

Article

Impact of Digitalization of Sales on the Profitability of the Restaurant Industry during COVID-19

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Abstract: The COVID-19 pandemic had a severe impact on the restaurant industry. Temporary shutdowns and seating capacity restrictions led to a sharp drop in sales. In this scenario, digitalization emerged as a crucial strategy for business survival, offering opportunities to increase restaurants' competitiveness and revenues. This study examines the financial profitability of restaurants during 2020, comparing establishments with digital sales tools to those without. Multiple linear regression results indicate that liquidity, sales growth, restaurant size, and having a website directly influenced profitability. In addition, restaurants with their own online ordering and home delivery services or associated with delivery platforms experienced lower profitability losses. These findings contribute to our understanding of the role of digitalization in the restaurant sector during the pandemic, providing valuable practical and theoretical implications for the industry in similar contexts.

Keywords: restaurant sector; digitalization; home delivery; profitability



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1. Introduction

The COVID-19 pandemic had a profound economic impact on the majority of the production sectors, including the food service industry, which has a substantial influence on the Gross Domestic Product (GDP). The measures enforced by countries to control the spread of the pandemic limited companies' activity and led to serious financial imbalances, even undermining the viability of many of them (Kim et al. 2020; Hu and Zhang 2021). Restaurants, classified as non-essential establishments with high social interaction, faced operational challenges in 2020, having to shut down and reduce seating capacity. Changes in consumer habits, driven by concerns about contagion risks, led to a decline in eating out (Liu and Kim 2021). Globally, the number of consumers who chose the traditional option of eating at a restaurant decreased by 30% globally between February 2019 and 2022 (Statista 2022a).

To survive the unprecedented health and economic crisis caused by COVID-19, businesses needed to embrace digitalization. Innovations and digital tools became crucial in developing competitive advantages that ensure profitability and resilience in the face of market turmoil (Schwertner 2017; Bouwman et al. 2018). Electronic commerce emerged as a leading trend, allowing companies to connect with consumers while ensuring social distancing and compliance with pandemic regulations (Dannenberg et al. 2020). Establishing an online sales channel became a vital tool for businesses to withstand the crisis and its economic impact (Kim et al. 2020; Türkes et al. 2021).

In this regard, the global market for restaurant online ordering and home delivery services experienced significant qualitative growth in 2020. Turnover increased from USD 157.34 billion in 2019 to USD 232.33 billion in 2020, with an annual growth rate of 26.45% in 2021 (Statista 2023). It was estimated that in 2022, global revenue from online sales for the restaurant industry would reach USD 325.44 billion and will continue growing at an annual rate of 6.71%, forecasting a turnover of USD 450.30 billion in 2027 (Statista 2023). In Spain,

this industry witnessed remarkable sales growth between 2015 and 2018, with revenue exceeding 420 million euros in 2019. During the pandemic in 2020, revenue surpassed 1018.92 million euros, and in the first three quarters of 2022 alone, restaurant online sales generated revenue of 1267.61 million euros (Statista 2022b).

Beyond the impact that the pandemic has had on the market growth of online orders and home delivery, the digitalization of sales channels presents restaurant businesses with opportunities to expand their competitive advantages (Ma et al. 2021). This technology has been shown to increase companies' productivity, minimize errors, reduce costs (Kimes 2011; See-Kwong et al. 2017; Niu et al. 2021; Türkes et al. 2021), improve customers' user experience (Gavilán et al. 2021), and foster customer loyalty (Kim et al. 2019).

However, while there is consensus that online sales should be included in a comprehensive restaurant offering to ensure continuity and growth, companies must address several issues to maximize the usefulness of this sales channel (Liu and Kim 2021). Factors such as increased packaging and transport costs, delivery platform commissions, delivery errors, and the substitution effect of traditional sales can negatively impact business earnings and profitability (Collison 2020; Ma et al. 2021; Chen et al. 2022). The aim of this study is to contribute to the understanding of how the digitalization of the sales channel has affected the financial performance of businesses in the restaurant sector in the context of the COVID-19 pandemic. For this purpose, this study analyses the financial performance of restaurant companies during the challenging year of 2020, distinguishing between those with digital sales tools and those without. Specifically, three categories are established: having a website, minimal digitalization requirement; having an online ordering system and own home delivery services; and having an online ordering system and home delivery services through any of the delivery platforms.

The case study focuses on restaurant establishments in the Valencian Community, one of Spain's territorial divisions. Spain was chosen due to its high tourism rates, ranking as the second most visited country by international tourists in 2019 (World Tourism Organization 2020). The restaurant sector contributes significantly to the national GDP, representing around 5.5% until 2020 (Statista 2023). Spain was also one of the European states most affected by the pandemic and the strict measures enforced by the authorities had a strong impact on restaurant establishments. The Valencian Community, known for its tourism activity, relies on the restaurant sector as a significant contributor to its economy, with tourism representing 15.7% of the region's GDP in 2019, and the restaurant industry accounting for more than 6% (Hostelería de España 2021). In 2020, it had more than 30,000 establishments (bars and restaurants), positioning itself as the third Spanish region with the most dining venues (Hostelería de España 2021). However, it is important to note that, during 2020, due to the COVID-19 pandemic, tourist activities plummeted dramatically in most destinations, including the Valencian Community. During this period, international tourism in the region experienced a steep year-on-year decline of 73.1%, and domestic tourism fell by 51.6%. However, internal tourism within the Community saw a much more moderate reduction of 26.6% (Exceltur 2021). Therefore, in the context of our research, local residents and proximity tourism played a crucial role in sustaining and stimulating the restaurant industry in 2020 (IvieLAB 2021).

