

29th International Scientific Conference

Strategic Management

and Decision Support Systems
in Strategic Management

Proceedings

SUBOTICA, SERBIA
17-18 May, 2024

Conference Proceedings

29th International Scientific Conference Strategic Management and Decision Support Systems in Strategic Management SM 2024

17-18 May, 2024
Subotica

ISBN: 978-86-7233-428-9

Organizer and publisher:
University of Novi Sad,
the Faculty of Economics in Subotica,
Segedinski put 9-11,
24000 Subotica, Serbia
http://www.ef.uns.ac.rs/sm2024/

CIP - Каталогизација у публикацији
Библиотеке Матице српске, Нови Сад

005.21(082)

INTERNATIONAL Scientific Conference Strategic Management and Decision Support Systems in Strategic Management (29 ; 2024 ; Subotica)
Conference proceedings [Elektronski izvor] / 29th International Scientific Conference Strategic Management and Decision Support Systems in Strategic Management SM 2024, 17-18 May, 2024, Subotica. - Subotica : Faculty of Economics, 2024

Način pristupa (URL): https://www.ef.uns.ac.rs/sm2024/download/SM2024-proceedings.pdf. - Opis zasnovan na stanju na dan 12.6.2024. - Nasl. sa naslovnog ekrana. - Bibliografija uz svaki rad.

ISBN 978-86-7233-428-9

a) Стратешки менаџмент -- Зборници

COBISS.SR-ID 146967049

DOI: 10.46541/978-86-7233-428-9_377



XXIX International Scientific Conference
Strategic Management
and Decision Support Systems
in Strategic Management
SM2024
Subotica (Serbia), 17-18 May, 2024

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PROFITABILITY DYNAMICS OF FOOD COMPANIES AMIDST COVID-19 CHALLENGES: EVIDENCE FROM SERBIA

Abstract: This study examines the impact of the COVID-19 pandemic on the profitability of food companies in Serbia. Lockdown measures, production, and supply chain disruptions, shifts in consumer behavior, and increased operational costs significantly impacted the food industry. The research was conducted on financial data from 1661 companies operating from 2018 to 2022. The assessment of the panel data model confirmed the presence of a negative and statistically significant effect of the Covid-19 epidemic on profitability as measured by return on total assets (ROA).

Keywords: Food Sector, Covid-19, Profitability, ROA

INTRODUCTION

The food industry serves as the primary market for agricultural raw materials, playing a crucial role in ensuring food stability. In the Republic of Serbia, the economic importance of the food sector is derived from favorable agroecological conditions, abundant arable land, a well-structured agricultural landscape, a longstanding tradition in food production, and its proximity to the European Union market. The relatively high share of agriculture and the food industry, or agricultural-food products in the export structure of the Republic of Serbia, is the result of favorable resources for their production, as well as the slow development and decreasing share of other sectors in exports (Božić & Nikolić, 2023).
Although the food sector holds a significant share in the economy of the Republic of Serbia, in terms of export potential and employment, COVID-19 has had significant impacts on demand and challenges in supply realization. Additionally, there are constraints in accessing capital and obtaining necessary investment funds, as well as limitations in international capital flows (Eit Food, 2020). Furthermore, changes in consumer behavior regarding risk aversion levels and uncertainty regarding future production and potential legislative changes are present. The COVID-19 pandemic has underscored the importance of digitalization and changes in consumer preferences, imposing trends that the food industry sector has had to adapt to.
The key long-term challenge in the context of COVID-19 has been ensuring a secure supply of food products. The primary concern for food security lies not in the availability of food but in consumers' ability to access it. As lockdowns and other COVID-19 disruptions contribute to a worldwide economic downturn, millions are either losing their jobs or facing significant reductions in their incomes. COVID-19 has caused disruptions across all aspects of food supply chains, impacting farm production, food processing, transportation, logistics, and consumer demand simultaneously (OECD, 2020). The food industry has been notably impacted by physical distancing requirements, quarantine measures, security and safety protocols, and disruptions across the supply chain (Vučenović et al., 2021).
This study aims to analyze how Covid 19 influence the profitability of food companies operating in the Republic of Serbia during the time period 2018-2022. The selection of other indicators is based on theoretical perspectives and the

results of empirical studies in the previous period. The obtained results should indicate the nature of the relationship between the identified indicators and profitability, in order to identify the impact of the COVID-19 pandemic on the profitability of companies in the food industry sector of the Republic of Serbia. Given the crucial role the food industry played during movement restrictions, the research focused on a sample of companies within this sector, bearing in mind that the profitability of companies in the food sector is often conditioned by their reputation and competitive market position. Food sector in the Republic of Serbia is characterized by a prominent dual structure, comprising numerous small and medium-sized enterprises alongside a few large companies. Despite foreign direct investment, the sector's limited investment in modern technology and efforts to enhance production efficiency are thought to adversely impact its prospects (Domanović et al., 2018).
The structure of the paper is organized as follows: we commence with laying out the theoretical framework and developing hypotheses. Subsequently, we introduce the data and methodology, followed by the presentation of empirical results and discussion. Finally, the conclusion encapsulates the limitations and provides future recommendations.

