



The importance of accounting information in time of crisis: The Semiconductor Shortage as a result of the COVID-19 Pandemic and the impact on the Romanian Cable Manufacturing Subsector

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ABSTRACT

Accounting information plays a crucial role in the decision-making process given that the primary users of this information are predominantly the company's managers. Based on the financial condition, operating results, and cash flows stated within the financial statements, managers from the automotive sector had to redesign their strategies because of the COVID-19 Pandemic followed by the worldwide semiconductor supply shortage. This study aims to analyze the decisions taken by managers from the cable manufacturing subsector in Romania, based on the information provided by the financial statements in 2018-2021, considering the crisis that the automotive sector had to face since the global vehicle sales and production rates continued to be significantly below historic levels. The results show the negative effects and disruptions caused by the dual crisis in terms of profitability and performance that will probably affect the industry beyond 2022.

KEYWORDS: Accounting information, COVID-19 Pandemic, Semiconductor Shortage, Romanian Cable Manufacturing Subsector.

1. Introduction

The challenges managers are compelled to confront originate from the increasing complexity of the decision-making process within organizations. This complexity is influenced by both external and internal factors and within this context, accounting information has evolved to become a critical instrument upon which decisions are predicated, surpassing its traditional confinement to analysis conducted solely within financial-accounting departments.

The outbreak of the COVID-19 pandemic offers an opportunity to underline the importance of accounting information and regulation in supporting public policy but also the decision-making process at the organizational level, for facing a systemic crisis (De Vito & Gómez, 2022). An accounting-based framework allows stakeholders, especially managers, to estimate the effects of the health pandemic and government interventions on profitability, equity depletion, and corporate bankruptcies (Buchetti et al., 2020). Moreover, the information provided by the financial statements offers the possibility to learn from previous experiences and predict future crises improving the organizational preparedness (Leoni et al., 2021).

First identified in the Chinese city of Wuhan, COVID-19 caused by the SARS-CoV-2 virus has become in a very short period a global pandemic that spread very fast and affected millions of people across the globe (He et al., 2020; Knight, 2020; Singhal, 2020).

The COVID-19 Pandemic had devastating consequences on the global economic environment in terms of business shutdowns, unemployment, and economic downturns and the automotive industry was certainly one of the most affected (Bauer et al., 2020; Ramani et al., 2022; Cu & Montoya, 2023).

Having its roots in China, which plays a pivotal role in the global semiconductor landscape, whether as a provider of raw materials, a manufacturer of intermediate goods, or a final assembler in electronic manufacturing services, COVID-19

generated a domino effect and starting with 2020, a direct consequence was the collapse of the automotive sector (Boshkoska & Jankulovski, 2020; Pató & Herczeg, 2020).

Regarding the semiconductor crisis, COVID-19 acted as both a direct and an indirect catalyst for highlighting vulnerabilities in the global supply chain and the challenges of planning the demand in uncertain times (Frieske & Stieler, 2022). The global lockdowns and the disruption in production, the misread of the demand for electronics, underestimating customers' demand for the automotive sector, and the Internet of Things in general, were some of the main problems causing chaos in the industry (Marinova & Bitri, 2021). Key semiconductor-producing regions, especially in East Asia, had to temporarily shut down their activity thus reducing the production capacity for several weeks. Moreover, the changes to address the global crisis involved the world transitioning to remote work, online education, and other digital activities and brought about an unforeseen surge in demand for electronic devices which strained semiconductor supplies.

The current study underlines the changes that companies within the Romanian cable manufacturing subsector had to face because of the consequences led by COVID-19, followed by the semiconductor crisis, based on the accounting information provided by the financial statements in terms of turnover, profit, cost of manufacture and number of employees. Data was collected for 2018-2021, to compare the results before COVID-19, during the pandemic when a significant decrease in vehicle production occurred, and after it ended, also including 2021 the year of global supply chain disruptions and the worldwide semiconductor supply shortage. The main conclusions of the study are that the strong recovery expected in 2021 following the significant COVID-19-related drop-off in global vehicle production failed to materialize due to a shortage of semiconductors that will probably affect the companies within the automotive industry beyond 2022.