To verify the relationship between companies' financial performance and the digitalization of sales channels, a multiple linear regression is performed where the dependent variable is Return on Assets (ROA). The results show that liquidity, sales variance, restaurant size and having a website had a direct and positive impact on restaurants' profitability. Similarly, restaurants with their own online ordering and home delivery services or through delivery platforms presented a lower loss in profitability.

2. Review of the Literature and Hypotheses

2.1. Digitalization and Financial Performance

Digital transformation is a global trend that is spreading throughout all economic sectors (Zhai et al. 2022). By implementing technology in the value creation processes,

companies are trying to adapt to the changes and impacts taking place in the business environment (Vial 2019). By doing so, they seek to maintain their competitive advantages or to develop new advantages that allow them to set themselves apart from their competitors (Schwertner 2017; Bouwman et al. 2018) and to guarantee the continuity of their business (Türkes et al. 2021). This transformation is intrinsically linked to dynamic capability theory, which argues that organisations that are able to identify and adjust their capabilities to changing environments are more likely to succeed (Teece et al. 1997).

From an economic perspective, different studies agree that digital transformation contributes to improving companies' profitability. In this sense, based on an analysis of business services, Ribeiro-Navarrete et al. (2021) conclude that the business use of social networks and training in digital tools improve the profitability of organizations. Fernández-Portillo et al. (2022) analysed a sample of Spanish companies and found that there is a direct and positive relation between a company's digitalization and its financial performance, with adequate innovation management acting as moderating variable. The results of the studies by Peng and Tao (2022) and Zhai et al. (2022), whose studies are based on a sample of listed Chinese companies, are in the same line. These authors determined that digital transformation directly and indirectly improves business performance: directly, because it increases return on assets and return on equity; and indirectly, because it reduces costs, increases operation efficiency, and contributes to the success of innovation.

Although it is one of the sectors most lagging behind (Tan and Netessine 2019), the restaurant sector is also immersed in the digital transformation of all its business processes (Collins et al. 2017). Digital tools provide support to the internal processes of restaurant businesses linked to the so called back of house activities (BOH), such as logistical management, human resources, and the finance/accounting area, and the external processes linked to front of house activities (FOH), which involve customer relations (Alt 2021).

FOH digitalization processes, especially digital marketing and online ordering and home delivery services, can have a positive impact on restaurants' profitability. The compilation and analysis of client data and their ordering habits can contribute to marketing strategies and together with home delivery services offer a new business opportunity, additional revenue and a stronger financial performance (Türkes et al. 2021). In addition, as described in the literature, if the digital tools used to provide these services are well implemented and integrated into a company's operations, they also offer other numerous benefits (Kimes 2008). They can attract new buyers, increase business efficiency, reduce mistakes in orders and improve customer relations management and profitability (Kimes 2011; See-Kwong et al. 2017; Niu et al. 2021; Türkes et al. 2021). In addition, these tools contribute to enhancing customer experience because customers benefit from the ease and convenience of online ordering and home delivery services, which contributes to an increase in their satisfaction and loyalty (Kimes 2011; Gavilán et al. 2021).

Nevertheless, these types of services also present some challenges. They could simply result in the cannibalization of traditional sales rather than an increase in demand. Customers could substitute physical purchases for online shopping without there being an increase in either sales or financial performance (Collison 2020; Chen et al. 2022). Likewise, the profit margins and profitability of companies could decrease due to higher costs involved in an online ordering system and home delivery (Kimes 2011; Chen et al. 2022; Niu et al. 2021). Incremental costs occur, although with differences, whether a restaurant invests in its own website, fleet of vehicles and delivery staff or whether it must pay commission to delivery platforms. Another risk, as See-Kwong et al. (2017) point out, is that restaurants lose control of the food once handed over to the delivery person and the desired level of quality could be compromised, which could consequently affect customer satisfaction, sales and profitability.

Therefore, although different empirical studies show a positive relationship between online ordering technologies and the sales growth of restaurants (Liu and Kim 2021; Tan and Netessine 2019), the truth is that this relationship is not always so evident and neither

is it clear if it directly relates to a higher profitability for companies. The relationship between the digitalization of restaurant sales channels and their financial performance is an aspect that has not been studied in depth. One study of note, by [Collison \(2020\)](#), analyses a sample of visa transactions made in the United States between card owners and restaurants with home delivery services. Although the study data reveals an increase in the revenue of restaurants that offer these services, it also reflects lower profitability. For their part, [Van Veldhoven et al. \(2021\)](#) analyse the financial performance of a sample of Belgians who offer online ordering through an external platform. They determine that restaurants' liquidity increases but there is no significant evidence that profitability and solvency also improve. The theoretical model by [Ma et al. \(2021\)](#) determines that although in practice the introduction of online ordering and home delivery can initially increase sales and revenue there are other factors, such as the cannibalization of sales and the restaurants' capacity to meet the demand from all the distribution channels, that influence the individual profitability of each establishment, making it difficult to determine their effect on economic and financial indicators.