THEORETICAL BACKGROUND

The profitability of companies in the food sector is measured through return on assets (ROA) as a determinant of the company's ability to generate income from available assets. In order to assess the impact of the COVID-19 pandemic on the profitability of Serbian food industry companies in the time period 2018-2022, and relying on previous empirical studies in this area, the independent variables used are current ratio, asset structure ratio, debt to assets, debt to equity, and firm size.
There is minor previous research on this topic. One of them is a study conducted by Mijailović et al. (2023) which explored how the financial performance of top-performing meat industry businesses measured by ROA was affected by the COVID-19 pandemic. Notably, the research results indicate a positive impact of the pandemic on the profitability of the meat industry in the Serbia in time period 2016–2020. The findings offer valuable insights for businesses to identify areas of vulnerability and potential avenues for improving financial outcomes. Other previous research addressing this topic is mostly based on examining the impact of COVID-19 on the profitability of companies in other sectors and countries. In that direction, the study conducted by Tica et al. (2023a) revealed a statistically significant adverse impact of the COVID-19 pandemic on the profitability of construction companies in Bosnia and Herzegovina from 2014 to 2020. The need for residential and non-residential construction projects in Bosnia and Herzegovina was experienced growth during 2020, coinciding with the onset of the pandemic. Furthermore, Tica et al. (2023b) suggested a statistically significant positive correlation between the COVID-19 pandemic and the profitability of operating companies within the logistics sector, located in the Western Balkans, operating from 2015 to 2020. Their findings validated the unique nature of the logistics sector, highlighting it as one of the rare industries that have been able to attain increased profitability amidst the crisis and recession triggered by the early 2020 pandemic.
The findings of Gomes et al. (2022) research indicate a detrimental effect of the COVID-19 pandemic on profitability within the restaurant sector, with this trend observed across both countries, Spain, and Portugal. The worldwide crisis triggered by COVID-19 in 2020 severely impacted the profitability of restaurants, escalated their debt burden, and jeopardized numerous jobs. Amnim et al. (2021) conducted a study on how the profitability of companies in Nigeria's consumer goods and healthcare sectors were influenced by the Covid-19 pandemic. Their findings revealed a statistically significant positive correlation between the pandemic and company profitability. Additionally, the authors suggested that retail companies could mitigate the adverse effects of the Covid-19 pandemic by implementing flexible supply and distribution models for their products to customers. The study conducted by Devi et al. (2021) revealed that during the pandemic, the consumer goods sector experienced a rise in profitability, whereas other sectors such as trade, utilities, transportation, infrastructure, finance, real estate, and investment witnessed a decline in profitability.
Demirhan & Sakin (2021) investigated how the COVID-19 pandemic impacted the profitability of manufacturing and non-manufacturing firms, excluding financial institutions such as holdings, banks, and investment trusts listed on the Borsa Istanbul. Their findings revealed a detrimental effect of COVID-19 on these companies' profitability from 2017 to 2021, potentially stemming from ineffective asset and equity management. Lockdown measures during the pandemic exacerbated cost management challenges for non-manufacturing firms, while manufacturing firms managed to sustain operations despite the restrictions, unlike those in the service industry. By studying a selection of Chinese listed companies, Xiong et al. (2020) observed that the market's reaction to the COVID-19 outbreak was heightened among firms operating in industries most vulnerable to the virus and those with substantial institutional investor involvement. Additionally, companies with greater size and better profitability experienced comparatively milder negative impacts from the COVID-19 outbreak than their counterparts.
Taking into account the purpose and issue addressed in this paper, along with the conclusions drawn by previous researchers, the hypothesis to be examined in this study is:

Hypothesis 1: The Covid-19 pandemic has a negative and statistically significant effect on the profitability of companies in the food sector in the Republic of Serbia in the time period from 2018 to 2022.

DATA & METHODOLOGY

The aim of the research is to examine the impact of the COVID-19 pandemic on the profitability of food companies in Serbia. A total of 8,305 observations are included in the data set, which is comprised of 1,661 companies based in Serbia. All sampled companies actively operated in the food industry over the time period from 2018 to 2022. Financial data is obtained from publicly disclosed financial reports from The Serbian Business Registers Agency. Based on previous studies together with the financial information that is available in the financial statements, the variables were selected in order to evaluate the model utilizing the panel regression analysis.
The following table provides a presentation of the variables that have been determined to be either dependent or independent in the assessed model.