2. Literature review

The Romanian automotive industry once centered around brands like Dacia-Renault and Ford has expanded in recent years with foreign investments and state aid, becoming a key player in the European automotive industry (Egresi, 2007; Ștefan et al, 2016). Dacia, one of the most recognizable automotive brands is one of the key players on the market and has confirmed its 3rd place on the European podium of sales to private customers with a record market share of 7.6% (Renault Group Earnings report 2022). Another major player in the market is Ford which in 2008 acquired the Craiova automobile plant which produces vehicles mainly for the European market (Ford Media Center).

According to the Romanian Automobile Manufacturers Association, the automotive industry generates approximately 14% of the GDP, and represents more than 25% of total exports, as the approximately 600 companies in this sector have over 230,000 employees (Bondoc & Jucătoru, 2020). Also, by the early 2020s, Romania was producing around 500.000 vehicles annually, most of them being destined for export, especially within the EU market (European Automobile Manufacturers Association).

In addition to the two significant automobile and engine manufacturing plants, numerous international suppliers have established operations in Romania, producing an extensive range of components and sub-assemblies, spanning from electrical wiring to transmission systems. The supplier industry encompasses over two hundred production units, each employing at least 100 individuals. Over 90% of the workforce in the automotive sector is currently employed by multinational enterprises, which also account for a similar proportion of the industry's total added value (Guga, 2018; Trăienescu, 2021).

Cable manufacturing has become a very important part of the Romanian automotive landscape since Romanian companies, taking advantage of the country's skilled labor and competitive costs, carved a niche, supplying cables to major European automotive players (Plank & Staritz, 2013).

COVID-19 drove the automotive sector into a deep economic crisis exposing it to an unprecedented shock and the lockdown measures that started in March 2020 forced many sectors to shut down their entire activity or to operate at their normal capacity (Turnea et al., 2020; Klein et al., 2021). In this context, the measures imposed by the Romanian government for crisis management during the state of emergency and alert generated the restriction or even suspension of the activity of diverse economic sectors so most Romanian automobile and cable manufacturers were forced to close production for weeks or even months (Velica Cărciumărescu et al., 2022).

According to The Automobile Industry PocketGuide 2020/2021 elaborated by The European Automobile Manufacturers' Association (ACEA) in March 2020 more than 20,000 employees were affected by the COVID-19 safety measures, the average shutdown duration in days was 31 and the

estimated loss in production (number of vehicles) was 68.673 units (Lazăr, 2021).

Even though at the end of 2020 and the beginning of 2021 the figures for the automotive industry started to increase due to the higher demand, especially for electric vehicles, a new crisis has arisen caused by the demand and supply disruptions in the semiconductor sector (Hasan et al., 2023).

The accelerated growth of interest in semiconductors is related to their essential role in the functioning of the modern economy considering that the world market capitalization of semiconductor companies boosted from 438 billion EUR in 2005 to over 2.5 trillion EUR in 2021 having one of the most accelerated increase rate than any other industry, especially in times of crisis (Ciani & Nardo, 2022).

One of the positive effects of COVID-19 was the increased demand for consumer electronics, which changed the priorities of semiconductor manufacturers toward IT and consumer electronics customers (Marinova & Bitri, 2021). As a consequence, bottlenecks in the production and supply of electronic components for the automotive industry occurred and even before 2020, the tensions between China and the USA led to a fraught situation in the semiconductor market, COVID-19 just making semiconductor shortage grew worse (Leoni Annual Report 2021).

After the global recovery from COVID-19 the production of semiconductors was below the demand from the motor vehicle industry and in addition, various external events, such as fires and droughts affecting the most important manufacturing plants, aggravated the global supply shortage of semiconductors (Attinasi et al., 2021; Krolikowski & Naggert, 2021).

The limited stock for semiconductors is mainly related to the fact that in 2020, 80% of the production was based in Taiwan or South Korea (Stewart et al., 2021) and also related to the "just-in-time manufacturing practices", which are very common in the automotive industry since it can minimize waste and increase efficiency by keeping the inventory low (Mc Kinsey, 2021). Within a stable environment, a low inventory is financially beneficial, but in times of crisis, the unexpected shortage will cause immediate disruption of the entire supply chain. Since nobody expected the semiconductor shortage most companies from the automotive industry had very limited stock available.

Considering the future trends in safety, autonomous driving, connectivity, and electric vehicles, the demand for semiconductors will continue to increase which could predict another future crisis that fosters the need for a more reliable and diverse semiconductor supply chain to meet increasing demand (Casper et al., 2021).