2.2. Digitalization of the Restaurant Industry during COVID-19 and Financial Performance

During the most restrictive stage of the pandemic, providing online access for clients to place their orders and collect their food from the premises or by home delivery was crucial for the sustainability of many businesses. In the digital era, not being on the internet can mean a company does not exist for certain clients or users and consequently a loss of potential revenue and profitability. In this regard, the study by [Han et al. \(2023\)](#) based on the theory of customer acquisition marketing and the theory of uses and gratification, shows that restaurant revenues increase as their digital visibility increases. In the context of the pandemic, [Brewer and Seby \(2021\)](#) also found that restaurant consumers' purchase intentions were positively influenced by the visual presentation of menus on websites.

Corporate websites are a basic tool in the digitalization process of companies and fundamental for digital communication ([García-García et al. 2021](#)). As [Saleem et al. \(2022\)](#) concluded in their research, a quality corporate website with clear, concise, engaging and relevant content for the audience positively influences consumers' purchasing decisions and consequently benefits the financial performance of the business. This digital tool enables customers to find out about the company, its products and services, production processes and any information that it is interested in making public ([Lowry et al. 2014](#)). It also makes it easier for customers to communicate with the company, and they can make suggestions or comments that could be useful for improving organizational performance. Websites are also a very valuable information channel for conducting personalized marketing actions ([Kimes 2011](#); [Safari et al. 2015](#)), which, as a result of their impact on client satisfaction and loyalty, can influence restaurants' profitability ([Kim et al. 2019](#)). [Singh et al. \(2022\)](#) empirically tested the effect of using various digital marketing tools in the restaurant sector and found that they have a positive relationship with the competitiveness of businesses. Therefore, in light of the previous literature, the following hypothesis is proposed:

Hypothesis 1. *Corporate websites positively influenced the financial performance of restaurants during COVID-19.*

As well as having a corporate website, online ordering and home delivery services have also established themselves as effective tools to reach a larger number of consumers in a cost-effective way ([Ray et al. 2019](#)), and they were key for restaurant businesses during the pandemic. As stated by some studies ([Yang et al. 2020](#); [Türkes et al. 2021](#)), these services allowed restaurants to continue generating revenue, cover some of their fixed costs and ensure a portion of their profitability during periods of mandatory closure and restricted operating hours. [Huang and Siao \(2023\)](#) explored the impact of implementing online ordering and delivery services in restaurants during the COVID-19 pandemic, concluding that these services can improve both the financial and non-financial performance

of establishments. Similarly, [Kim et al. \(2021\)](#) demonstrated that the adoption of digital channels had a positive impact on restaurant sales in China, regardless of the restrictions imposed by the city's location. Likewise, [Neise et al. \(2021\)](#) highlighted that during the initial months of the lockdown in Germany, delivery and takeout services were the most relevant factors that explained the resilience of restaurants. Moreover, once the restrictions were lifted, and restaurants were able to reopen, the reduction in seating capacity and consumers' fear of contagion meant a substantial decrease in the influx of consumers on the premises. In this context, the demand for online ordering and home delivery services continued to be an important source of revenue for restaurants ([Kim et al. 2021](#); [Gavilán et al. 2021](#); [Hu and Zhang 2021](#)).

In recent years, an increasing number of restaurants have developed their own websites to allow customers to place orders directly through this channel ([Yeo et al. 2017](#)). However, whether due to operational or financial considerations, many restaurants choose to outsource these services through digital delivery platforms ([See-Kwong et al. 2017](#)), such as Deliveroo, Glovo, Just Eat, or Uber Eats. Both options have potential advantages and disadvantages. On the one hand, restaurants with in-house online ordering and home delivery services must bear the fixed and operational costs of this infrastructure, which can potentially impact their profitability ([Collison 2020](#)). However, as highlighted by [Du et al. \(2023\)](#), providing these services autonomously allows them to have greater control over the process, including service quality, delivery time and customer relationships, which can increase consumers' purchase intent and benefits.

On the other hand, the qualitative research by [See-Kwong et al. \(2017\)](#) suggests that restaurant managers believe that marketing investments and delivery services provided by large delivery platforms enhance the visibility and reach of restaurants, helping them attract more customers and generate higher revenue. According to the study by [Kim et al. \(2021\)](#), restaurants offering services through China's main food delivery platform benefited from the COVID-19 crisis, experiencing an increase in average monthly sales in the first quarter of 2020 compared to the same period in 2019. Nevertheless, as noted by [See-Kwong et al. \(2017\)](#), the commissions charged by these platforms for each order can negatively impact the profitability of restaurants, which already have very tight profit margins. This reduction in profitability particularly affects smaller restaurants as they have limited negotiation power with the platforms ([Ji et al. 2022](#)).

