep their business running and the quality of their products. Some agents consider this atypical moment under a positivist viewpoint, in which their companies have found new products and interesting partnerships. Conversely, other firms still do not consider the dynamism resulting from the pandemic to be advantageous and highlight the difficulties experienced.

This situation has rewarded these agents with extra learning and resilience in managing their businesses, as their firms have been forced to constant innovation and digital tools to face the imposed challenges. The research suggests that the more informed and even digitalized this chain is, the greater the response agility in extraordinary moments like this.

This article considers some limitations arising from its qualitative approach with a reduced number of respondents, whereas a quantitative sample survey would result in data that is broader and closer to the reality of this supply chain. As a suggestion, further research could investigate the foodservice chain after the pandemic period to find out whether the flow of information has changed in its supply management in light of the lessons learned from the COVID-19 crisis.

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APPENDIX - QUESTIONNAIRE APPLIED TO PIZZA RESTAURANT MANAGERS

- How were purchases made before the pandemic period?
- How are purchases being made during the pandemic period?
- How was the relationship with suppliers before the pandemic?
- How is the relationship now? Which coronavirus prevention measures have been adopted between supplier and company?
- What was the main challenge in supplying the pizza restaurant during the pandemic period?
- Were there any changes in the supply of the pizza restaurant?
- Did supplying influence product offerings to end customers?

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