

DIAGNOSING THE RISK OF MANIPULATION IN FINANCIAL ACCOUNTING INFORMATION. AN M-SCORE BASED APPROACH**Marius-Sorin CIUBOTARIU***Stefan cel Mare University of Suceava, 720229, Romania
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cristina.cernovschi09@gmail.com***Abstract**

The information provided by accounting is the raw material for the reports used in the decision-making process, and attempts to compromise its quality affect both the company and external users, generating attitude changes and wrong decisions. Starting from this idea, the aim of our study is to assess and measure the quality of financial information reported by some companies listed on the Bucharest Stock Exchange in 2023, operating in the HoReCa, construction, IT and agriculture industries. In order to succeed our goal, we set out to identify the main research directions and apply the M-Score model to capture the level of vulnerability to financial statement manipulation techniques of certain industries. The results of the research will materialize in a synthesis of the main issues that need to be known by users of accounting information and in a hierarchy of the most secure areas of activity among those analyzed, in order to help stakeholders and prevent wrong decisions or misallocation of resources.

Keywords: *financial manipulation; M-Score; financial quality reporting; creative accounting*

JEL Classification: *M41; M42*

I. INTRODUCTION

In today's unpredictable business climate, thriving amid instability requires companies to align their operations with ongoing changes. To navigate new challenges effectively, management and other stakeholders must remain aware of both the internal and external environment. Leveraging artificial intelligence techniques and strengthening cybersecurity measures are essential for adapting to evolving threats and ensuring sustainable growth. (Dragomir & Alexandrescu, 2017; Artene & Domil, 2024). In such circumstances, information is the main pillar that supports business continuity, an important part of which is obtained through accounting, which extracts and processes data to provide competitive advantages to its users.

Financial-accounting information covers multiple areas of interest while serving several categories of users, depending on the nature of the decision they are about to take, and includes several time dimensions (Budai et al., 2022) as it provides details of past events, gives a broad picture of the current situation, but also allows financial forecasts facilitating the company's economic growth or avoiding failures. Starting from this idea, the aim of our study is to assess and measure the quality of financial information reported by some companies listed on the Bucharest Stock Exchange in 2023, operating in different industries. Therefore, the future of organizations, the people who are in some way connected with them and the stability of the economic environment depend on the quality of the information provided by the accounting system. Companies that do not have access to quality information can compromise their development strategies, generate false financial forecasts and end up losing their competitiveness in the face of competitors operating with clear and relevant data, and in some cases even on the verge of bankruptcy (Ciubotariu et al., 2021).

However, over the years, many companies have chosen to manipulate financial information by using creative accounting practices to present a different picture than the economic reality in order to maximize their profits. In addition, with the development of the business environment and technological developments, in some areas of business, elaborate accounting regulations have become insufficient making them more vulnerable to use information manipulation techniques (Grosu et al., 2022). As a result, this study aims to highlight a method by which distortions of reality through information manipulation can be detected and countered with the help of a tool to measure and evaluate their quality.

II. LITERATURE REVIEW

The quality of financial accounting information has remained a major issue for accounting professionals, regulators and other users of financial information on the grounds that financial reporting has been and continues to be the principal means of communicating the results, transactions and events occurring within an entity.

In addition to the actions taken by practitioners to encourage companies to deliver quality financial information, several academics have focused their studies on demonstrating the need for accurate reporting and raising awareness of the impact that manipulated financial information has on business sustainability. Thus, we find in the literature studies on the link between the quality of financial accounting information and crisis management, which testify that quality financial reporting is a basic component in crisis control activities in organizations helping to prevent unpleasant situations, early detection of financial problems, identification of causes and implementation of loss minimization strategies (Dalloul et al., 2023; Joyce, 2020). Furthermore, there is evidence that quality information positively correlates with financial performance metrics (Ngoc Hung et al., 2023), such as rate of return on investment, rate of growth in investment volume, earnings per share (Cosmulese et al., 2021) and allows companies to assess their profitability, liquidity or solvency, helping to identify potential financial gaps, optimize costs and ensure the right allocation of resources.