Additionally, [Tao et al. \(2020\)](#) highlight the issue of restaurants losing control over service quality when using these platforms, a concern that can also have a negative impact on sales and profitability. However, [Mhlanga \(2022\)](#) measured the impact of these platforms on restaurants in two South African cities and determined that they do not influence meal prices or restaurant profitability. The study by [Niu et al. \(2021\)](#) concludes that the choice between using in-house infrastructure or delivery platforms depends on a restaurant's ability to adjust prices to cover the cost of the service, whether in-house or outsourced. It also suggests that a restaurant prefers to use its own logistics when there is a high potential for online sales. Conversely, they will outsource services when online sales are minimal. Therefore, based on the mixed results of previous research, we posit the following hypotheses:

Hypothesis 2. *In-house online ordering and home delivery services influenced the financial performance of restaurants during COVID-19.*

Hypothesis 3. *Online ordering and delivery services through external platforms influenced the financial performance of restaurants during COVID-19.*

3. Methodology

3.1. Sample Selection and Data

The first step in this study was to determine the target population. In a primary selection process, the restaurants were selected in exactly the same way as in the study

by Lado-Sestayo et al. (2016), using the database of the Iberian Balance Sheet Analysis System (SABI).

SABI is a widely used database by researchers, offering a 25-year historical dataset of accounting, economic and financial information for 2,900,000 Spanish companies. As a result, the restaurant establishments examined in this study are limited to those with a legal structure as corporations. These companies are required to submit their annual reports to the Commercial Registry, making their information publicly available. The restaurant establishments which were operated by individual entrepreneurs do not have accounting, economic and financial information in the database; therefore they were not included in the analysis.

The variable used for the search was code I.5610: “Restaurants and mobile food service activities” from the statistical classification of economic activities in the European Community (NACE). To conduct the search and obtain the list of restaurant establishments, the year 2020 was selected, as it was the worst year of the COVID-19 crisis when restaurants experienced mandatory closures for extended periods. Once they were allowed to reopen, they had to cope with strict seating capacity restrictions. Subsequently, as a search filter, the Valencian Community was included. This region is a significant driver of tourism and the economy in Spain. According to data from the National Statistics Institute, in 2019, tourism contributed 12.6% to the national GDP, employing 12.5% of the employed population. The restaurant sector contributed 5.5% to the national GDP, representing approximately 7.9% of employment across all sectors. In the Valencian Community, tourism accounted for 15.7% of the region’s GDP and 15.8% of employment (Exceltur 2021). The restaurant sector generated 6.8% of the Valencian Community’s GDP and employed 9.7% of the population.

As shown in Table 1, the total number of restaurant establishments in 2020 amounted to 63,997. After excluding the restaurants whose database information was insufficient, incomplete or did not meet the requirements for analysis, the population was 8494.

Table 1. Restaurant population selection process.

Search Criterion	N° of Excluded Restaurants	N° of Valid Restaurants
Code NACE I.5610		63,997
Geographic area: Valencian Community	54,329	8668
Unreliable accounting reports	47	8621
Incomplete accounting data	86	8535
Incoherent accounting data	41	8494

Once the population was established, a simple random sample was taken from the total number of restaurant businesses that belong to the Valencian Community, with a confidence level of 95% and a sample error of 1%. The number of restaurants to be studied as a result of this random sampling was 1503. Subsequently, the financial information from the balance sheet and income statement of these selected restaurants for the 2020 fiscal year was collected.

This study aims to determine the effect of digitalization on the profitability of restaurant businesses during the pandemic according to the three hypotheses established. Thus, the next step was to classify the establishments with respect to their digitalization situation and the mode of service they used to confront the situation caused by the pandemic.

First, the restaurant establishments were classified according to whether they had a website. In this respect, it is assumed that having a website corresponds to a basic level of digitalization, which is the first classification category. Having a website allowed clients to consult information corresponding to the menu, whether the establishment was closed or not, opening hours, how to place an order, whether they could collect from the establishment or if home delivery was possible. Second, companies were divided according to whether an order could be placed online instead of using other alternatives, such as in person or by telephone, and whether the establishment had its own delivery service.

Finally, companies were segmented into a third category, which included establishments integrated into any of the numerous external food ordering and delivery platforms like Glovo, Just-Eat or Deliveroo.

The information consulted to make the above classifications was mainly available on the restaurant websites themselves, home delivery platforms, web portals like Tripadvisor, the Fork, Bookeat, Restaurantes.com, and social networks like Facebook or Instagram. Table 2 presents the number of restaurants that are grouped under each of the classifications according to their digitalization category.

Table 2. Distribution of restaurants by type of digital service.

Variables		Companies	%
Website (WEB)	No	556	36.99%
	Yes	947	63.01%
Website + own delivery service (WODS)	No	1390	92.48%
	Yes	113	7.52%
Delivery Platforms (DF)	No	1272	84.63%
	Yes	231	15.37%
Pooled sample		1503	100.00%

Note: The % symbol indicates the percentage of restaurants within each category.