Table 1: A summary of research variables

Variable	Name	Computation	Source
Dependent	Profitability	ROA=Net profit/Total Assets	Demirhan & Sakin (2021); Devi, et al. (2021); Domanović et al. (2018); Mijailović et al. (2023); Tica et al. (2023a); Tica et al. (2023b).
Independent	Liquidity	Current ratio=Current Assets/Current Liabilities	Amnim et al. (2021); Devi, et al. (2021); Tica et al. (2023a); Tica et al. (2023b).
	Asset Structure	Fixed assets/Total assets	Tica et al. (2023a); Tica et al. (2023b).
	Debt-to-asset	Debt/Total Assets	Demirhan & Sakin (2021); Gomes et al (2022); Shen et al. (2020); Tica et al. (2023b).
	Debt-to-equity	Debt/Total Equity	Devi, et al. (2021);
	Firm Size	Natural logarithm of Total Assets	Demirhan & Sakin (2021); Shen et al. (2020); Tica et al. (2023b).
	Covid-19	1 for Covid-19 years, 0 for non-covid-19 years	Shen, et al. (2020), Atayah, et al. (2021); Devi, et al. (2021); (Amnim et al., 2021).

Source: Authors' computations

To achieve this aim, the study will employ panel data analysis as the primary methodological framework. Panel data analysis, also known as longitudinal data analysis or cross-sectional time-series analysis, is a robust statistical method particularly suited for examining changes over time across different entities.

RESULTS & DISCUSSION

A descriptive statistical examination is performed on all the model variables, and the findings are presented in Table 2. When conducting an analysis of the average values, the median is the statistical measure of choice rather than the arithmetic mean. This is because extreme values are commonly found. There is an acceptable rate of profitability among the food enterprises, as indicated by the median value of the variable ROA, which is 3.17%. There is a low degree of current liquidity, as indicated by the fact that the median of the current ratio values 1.415. This indicates that firms in the food industry have a limited capacity to fulfill their short-term debts using current assets. Additionally, the findings indicate that the asset structure is slightly skewed toward current assets. This is to be expected given the nature of the food sector activities, considering the characteristics of the sector whose operations include a large amount of inventory, production, and receivables. Furthermore, the median of debt-to-asset and debt-to-equity indicators reveals that sampled companies' sources rely more on owned funds rather than borrowed.

Table 2: Descriptive statistical examination

Variable	Observation	Median	Mean	Minimum	Maximum	St. deviation
Profitability	8,305	3.173	5.938	-95.209	93.75	10.820
Liquidity	8,305	1.415	2.539	0.003	82.168	4.835
Asset Structure	8,305	0.334	0.354	0.000	1.000	0.262

Debt-to-asset	8,305	0.075	0.137	0.000	0.962	0.172
Debt-to-equity	8,305	0.182	2.229	0.000	2.408	45.883
Firm Size	8,305	5.541	5.621	-1.778	12.870	2.157
Covid-19	8,305	1.000	0.600	0.000	1.000	0.490

Source: Authors' computations

Given the results of Pearson's matrix shown in Table 3, the initial predictions about the course and significance of the relationship among the variables could be made. The findings of matrix reveal a statistically significant connection among all independent variables and ROA, with the exception of the linear relationship between debt-to-equity and profitability. Furthermore, there exists a negative correlation between the coronavirus epidemic and the profitability.

Table 3: Findings of Pearson's matrix

Variable	Profitability	Liquidity	Asset Structure	Debt-to-asset	Debt-to-equity	Firm Size	Covid-19
Profitability	1.0000						
Liquidity	0.0922*	1.0000					
Asset Structure	-0.1318*	-0.1359*	1.0000				
Debt-to-asset	-0.1214*	-0.2199*	0.0275*	1.0000			
Debt-to-equity	-0.0215	-0.0165	-0.0018	0.0827*	1.0000		
Firm Size	-0.1721*	-0.0337*	0.3467*	0.0091	-0.0283	1.0000	
Covid-19	-0.0476*	0.0172	-0.0109	-0.0528	0.0010	0.0611*	1.0000
* - level of significance > 0.05							

Source: Authors' computations

Prior to beginning the panel data assessment, it is imperative to assess the underlying assumptions intended for the implementation of the selected methodology. One of the key premises behind the utilization of panel analysis is the absence of significant correlation among the independent variables, specifically the absence of multicollinearity. Table 4 presents the results of the Variance Impact Factors (VIF) test.