Academic writings go beyond just presenting the usefulness of quality financial information, but investigate in more detail, looking at the issue of the quality of financial statements from a number of perspectives, in particular exploring the relationship between creative accounting and accurate reporting (Abed et al., 2022). We therefore find papers that focus on describing creative accounting techniques, which are either categorized according to the components of the financial statements whose quality is impaired (Mihaila & Erhan, 2015), either according to the purpose for which a false reality has been created (Guinea, 2016). Mangu et al. (2023) and Owolabi (2020) explains forms of creative accounting that have an impact on the balance sheet and the indicators that reflect the financial position, techniques that affect the result, distorting the information presented in the income statement. As an illustration, for non-current assets, a specific range of years over which they must be depreciated is suggested rather than a fixed number, and a longer or shorter depreciation period affects the size of the result, creates the possibility of an increase or decrease in the net asset value and therefore affects the relevance of the reported information. Similarly, relevance and comparability may also be affected by the method by which current assets are measured, with the effect of slowing or intensifying the way income is recognized (Balaciu et al., 2009). Table 1 summarizes the main techniques that degrade the quality of financial reporting.

Table 1. Creative accounting practices on the quality of information

Modified structures	Creative accounting techniques	Impact on quality of information
Intangible assets	Over-valuing intangible assets (goodwill, patents)	Artificially increasing the value of assets and distorting the financial position
Tangible assets	Capitalization of maintenance and repair costs	Artificially increasing the result and the value of assets by passing current expenditure to next years
	Lease-back operations	Decreasing the value of assets, creating false income and changing the liquidity indicator
	Using operating leases instead of finance leases	Decreasing the value of assets and liabilities, increasing current expenses and decreasing the result
	Understating or overstating depreciation charges	Falsely increasing or decreasing the value of assets, accelerating the recording of expenses or delaying the recording of the full amount
Current assets	Cash flow manipulation through reverse factoring	The company gives a false picture of cash flow management, hiding real liquidity problems.
	Recognizing long-term receivables as current assets	Appear more liquid because short-term receivables are considered liquid assets.
	Understating bad debt provisions	Underestimating future expenses and artificially increasing net profit
Liabilities	Using derivatives and financial instruments to mask liabilities	Delaying or reducing debt recognition and artificially lowering leverage
Equity	Revaluing assets at an opportune time or to increase equity value	Improving the debt-to-equity ratio by creating revaluation reserves
Provisions	Creating excessive provisions to be reversed in less profitable years	Income smoothing and artificially improving financial performance

Source: Own processing after Mangu et al. (2023), Mihaila & Erhan (2015)

All of these artifacts in financial statement captured in Table 1 affect predictive models, losses cannot be predicted, risks are hidden, and the strategies of investors, lenders or managers may not be workable. Moreover, information about a company is more valuable if it can be compared with similar information from other companies

operating in the same industry or with similar information from the same company from a different time period. However, if the techniques described in the table are applied at company level, the comparison does not accurately reflect reality.

Moreover, organizations go beyond internal operations by creating special purpose entities (SPEs) to isolate certain assets or liabilities from the rest of the company (Deméré et al., 2020), such as non-performing loans or unsafe investments, and thereby transfer risks off-balance sheet, in order to present a strong financial position to investors or to satisfy creditors. We cannot omit the psychological methods that can be used in other reports that support financial statements to influence market behavior, such as the amount and type of information included in the appendices, delaying bad news and accelerating good news.

Because it is not enough to simply identify the means by which the quality of information is lowered, Zdraveski & Janeska (2021) direct research towards methods of detecting manipulated financial information, and according to them a key point in measuring the quality of information is the identification of recurring figures. In this case they often use Benford's Law, a mathematical principle describing the frequency of occurrence of digits in many datasets. By comparing the observed distribution of the first digit with the expected distribution according to Benford's Law, anomalies can be identified because falsified or manipulated data do not tend to follow the natural distribution of digits as a true dataset does (Geyer & Williamson, 2004). Also useful for assessing the quality of financial information is artificial intelligence, specifically with natural language processing (NLP) tools that uncover terms that appear unusual, changes in sentence wording, or attempts to hide information (Hajek & Henriques, 2017; Dragomir, 2017).