Given the turbulent and unpredictable environment that companies worldwide had to face since 2019, managers need to develop different tools that allow them to predict future crises and shape efficient strategies. Accounting information, practices of budgeting, forecasting, and performance reporting are part of the anticipatory capacities that allow decision-makers to navigate



crises (Kober & Thambar, 2021). The accounting role is not only to report on the past but also to quantify plans, simulate different scenarios, and guide improved decisions (Huefner & Largay, 2008).

Accounting could be seen as a spotlight that shows the behind-the-scenes of a business's performance giving managers a clearer picture of the workplace by highlighting activities they might miss in their day-to-day routine. Not only does it provide a numerical view of their work, but it also reveals any issues that might go unnoticed during daily operations (Hall, 2010). To be considered useful and significant for the decision-making process, the accounting information must fully present all facts relating to the firm's operations for the previous and current reporting periods. To achieve this, financial statements must be prepared according to the financial reporting framework such as the International Financial Reporting Standards (IFRS) used by all countries except the USA, or Generally Accepted Accounting Principles (US GAAP) (Belesis et al., 2022).

The importance of accounting information in times of crisis was shown by the decreasing figures companies within the Romanian Cable Manufacturing Subsector obtained, the indicators calculated based on the financial statements underlying the impossibility of reaching the forecasted

key performance indicators. The main problems were a lack of raw material stocks due to supplier shortages followed by increased demand from the customers and a lack of labor force.

3. Research Methodology

The research in this paper was conducted using a quantitative analysis to illustrate the causes of the semiconductor shortage, because of COVID-19, and to evaluate the impact on the Romanian Cable Manufacturing Subsector.

Data was collected using the TP Catalyst Database (information from the annual reports such as the Balance sheet and the Profit and Loss account), for a sample that included all Romanian companies that have the 2931 NACE Code

(Classification of Activities in the National Economy): *Manufacture of electrical and electronic equipment for motor vehicles and engines of motor vehicles*. The sample consists of 89 companies both multinationals and local ones and for a more reliable analysis, the small local companies were grouped to have comparable results.

Considering that turnover, positive cash flow, cost of labor, and cost of purchasing raw materials are some of the main important key performance indicators for companies in general and for the manufacturing sector in particular (Johnson & Soenen, 2003; Marek et al., 2020; Contini & Peruzzini, 2022; Zharfpeykan & Akroyd, 2022) for the current study we considered significant to our research to take into account several indicators such as operating revenues (turnover), results (profit or loss), material costs and cost of employees. The time series considered relevant for our study starts with the year 2018 (before COVID-19) up to 2021-year end.

Data was analyzed using Excel linear regression and from our knowledge the research is original since it's the first study that focuses on the Romanian cable manufacturing sector and not on the automotive industry in general, comparing it with the few previous studies made so far (Bondoc & Jucătoru, 2020; Cernicova-Buca & Cocea, 2021; Lazăr, 2021). The dependent variable was considered to be the current result (profit or loss) and the independent variables were: material costs, cost of employees, and operating revenues.

4. Results and discussion

The overall regression model predicts the variance in the integration ($R^2 = 0.4028$) meaning that 40.28% of the variability in the dependent variable (current result profit or loss) is explained by the regression model using the given independent variables (material cost, operating revenue and cost of employees). This indicates a moderate explanatory power. The results of the regression are presented in Table 1.

Table 1-Regression Statistics Romanian Cable Manufacturing Subsector SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,63469894
R Square	0,40284274
Observations	33

The analysis of variance shows that results are reliable (Significance F = 0,0017) and statistically significant since the value is less than 0,05, the maximum allowed for a (Duncan, 1955). The F-statistic tests the null hypothesis that all of the regression coefficients are equal to zero. An F-value of 6.5211,

given our degrees of freedom, with a low Significance F-value of 0.0017, provides strong evidence against the null hypothesis. This means that at least one predictor variable is useful in predicting the response variable. The values for ANOVA are presented in Table 2.

Table 2-The analysis of variance for the Romanian Cable Manufacturing Subsector

ANOVA					
	df	SS	MS	F	Significance F
Regression	3	6101348806	2033782935	6,52114068	0,00165754
Residual	29	9044384718	311875335		
Total	32	1,5146E+10			



The Coefficients table provides the necessary information to build the regression equation and to test hypotheses about the individual predictors.