3.2. Variables

In reference to the studies by [Chen \(2010\)](#), [Cavero-Rubio and Amorós-Martínez \(2020\)](#), [Nguyen and Nguyen \(2020\)](#) and [Van Veldhoven et al. \(2021\)](#) Return on Assets (ROA) has been chosen as the dependent variable to measure financial performance. According to these authors, ROA is the variable usually used to measure financial performance in research, and many researchers see it as a stable variable and more indicative of an organization's financial performance.

The independent variables included in this study are indebtedness, liquidity and sales variance ([Xu and Jin 2022](#); [Opstad et al. 2022](#)). Firstly, an excessive level of debt can decrease a company's profitability when their financial costs increase ([Nguyen and Nguyen 2020](#); [Opstad et al. 2022](#)). However, it is also possible that a moderate level of indebtedness may improve profitability as it permits a company to finance investment projects at a lower cost than if they were to only use their own resources ([Margaritis and Psillaki 2010](#)).

Secondly, COVID-19 caused restaurant establishments to be hit by a serious liquidity crisis due to the severe loss of revenue they sustained ([Dube et al. 2021](#)). In particular, in the case of the restaurant sector, which was vulnerable during the pandemic, having liquidity was crucial ([Nguyen et al. 2021](#)). Not only did restaurants need to cover operational and financial costs, but they also required sufficient resources to adapt their installations and processes to health protocols and invest in digital tools and online sales channels that would help increase their income and profitability. Apart from this, restaurants with insufficient liquidity could find themselves being forced into taking drastic measures like selling assets or resorting to loans, which could negatively affect their profitability. Therefore, the adequate management of liquidity is fundamental for small and medium companies, as is the case of most restaurants ([Lakatos 2020](#)), and it is crucial to improve long-term business profitability ([Zimon and Tarighi 2021](#); [Kumar 2022](#)).

According to [Markman and Gartner \(2002\)](#), business growth is the basis for achieving competitive advantages and increasing profitability. Sales variance is a good measure of business growth ([Fareed et al. 2016](#)) and maintains a close link to profitability ([Mun and Jang 2015](#); [Fareed et al. 2016](#)). Generally, the more sales increase, the greater the likelihood that profitability will increase. Nevertheless, although different studies suggest that there is a positive relation between sales variance and business performance ([Lee 2014](#); [Fareed et al. 2016](#)), other researchers have found that this relation is negative

(Reid 1995; Jang and Park 2011) or that the relation between both variables is not significant (Markman and Gartner 2002).

As size influences a company's capacity to adapt to changes and make the most of the benefits from digitalization (Buer et al. 2021), the size of the restaurant businesses has been selected as the control variable and is measured as the natural logarithm of all their assets. This is a factor that can also positively influence profitability because of the economies of scale and the advantage of having more market power (Mun and Jang 2015). However, in the case of labour-intensive industries such as the restaurant sector, it is possible that there are diseconomies of scale and that smaller-size companies may be more profitable, as shown in the results of the study by Opstad et al. (2022).

Table 3 shows the definition and description of the variables considered in this study.

Table 3. Definition and description of the variables.

Variable	Description
Return on Assets (ROA)	Earnings before interests and taxes (EBIT)/Total assets
Indebtedness (DEBT)	(Current liabilities + Long-term liabilities)/Net Worth
Liquidity (LIQ)	Current assets/Current Liabilities
Sales growth (SGROW)	$(\text{Sales year}^t - \text{Sales year}^{t-1})/(\text{Sales year}^{t-1})$;
SIZE	Natural logarithm of total assets
Website (WEB)	Yes = 1 if the restaurant business has a website No = 0 otherwise
Website + own delivery service (WODS)	Yes = 1 if the restaurant business has a website and own home delivery No = 0 otherwise
Delivery Platform Service (DPS)	Yes = 1 if the restaurant uses external online ordering platforms and home delivery No = 0 otherwise

3.3. Models and Estimation Method

In line with Lucas and Ramires (2022) and Opstad et al. (2022), a multivariate analysis is performed to contrast the proposed hypotheses. It uses a linear regression approach, which is one of the most commonly used models in multivariate statistical analysis (Lederer and Lederer 2022). Linear regression allows the examination of the specific effects of one variable on another while controlling for the effects of other variables. Using the established hypotheses, the objective is to verify whether the effects of the pandemic crisis on sales growth (SGROW), liquidity (LIQ) and indebtedness (DEBT) imply a higher financial performance by restaurants according to the three different digitalization categories established.

Given that the aim of this study is to determine whether restaurants' profitability was conditioned by the digitalization of their operations, it is necessary to introduce a new effect on the model that will include these three interactions. In line with Hardy (1993) and Aiken et al. (1991), to determine the effects of digitalization, the product of WEB, WODS and DPS with the explanatory (LIQ, DEBT, SGROW) and control (SIZE) variables is added to the model. In this way, the β coefficients of the interactions represent the effect of sales growth, liquidity, indebtedness and size on ROA for restaurants with a website, with a website + own delivery service or integrated into a delivery platform.

Given that the interactions only affect digitalized restaurants, to determine the total effect of the explanatory variables on their performance, the β coefficients of the interactions are added to or subtracted from the β coefficients of all the individual values of LIQ, DEBT, SGROW and SIZE.