Another option to recognize manipulated information is statistical models, but they often require a lot of time and expertise to apply correctly. Researchers and practitioners have developed several models to measure information quality, each approaching the problem from different angles. Most models constructed to detect the presence of creative techniques in financial reporting focus on provisions, because the components of profit that involve actual cash flows, such as receipts from customers and payments to suppliers, are more difficult to manipulate by being more visible and easier to verify, and accounting items that do not immediately involve cash flows, such as provisions, depreciation, amortization, trade receivables, and inventories, have a degree of subjectivity and are more difficult to observe. The Dechow-Dichev model focuses on the quality of provisions by analyzing their variability compared to operating cash flows and provides insight into the discrepancies between cash flows and reported revenues (Dechow & Dichev, 2002), the Jones model either in its original form or in modified variants is used to measure discretionary provisions (Garza-Gomez & Okumura, 2001), and the Kothari, Leone, and Wasley model focuses on abnormal variation in revenues. Among the most widely used models to measure the degree of manipulation in financial statements is a mathematical model developed by Professor Messod Beneish, M-Score, which uses a set of financial variables to identify inconsistencies that may suggest that a company is manipulating its earnings (Beneish, 1999).

Clearly the literature dealing with the relationship between the quality of financial information and creative accounting is rich and addresses this issue in a myriad of ways, from attempts to raise awareness of the importance of accurate reporting to the development of methods to identify anomalies. However, no model can provide an absolute guarantee, even the most advanced ones have limitations and on top of that there are a lot of factors that make these assessments difficult such as frequent changes in legislation, rapid evolution of creative techniques, reporting as succinct as possible.

III. RESEARCH METHODOLOGY

The research methodology for the applied part of this paper involves measuring and assessing the quality of financial-accounting information using a tool proposed by Beneish based on 8 relevant indicators. With the help of these indicators, it is possible to portray the financial behavior of a company, as they manage to capture 83% of attempts to distort reality and the items in the financial statements on which changes are intervened. Data collection for the application of this tool in our study was carried out from the annual reports of companies listed on the Bucharest Stock Exchange. In more detail, we have chosen four areas of activity that we considered more prone to distort the quality of financial statements due to existing regulations and some industry particularities: HoReCa, construction, IT and agriculture. For each of these domains, 5 companies were randomly chosen, and in an Excel were extracted the necessary elements to determine the final score for the year 2023, whose equation is written as follows:

$$M - \text{Score} = -4.84 + 0.92 * \text{DSRI} + 0.528 * \text{GMI} + 0.404 * \text{AQI} + 0.892 * \text{SGI} + 0.115 * \text{DEPI} - 0.172 * \text{SGAI} + 4.679 * \text{TATA} - 0.327 * \text{LVGI} \quad (1)$$

The range (-2.22; 2.22) is used to determine whether or not the data has been interfered with. Thus, companies for which the calculations result in a score below -2.22 have 0 risk of data manipulation, values above 2.22 clearly indicate the presence of creative accounting, and results within the range require further analysis as

they create suspicion. As for the calculation of each individual variable, but also how to interpret each individual result, a more detailed presentation has been made in Table 2.