Table 4: Variance Impact Factors results

Variable	VIF	TOL (1/VIF)
Asset Structure	1.16	0.863418
Firm Size	1.14	0.874632
Liquidity	1.07	0.934522
Debt-to-asset	1.06	0.942881
Debt-to-equity	1.01	0.992219
Covid-19	1.01	0.992275

Source: Authors' computations

Based on the data in Table 5 showing that the VIF scores for all variables are below 10 and the TOL score surpasses 0.1, it may be inferred that there is no presence of multicollinearity in the preset model. The presence of heteroskedasticity and autocorrelation is subject of further examination.

Table 5: Variance Impact Factors results

Variable	Test statistic value	p value
Wooldrige test	2480.96	0.0000
Breusch-Pagan / Cook-Weisberg test	30.375	0.0000

Source: Authors' computations

The Wooldridge test results indicate that the p-value is below the level of 5%, confirming the presence of autocorrelation. The Breusch-Pagan / Cook-Weisberg test was applied to examine the existence of heteroskedasticity. The p-value obtained is found to be above the predetermined significance limit of 5%. The presence of heteroskedasticity was confirmed for the model. Given the breach of fundamental premises in panel analysis, the model should be transformed in order to conduct a thorough examination. Table 6 displays the revised regression model that is evaluated to determine whether Hypothesis 1 should be accepted or rejected.

Table 6: Findings of evaluated model

Variable	Coefficient value	p value
Liquidity	0.098	0.009
Asset Structure	-3.809	0.000
Debt-to-asset	-6.688	0.000
Debt-to-equity	-0.004	0.099
Firm Size	-0.690	0.000
Covid-19	-1.027	0.000
Constant	12.455	0.000

Source: Authors' computations

The empirical analysis conducted in this study provides robust evidence supporting Hypothesis 1. Through the utilization of return on assets (ROA) as a measure of profitability, it was observed that the Covid-19 pandemic indeed had a negative impact on the profitability dynamics of food companies in Serbia during the specified time period. The findings align with the anticipated negative effect postulated in the hypothesis and corroborate the observations made in previous research conducted within both domestic and international contexts (Demirhan & Sakin (2021), Gomes et al. (2022), Tica et al. (2023a))

The negative impact of the COVID-19 pandemic on profitability within the food sector in Serbia could be attributed to several interconnected factors. Firstly, the obligation of lockdown measures and mobility restrictions aimed at limiting the spread of the virus severely disrupted consumer behavior and consumption patterns. Secondly, supply chain disruptions emerged as a major challenge for food companies, compounded by logistical constraints, border closures, and disruptions in transportation networks. Furthermore, increased health and safety regulations necessitated costly investments in protective equipment, sanitation measures, and workplace reconfigurations to ensure compliance with health protocols and safeguard employee well-being. Additionally, shifts in consumer preferences towards essential food items characterized by longer shelf life, nutritional value, and affordability further exacerbated the challenges faced by food companies specializing in non-essential or premium products.

CONCLUSION

In conclusion, this research sheds light on the complexities of the profitability dynamics within the food industry of Serbia amidst the challenges posed by the COVID-19 pandemic. The findings emphasize the impact of the pandemic on various facets of the food companies' operations, particularly on their profitability metrics. The implemented lockdown measures, disruptions in production and supply chains, shifts in consumer behavior, and escalated operational costs collectively contributed to a significant negative effect on the profitability of food companies in the country. Through the utilization of panel data analysis encompassing financial information from 1661 companies operating from 2018 to 2022, this study validates the empirical evidence of the adverse influence of the COVID-19 epidemic on the profitability, as measured by return on total assets (ROA). This negative and statistically significant effect underlines the vulnerability of food companies to external shocks, such as pandemics, and emphasizes the need for adaptive strategies and robust risk management frameworks to navigate through such turbulent times.

Moreover, the results emphasize the resilience and adaptability imperative for food companies to navigate through such unprecedented crises effectively. Strategies aimed at enhancing operational flexibility, strengthening supply chain resilience, and leveraging digitalization to meet evolving consumer demands emerge as critical considerations for mitigating the adverse impacts of future disruptions. This study contributes to the existing body of literature by providing empirical insights into the specific challenges faced by food companies amidst the COVID-19 pandemic in the Serbian context. Furthermore, the findings offer valuable implications for policymakers, industry stakeholders, and managerial practitioners in formulating strategies to bolster the resilience and sustainability of the food sector in the face of ongoing and future uncertainties.

ACKNOWLEDGEMENT: This research was supported by the Science Fund of the Republic of Serbia, 10911, Potentials for improving the competitiveness of the agri-food sector in the function of sustainable economic development - POT4food.

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