Thus, for restaurant i in year t , the defined equation for WEB is as follows:

$$\text{ROA}_{it} = \alpha_0 + \beta_1 \text{LIQ}_{it} + \beta_2 \text{DEBT}_{it} + \beta_3 \text{SGROW}_{it} + \beta_4 \text{SIZE}_{it} + \beta_5 \text{WEB} + \beta_6 \text{WEB} \times \text{LIQ}_{it} + \beta_7 \text{WEB} \times \text{DEBT}_{it} + \beta_8 \text{WEB} \times \text{SGROW}_{it} + \beta_9 \text{WEB} \times \text{SIZE}_{it} + e_{it}$$

For restaurant i at year t the defined equation for WODS is as follows:

$$ROA_{it} = \alpha_0 + \beta_1 LIQ_{it} + \beta_2 DEBT_{it} + \beta_3 SGROW_{it} + \beta_4 SIZE_{it} + \beta_5 WODS + \beta_6 WODS \times LIQ_{it} + \beta_7 WODS \times DEBT_{it} + \beta_8 WODS \times SGROW_{it} + \beta_9 WODS \times SIZE_{it} + e_{it}$$

And, for restaurant i at year t the defined equation for DPS is as follows:

$$ROA_{it} = \alpha_0 + \beta_1 LIQ_{it} + \beta_2 DEBT_{it} + \beta_3 SGROW_{it} + \beta_4 SIZE_{it} + \beta_5 DPS + \beta_6 DPS \times LIQ_{it} + \beta_7 DPS \times DEBT_{it} + \beta_8 DPS \times SGROW_{it} + \beta_9 DPS \times SIZE_{it} + e_{it}$$

To measure the intensity of association between the model's variables, Pearson's correlation analysis is carried out. As the Pearson correlation coefficients (untabulated) between variables do not exceed the rule of thumb level (0.80), and the Variance Inflation Factors (VIF) and condition indices (untabulated) for the independent variables are less than 4 and 10, respectively, we can assert that multicollinearity is unlikely to be an issue of concern (Menard 2002; Kleinbaum et al. 1998).

4. Results

4.1. Descriptive Statistics

Tables 4 and 5 summarize the descriptive statistics for the liquidity, indebtedness, profitability and sales growth ratios for the restaurant companies in the sample. In Table 4, the statistics are presented for the entire sample, whereas in Table 5, they are presented separately for each of the established digitalization categories along with the results of the Student's t -test.

Table 4. Descriptive Statistics. Pooled Sample.

Ratio	Mean	Median	Std. dv
LIQ	1.76	1.22	1.86
DEBT	2.41	1.43	2.62
ROA %	−4.77	−1.97	15.89
SGROW %	−34.10	−33.42	21.58

Table 5. Descriptive statistics. Mean Differences. T-Student test.

Variables	Ratio	Yes			No			Difference T-Student Test
		Mean	Median	Std. dev.	Mean	Median	Std. dev.	
WEB	LIQ	1.76	1.23	1.65	1.45	0.96	1.61	0.31 ***
	DEBT	4.65	1.78	7.89	5.34	1.32	2.28	−0.70 *
	ROA %	−5.65	−1.04	19.29	−11.63	−6.71	24.02	5.98 ***
	SGROW %	−32.70	−32.77	19.66	−34.67	−33.17	18.92	1.98 **
WODS	LIQ	1.65	1.23	1.52	1.63	1.10	0.92	0.02
	DEBT	4.77	2.18	6.91	4.89	1.71	8.36	−0.12
	ROA %	−1.38	0.91	18.90	−8.36	−3.47	21.44	6.98 ***
	SGROW %	−25.43	−24.49	23.55	−34.32	−33.66	19.18	8.89 ***
DPS	LIQ	1.81	1.26	1.75	1.62	1.09	1.62	0.19 **
	DEBT	4.36	2.05	5.80	4.81	1.68	8.31	−0.45
	ROA %	−4.08	−0.57	18.97	−8.52	−3.48	21.67	4.43 ***
	SGROW %	−28.58	−31.43	20.56	−34.44	−33.32	19.18	5.86 ***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

As shown in Table 5, in 2020, having a corporate website was a competitive advantage for restaurants. Establishments with their own website averaged higher liquidity (+0.31), lower indebtedness (−0.7), reduced profitability loss (+5.98) and a smaller decrease in sales (+1.98) compared to those without this digital tool. Statistically significant differences were observed between both groups for all ratios. Similar results are also found for restaurants that have a website and offer their own home delivery service compared to those that

do not provide this option to consumers. In this case, while there were no statistically significant differences in liquidity and indebtedness, significant variations were observed in profitability and sales growth. Although both groups had negative mean values for the last two variables, they were less unfavourable in restaurants with a website and their own delivery service, with profitability and sales growth at -1.38% and -25.43% , respectively, as opposed to -11.63% and -34.67% for restaurants without this technology. In the same way, all the ratio values of restaurants integrated into delivery platforms are better than those that do not have this form of e-commerce, and, except for indebtedness, all the differences are statistically significant.