Table 2. Database processing methodology

Indicator	Formula	Qualitative	Manipulated
Days Sales in Receivables Index (DSRI)	$(\text{Net Receivables}_t / \text{Sales}_t) / \text{Net Receivables}_{t-1} / \text{Sales}_{t-1}$	<1.031	>1.465
Gross Margin Index (GMI)	$[(\text{Sales}_{t-1} - \text{COGS}_{t-1}) / \text{Sales}_{t-1}] / [(\text{Sales}_t - \text{COGS}_t) / \text{Sales}_t]$	<1.014	>1.193
Asset Quality Index (AQI)	$\{1 - [(\text{Current Assets}_t + \text{Tangible assets}_t) / \text{Total assets}_t]\} / \{1 - [(\text{Current Assets}_{t-1} + \text{Tangible assets}_{t-1}) / \text{Total assets}_{t-1}]\}$	<1.039	>1.254
Sales Growth Index (SGI)	$\text{Sales}_t / \text{Sales}_{t-1}$	<1.134	>1.607
Depreciation Index (DEPI)	$[\text{Depreciation}_{t-1} / (\text{Depreciation}_{t-1} + \text{Tangible assets}_{t-1})] / [\text{Depreciation}_t / (\text{Depreciation}_t + \text{Tangible assets}_t)]$	<1.001	>1.077
Sales, General, and Administrative Expenses Index (SGAI)	$(\text{SG\&A Expense}_t / \text{Sales}_t) / (\text{SG\&A Expense}_{t-1} / \text{Sales}_{t-1})$	<1.054	>1.041
Total Accruals to Total Assets (TATA)	$(\text{Income before extraordinary items}_t - \text{Cash from operations}_t) / \text{Total assets}_t$	<0.018	>0.031
Leverage Index (LVGI)	$(\text{Total liabilities}_t / \text{Total assets}_t) / (\text{Total liabilities}_{t-1} / \text{Total assets}_{t-1})$	<1.037	>1.111

Source: Own processing after Safta et al. (2020)

After creating a database containing each component as described above, the formulas in the second column of Table 2 were implemented using Excel, resulting in the M-score for each company. We then proceeded to group the companies according to sector of activity, critically analyzing and comparing the results of each indicator first, guided by the ranges contained in columns 3 and 4, in order to make it easier to understand why and where there are anomalies. As a last step, we interpreted and analyzed the score results in order to rank the 4 industries in order of low, moderate or significant risk of reporting manipulated financial statements. It is important to note that our analysis did not take into account external factors such as market volatility, but focused only on the information disclosed by companies in their publicly available reports.

IV. RESULTS AND DISCUSSIONS

Users of accounting information should be aware of at least one method to assess the degree of manipulation of financial statements. Our study aims to provide a practical example of how to identify irregularities in the presentation of financial statements using M-Score, a quick method that does not require internal company data and can be implemented at no cost, using Excel. In order to have a more comprehensive picture, we have opted for companies in several sectors of activity and summarized the results in 4 tables below.

Table 3. Determining the M-Score for HoReCa companies

Name	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	M-SCORE
A	1.142	1.289	0.935	1.039	0.925	1.099	0.521	0.01	-2.02
B	0.514	0.554	0.861	5.368	0.752	0.278	0.252	0.09	1.42
C	1.132	1.186	0.637	1	1.286	1.113	0.240	0	-2.13
D	1.663	0.600	0.665	1.228	0.903	0.908	0.330	0.01	-1.72
E	1.103	0.783	10.692	2.234	1.049	0.529	0.237	0.01	2.92

Source: Own processing

As we can remark, Table 3 comprises the results of the 8 indicators necessary to calculate the M-Score as well as its value for 5 companies in the HoReCa sector. At a first analysis, we notice that the final score of the 5 analyzed companies differs quite a lot in terms of value. Only 2 companies out of the 5 analyzed, namely A and C, are close to the lower limit of the range, so they do not present any cause for concern, but it should be mentioned that none of them is outside the range, i.e. with 0 risk of information manipulation. For organizations B and D the risk is moderate, and for company E the adoption of creative accounting techniques in the preparation of financial statements is clear, as it is outside the upper limit of the reference range. If we were to take an overview of each individual company, it is easy to see that overall, DSRI, AQI and SGI have the most values outside the normal parameters, so they use creative techniques to increase their financial performance. Because the DSRI indicates a large increase in receivables, the company misleads lenders into offering loans that they risk not recovering

because it conveys a false image of stability. At the same time, this indicator suggests an overestimation of revenues, and coupled with the warnings provided by SGI's values, it is clear that sales information is being manipulated and potential investors may be misled (Ciubotariu & Cernovschi, 2024). However, in the short term, some stakeholders are favored, the state may collect more taxes due to higher reported revenues, fictive growth provides short-term bonuses to managers, and existing investors will benefit from higher earnings for a period of time.