The first independent variable which is the material cost (-0.2343) indicates that for every one-unit increase in material cost, the current result (dependent variable) is expected to decrease by 0.2343 units, keeping all other predictors constant. In other words, the profit will decrease by 0.2343 units when the material cost increases. This is significant at the 5% significance level given its p-value (0.0076) is below 0.05. It also indicates a negative relationship between material cost and profit which is normal since the costs are decreasing the company's results.

In the automotive industry material costs have a significant percentage in the total costs and the disruptions caused by COVID-19 and the semiconductor crisis led to increased competition for limited materials, driving up prices up to 40% or even more (Sneci report),

The operating revenue (0.2051) shows that for every one-unit increase, the current result (dependent variable) is expected to increase by 0.2051 units, *ceteris paribus* (all else being equal). This predictor is statistically significant with a p-value of 0.0021, meaning it's a reliable predictor in this model. The positive relationship between the two can be explained by the fact that revenues are the ones contributing to the company's profit.

Table 3-The Coefficients table Romanian Cable Manufacturing Subsector

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	-7325,7492	5820,95643	-1,258513	0,21824421	-19230,942	4579,44343	-19230,942	4579,44343
Material Cost	-0,2343424	0,0816761	-2,8691673	0,00760096	-0,4013888	-0,067296	-0,4013888	-0,067296
Operating revenue	0,20512562	0,06085492	3,3707317	0,00213724	0,08066332	0,32958791	0,08066332	0,32958791
Cost of Empl	-0,1526749	0,11169716	-1,3668646	0,18217137	-0,3811212	0,07577145	-0,3811212	0,07577145

The model does a moderate job of explaining the variance in the dependent variable. While "Material Cost" and "Operating Revenue" are valuable predictors in this model, "Cost of Employees" does not seem to significantly impact the dependent variable (current result) based on this analysis. Further data or exploration of other potential predictors might improve the model's explanatory power. Additionally, assessing assumptions like linearity, independence, homoscedasticity, and normality of residuals is crucial for validating the regression model's appropriateness.

5. Conclusions

The accounting data allows a comprehensive understanding of the firm's economic reality, not only for the company's outcomes but also for potential red flags that demand immediate and decisive action.

As shown in the current study, COVID-19 and the semiconductor crisis harmed the Romanian automotive sector resulting in reduced vehicle production schedules and sales from historical levels, which adversely impacted the financial condition, operating results, and cash flows in 2020 and 2021. Even though figures started to increase, the fallout from the semiconductor crisis will probably affect the automotive industry including the cable manufacturing sector beyond 2022.

The third independent variable included in the study was the cost of employees (-0.1527) and the results show that for every unit increase in cost of employees, the dependent variable is expected to decrease by 0.1527 units, *ceteris paribus*. However, this variable isn't statistically significant at the 5% level given its p-value of 0.1822. This suggests that while the coefficient indicates a negative relationship, we cannot be sufficiently confident about this relationship given the data. Even though the cost of labor is significant in the total cost of automotive actors, this situation can be explained by the fact that during the lockdown there were notable labor shortages, and Romanian automotive companies were forced to initially reduce their activity and eventually shut down the production. The Romanian government, through various ordinances including OG30/2020, offered economic support mechanisms to alleviate some of the strain on both employees and employers in the automotive sector. During the state of emergency, the allowances that employees benefit were supported by the unemployment insurance budget up to 75% of the gross average wage provided for 2020 by the state social insurance budget law (KPMG Publications, 2020). Given this situation, in 2020-2021 several cable manufacturing companies have recorded labor cost reductions. All results are presented in Table 3.

The dual crisis of COVID-19 followed by the semiconductor shortage addressed significant challenges for the automotive industry worldwide but also provided valuable lessons on vulnerabilities and opportunities. As the whole world is struggling to build more resilient supply chains and industries, Romania's automotive and cable manufacturing sectors have the potential to play pivotal roles.

Post the crises, companies are exploring ways to avoid over-reliance on specific regions or suppliers and Romanian companies could benefit if global companies look for diversifying sources, trying also to innovate to reduce future vulnerabilities.

Romanian cable manufacturers might look into expanding product lines or integrating advanced technologies to remain competitive by actively monitoring and managing inventory levels across all inventory types to maximize both supply continuity and the efficient use of working capital. In other words, the long-term recovery of this subsector will depend on the ongoing management and its ability to anticipate future crises based on the information provided by the accounting information.



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