4.2. Multivariate Analysis

To test the hypotheses established and to analyse how the restaurants' financial indicators and the level of digitalization of sales channels affected ROA during COVID-19, three regression models are proposed. These three models (Table 6) are differentiated by the dichotomous variables included in each one and their interaction with the predictor variables. The dichotomous variables included in the regression models are the first model (1) WEB, the second model (2) WODS, and the third model (3) DPS. The adjusted R² suggests that all the models have an adequate goodness-of-fit for the sample data.

Table 6. Regression analysis results.

Variables	(1)	(2)	(3)
	ROA	ROA	ROA
Intercept	−0.212 (−4.416) ***		−0.096 (−1.318)
LIQ	0.017 (4.766) ***	0.013 (6.052) ***	0.007 (3.249) ***
SGROW	0.287 (13.332) ***	0.304 (15.140) ***	0.318 (13.852) ***
SIZE	0.040 (4.330) ***	0.057 (6.771) ***	0.031 (3.519) ***
WEB	0.072 (4.744) ***		
WEB × LIQ	−0.011 (−2.313) **		
WEB × DEBT	−0.005 (−2.008) **		
WODS × SGROW		−0.093 (−1.717) **	
DPS × DEBT			−0.011 (−3.292) ***
DPS × SGROW			−0.097 (−2.462) ***
N	1503	1503	1503
Adj. R ²	0.220	0.203	0.203

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

As shown in Table 6, the results across all models consistently highlight the positive influence of liquidity, sales growth, and size on restaurant financial performance during the pandemic. Greater liquidity can help restaurants cope better with economic challenges posed by COVID-19, such as a decrease in sales. It provides a financial cushion to sustain operations and meet obligations during difficult periods, ultimately leading to improved performance. Moreover, size can also help them more effectively address economic challenges, establishing itself as a strategic advantage that enhances their profitability.

Regarding the effects of digitalization tools, in model (1), it can be observed that having a website had a positive effect (+0.072) on profitability, proving hypothesis 1. However, efficient liquidity management is essential to increase profitability (Aktas et al. 2015), and

it is possible that restaurants with websites may not be managing it effectively. This is highlighted by the negative β coefficient for the $WEB \times LIQ$ interaction (-0.011), which indicates that the positive influence of liquidity on the ROA of restaurants is moderated when they have their own website ($0.017 - 0.011 = 0.006$). Moreover, as the $WEB \times DEBT$ (-0.005) interaction indicates, the higher the indebtedness of restaurants with this digital tool, the more their financial performance decreases.

Model (2) shows that having a website and own home delivery service leads to an improvement in financial performance for restaurants during COVID-19. The interaction with sales growth ($WODS \times SGROW = -0.093$) implies a favourable effect for restaurants with this digitalization characteristic. This is so because the negative coefficient value of this interaction reduces the positive coefficient value of $SGROW$ on ROA ($0.304 - 0.093 = 0.211$). In this way, the low coefficient value for digitalized restaurants on the negative value of $SGROW$ during the 2020 financial year implies a lower negative impact on financial performance. Consequently, hypothesis 2 is confirmed.

Finally, model (3) shows that having online ordering and delivery services using a platform positively influences restaurant profitability. Therefore, hypothesis 3 is confirmed. Similar to model (2), the impact of the decline in sales during the COVID-19 pandemic on the profitability of restaurants with this technology is reduced, as the interaction $DPS \times SGROW$ (-0.097) implies a lower coefficient value for $SGROW$ ($0.318 - 0.097 = 0.221$). Conversely, as indicated by the significance of the interaction $DPS \times DEBT$ (-0.011), the level of indebtedness of establishments with this system of ordering and home delivery negatively affects ROA .

5. Discussion and Conclusions

In this study, we analysed the financial performance of restaurants during 2020, a very critical year for this sector from an operational perspective since it became vulnerable due to the different restrictions and regulations enforced by the government to control the spread of COVID-19. Research has been carried out into how a combination of economic variables and variables of the digitalization of sales channels influence restaurants' ROA .

In line with previous studies (Shaharuddin et al. 2021; Lucas and Ramires 2022; Opstad et al. 2022), this study shows that liquidity is a key determinant of the financial performance of restaurants. However, the reduction in sales, the weight of fixed costs, and additional expenses related to safety and protection measures against the virus led to serious liquidity problems for companies (Hao et al. 2022). This was particularly the case in the restaurant industry, which in comparison to other industries, is characterised by having structural liquidity deficits (Mun and Jang 2015). Nonetheless, liquidity was crucial for restaurants during the pandemic so they could maintain operations and afford the investments required for adapting businesses to government restrictions and requirements. For example, establishing a home delivery service would allow them to continue to generate revenue and profitability. In fact, for some researchers, during periods of uncertainty and crisis, investment opportunities open up for companies that can turn out to be more profitable than in ordinary periods (Zimon and Tarighi 2021). Nevertheless, as previous studies have noted (Mun and Jang 2015; Chambers and Cifter 2022), there is an optimal level of liquidity, and an excess of liquidity can be detrimental to business performance, given that maintaining idle assets incurs opportunity costs. In this sense, the results suggest that it is likely that in the face of economic uncertainty, the restaurants with a website, whose mean liquidity values were significantly higher than the rest of the restaurants, could have maintained idle financial resources and renounced making investments that could have generated greater profitability for the company.