Table 4. Determining the M-Score for construction companies

Name	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	M-SCORE
F	1.329	0.769	1.286	0.801	0.588	1.504	1.196	0.30	-1.17
G	1.450	1.069	0.013	0.911	1.005	1.581	1.028	0.10	2.14
I	0.884	1.206	0.981	0.802	0.862	1.049	0.339	0.05	-2.24
M	1.649	1.512	0.120	2.575	0	0.606	0.381	0.71	2.89
N	2.21	0.903	0.902	1.151	24.549	0.596	0.338	0.06	1.94

Source: Own processing

Based on Table 4 we identify that among the firms operating in the construction sector, 3 companies have a positive score (G, M,N), of which M sufficiently exceeds the maximum limit of 2.22 due to discrepancies between receivables and revenues. Specifically, a large part of the revenues recognized by company M materialize in uncollected receivables, so there is a high probability that they are fictitious or recorded prematurely, all the more so as the value of the ratio of the previous year's sales to the one under analysis exceeds the safe boundary. In this case the users of the information should adopt protective measures, investigate the auditor's reports more vigilantly, the state should carry out additional checks, and investors should avoid reinforcing their capital in the company. Another question mark is raised by the 0 depreciation index, which means that in 2023 there was no machinery or premises to be depreciated, and the recorded revenues were realized without the use of technological equipment, a rare occurrence in the construction industry. For the other companies, less risky but which create suspicions of reporting a distorted picture, the problems are also found in asset depreciation, N has the highest index, so clearly there has been a change in the depreciation method or there has been a revaluation of fixed assets.

Table 5. Determining the M-Score for IT companies

Name	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	M-SCORE
O	0.493	0.908	1.739	1.791	0.994	0.619	0.188	0.041	-1.85
P	0.786	0.919	1.393	1.529	0	1.118	0.296	0.030	-3.262
R	0.266	0.689	0.390	3.583	0.328	1.469	0.485	0.314	0.216
S	0.968	0.917	0.768	1.425	0.770	1.095	0.334	0.055	-1.837
T	0.671	0.263	1.053	1.954	0.687	0.886	0.309	0.224	-0.514

Source: Own processing

Given the data summarized in Table 5, collected from companies operating in the information technology industry, we can state that the score is within the reference range, except for company P which has 0 risk of financial statement manipulation, so this area remains in the grey zone in terms of accurate reporting. Therefore, for a clear perspective, detailed analyses must be carried out focusing on the asset liquidity ratio (AQI), the degree of asset depreciation and the evolution of sales, especially since we are talking about a business sector characterized by the ownership of intangible assets, whose value can be subjective, so it can be easily juggled with them depending on the entity's purpose.

Table 6. Determining the M-Score for agricultural companies

Name	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	M-SCORE
K	1.477	0.947	1.099	1.060	1.050	0.969	0.344	0.079	-1.379
W	0.442	1.214	0.767	0.986	1.111	0.835	0.421	0.038	-2.579
X	0.785	1.258	0.736	1.018	1.985	1.089	0.041	-0.018	-2.303
Y	0.647	0.637	2.131	1.452	0.732	0.877	0.251	-0.064	-2.198
Z	1.828	0.794	0.808	0.983	1.035	1.283	0.329	0.002	-1.735

Source: Own processing

As shown in Table 6, for agricultural entities, the M-Score and the figures resulting from using the formula developed by Beneish confirm the quality of the reported information. Most of the selected companies, are either outside the risk zone (W, X, Y) or quite close to the safe zone (Z), so we deduce that the financial statements present the accurate picture of the enterprise. The only company that presents some uncertainty problems is K, but to confirm whether or not there are some manipulations we should insist on an analysis of the uncollected

receivables in relation to the recorded revenues. However, the indicator that strictly tracks the evolution of revenues does not suggest that there are any premature recognition or fictitious revenues. Although overall the results of the score indicate that the quality of reporting is reliable, some DEPI and AQI values exceed the safe zone, and could therefore signal small attempts to distort reality.

Table 7. Ranking companies according to the quality of information reported

Name	M-SCORE	AREA OF ACTIVITY	QUALITY
P	-3,262	Information technology	✓
W	-2,579	Agriculture	✓
X	-2,303	Agriculture	✓
I	-2,240	Construction	✓
Y	-2,198	Agriculture	✓
C	-2,130	Hotels, Restaurants and Catering	⊗
A	-2,020	Hotels, Restaurants and Catering	⊗
O	-1,850	Information Technology	⊗
S	-1,837	Information Technology	⊗
Z	-1,735	Agriculture	⊗
D	-1,720	Hotels, Restaurants and Catering	⊗
K	-1,379	Agriculture	⊗
F	-1,170	Construction	⊗
T	-0,514	Information Technology	⊗
R	0,216	Information Technology	⊗
B	1,420	Hotels, Restaurants and Catering	⊗
N	1,940	Construction	⊗
G	2,140	Construction	⊗
M	2,890	Construction	▲
E	2,920	Hotels, Restaurants and Catering	▲

Source: Own processing

As evidenced in Table 7, we have made a hierarchy of companies according to the M-Score value achieved in order to visualize the business sectors more prone to use creative accounting to achieve their own goals. So we observe that in agriculture the information presented in the reports does not give cause for concern, while in construction we identify a high likelihood that the financial statements are compromised. This result in the construction sector is supported by some current events, such as the Nordis Group scandal, which caused major damages for several individuals and legal entities in Romania because some suspicious operations were ignored by the control institutions and clients went on trust and did not analyze the consolidated financial statements of the group where they could observe irregularities.

With regard to HoReCa and IT, the scores are quite varied and the vast majority fall within the reference range, thus requiring further analysis (Ciubotariu & Cernovschi, 2024). Also these two areas have the lowest and the highest score, a company operating in IT has the lowest score, the risk of manipulation is 0, and a company operating in HoReCa has the highest score above the cut-off, so creative techniques were definitely used.

Considering that one of those most affected by the poor quality of financial-accounting information is the state, based on this classification, it could initiate forms of control and detailed analysis particularized by areas of activity, all the more so as some manipulative techniques are possible due to fluctuating or insufficient regulations. Investors and creditors can then take these results into account before making hasty decisions based on superficial analysis, and for managers this ranking should motivate them to find the right solutions to increase financial performance without harming the long-term health of organizations (Bores, 2023).

V. CONCLUSIONS

The quality of financial information is addressed in the literature through different approaches, varying from the impact it has on the financial health of the enterprise and its stakeholders, to how it can be measured and what are the forms of its compromise. Our study has managed a synthesis of academic resources capturing the main elements on this topic and can be of real help to users of financial accounting information.

The final result of the work is quantified in a ranking of the areas of activity more prone to report a distorted picture of reality that could be made possible by measuring the quality of financial-accounting information using the tool proposed by M. Beneish. In the course of the analysis we identified items in the balance sheet and profit and loss account that were presented differently from reality. We find that most of the time creative techniques are applied on fixed assets and income, and there are no major differences in the structures affected by creative accounting from one area to another. Therefore, it can be said that in Romania the most known manipulation practices are limited to the cosmetization of income.

Another aspect that emerges from our analysis is related to the construction sector as the most problematic companies were identified. We believe that more emphasis should be placed on educating the behavior of investors in this area, so that they can recognize and report suspicious situations and organizations can be discouraged from resorting to cosmetic financial statements. At the same time in the HoReCa and IT sectors the majority of companies are in the gray area, with moderate risk, so further investigation is needed. A worrying fact is that quite a few companies are outside any risk of data manipulation, which means that in Romania the focus is not on transparency in reporting, but rather on presenting high but unreal profits.

The findings of the study can be a starting point in checking the degree of fairness in reporting, and stakeholders can calculate only the problematic variables we uncover, thus saving time for informed decision making.

The limits of the research are related primarily to the small number of companies analyzed, but also to the fact that we selected only those industries that have undergone the most legislative changes in recent years. Also, the data used in the calculation of the indicators to determine the score were collected only from public reports, without access to additional information. This study can be extended in the future by analyzing all companies listed on the Bucharest Stock Exchange, comparisons can also be made between regions of Romania or with other European countries, and the method used can be interleaved with methods using artificial intelligence.

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