Furthermore, the results show that the indebtedness of restaurants does not affect their profitability, aligning with the findings of Jung et al. (2019). In the context of the COVID-19 crisis, this may be partly explained by government support measures for businesses, which included debt restructurings and deferments. However, the results indicate that in restaurants adhering to delivery platforms, indebtedness did have a negative impact on

their financial results. According to the results of [Nguyen and Nguyen \(2020\)](#) and [Opstad et al. \(2022\)](#), because these restaurants perhaps did not use debt for profitable investments, the cost of debt led to a decline in their revenues and profitability.

Regarding sales growth, in line with the findings of [Mun and Jang \(2015\)](#), this study found that it positively influences the financial performance of restaurants. This effect is even more pronounced for restaurants with online ordering and home delivery services, whether they have their own infrastructure or use a delivery platform. As stated by [Kumar and Ayedee \(2021\)](#) in their study, the pandemic led to the adoption of e-commerce, enabling businesses to adapt to consumer needs, resulting in increased sales and revenue. Despite the potential decrease in restaurants' profit margins due to the implementation of this technology ([Li et al. 2020](#); [Ma et al. 2021](#)), during certain periods in 2020, it possibly represented the only source of revenue for these establishments.

Finally, similarly to previous research within the restaurant industry ([Hsu and Jang 2009](#); [Sun and Kim 2013](#)), this study has identified a positive relationship between restaurant size and financial performance. This relationship may be partially explained by the ability to leverage economies of scale ([Gschwandtner and Hirsch 2018](#)) and reduce operational expenses, particularly those related to the cost of food, which directly impact business profitability ([Mun and Jang 2015](#)). On the other hand, larger restaurants can access greater financial support to cope with unexpected situations like the COVID-19 pandemic to the detriment of smaller restaurants, which are more sensitive to the negative effects of operational interruptions ([Wieczorek-Kosmala 2021](#)).

6. Theoretical and Practical Implications

This study contributes to enriching the existing literature on the digitalization of sales channels and its impact on the financial performance of restaurants in crisis contexts like the COVID-19 pandemic. Furthermore, it enhances the understanding of the factors that can affect the resilience of restaurants, emphasizing the significance of liquidity and business size in the effective adaptation of these establishments to crises like the COVID-19 pandemic.

From a theoretical perspective, this study emphasizes the importance of agility in business management, a fundamental concept within the theory of dynamic capability. Our research highlights how digital sales channels have become essential components that enable restaurants to adjust their strategies and operations swiftly and effectively in times of crisis. This not only allows them to survive but also to maintain and strengthen their competitive advantage, resulting in improved financial performance. The study also underscores the significance of liquidity management, indebtedness and sales in the context of the digitalization of sales channels, as they play a crucial role in enhancing the profitability of restaurants.

Furthermore, the findings of this study have clear practical implications for both restaurant managers and public policymakers. They can be useful for restaurant managers to make informed decisions regarding their finances and marketing strategies during periods of market instability and turbulence. In this regard, this study provides empirical evidence that, in a time marked by restrictions on dining in restaurants, online orders and home delivery services offered restaurants an opportunity for growth and resilience development while also contributing to enhanced profitability. Additionally, it suggests that maintaining an appropriate liquidity balance and having a larger business size may be crucial for safeguarding profitability during times of complexity and uncertainty. The findings also highlight the importance of directing debt towards profitable investments, as its impact on profitability may vary depending on the sales model of the business.

For policymakers, this study provides evidence of the importance of providing liquidity to smaller and more vulnerable businesses in the context of severe economic shocks. This may be through direct grants or credit lines, but it is essential that support measures are designed in a way that is easy to access, quick to implement and simple to process, which will allow restaurants to cope with financial difficulties and continue to operate. Moreover,

given the importance of digitalization in improving the resilience and competitiveness of businesses in a constantly changing economic environment, funds aimed at boosting digital transformation in the sector are essential. In this regard, the importance of the Next Generation EU funds, approved by the European Council to help all Member States to repair the economic and social damage caused by the pandemic, should be highlighted. The appropriate and efficient allocation of these resources will be essential to maximise this drive towards recovery and sustainable growth of the restaurant industry in the digital age.

7. Limitations and Future Lines of Research

Although this study provides significant findings, it is true that it also has some limitations. Firstly, the study sample of restaurant establishments corresponds to a region in Spain, which, although it is the third region with the highest number of registered restaurants and bars, is not a random sample of all the restaurants in the country. Future research could extend the study to a national and international level to obtain more generalizable results. Secondly, the information about the degree of digitalization of restaurants was obtained from different websites, social networks and delivery platforms. However, no qualitative research has been carried out on the quality of these services. Future research could address this subject to evaluate how far better online ordering and home delivery practices influenced the commercial success of restaurants and their profitability during the pandemic. Thirdly, this study has considered a limited number of variables; in future studies, it would be of interest to introduce other explanatory and control variables that influence restaurants' capacity to deal with a crisis like COVID-19 and their financial performance in general.

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