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FORENSIC ACCOUNTING: THE USE OF BENFORD'S LAW TO EVALUATE INDICATIONS OF FRAUD

CONTABILIDADE FORENSE: O USO DA LEI DE BENFORD PARA AVALIAR INDICAÇÕES DE FRAUDE

Nicholas Renaldo [1]

Sudarno[2]

Marice Boru Hutahuruk[3]

Suhardjo[4]

Suyono[5]

Ienne Yoseria Putri[6]

Andi[7]

ABSTRACT

The sudden decline in profit at PII Corporation is an important issue that requires further discussion. This study aims to evince whether there are indications of fraud in the preparation of PII Corporation's profit and loss statements, which can be proven through Benford's Law. This study uses the Binomial Test, Sign Test, and Chi-Squared Test methods to test the alignment of data with Benford's Law. The sample in this study consists of PII Corporation's 2013-2019 profit and loss reports. The results have shown that 25 out of 28 tests expressed no indication of fraud, while 3 tests have indicated fraud, detected in the fourth digit of the company's expenses, in the first 2 digits of its expenses, and in the last 2 digits of other incomes and costs. After further investigation, it was found that the significant decrease in profit occurred because the company had paid interest on bonds with quite large values in 2019, so the statistical test results were considered false-positive. The recommendation that can be given is that PII Corporation regulates the imposition of the bond coupon value in stages.

Keywords: Fraud detection

1, 2, 4, 5, 6, 7 Institut Bisnis dan Teknologi Pelita Indonesia
3 Institut Teknologi dan Bisnis
Main Contact Email: nicholasrenaldo@lecturer.pelitaindonesia.ac.id

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ABSTRAK

Penurunan laba yang terjadi tiba-tiba pada PII Corporation merupakan permasalahan yang penting untuk dibahas lebih lanjut. Penelitian ini bertujuan untuk membuktikan apakah ada indikasi kecurangan pada penyusunan laporan laba (rugi) PII Corporation yang dapat dibuktikan melalui Benford's Law. Penelitian ini menggunakan metode Binomial Test, Sign Test, dan Chi-Square Test untuk menguji keselarasan data dengan Benford's Law. Sampel pada penelitian ini adalah laporan laba (rugi) PII Corporation tahun 2013-2019. Hasil penelitian menunjukkan bahwa dari 28 kali pengujian, 25 pengujian menunjukkan hasil tidak adanya indikasi kecurangan, sedangkan 3 pengujian menunjukkan hasil adanya indikasi kecurangan yang terdeteksi pada digit keempat beban, dua digit pertama beban, dan 2 digit terakhir pendapatan (biaya) lainnya. Setelah penelusuran lebih lanjut, ditemukan bahwa penurunan laba yang signifikan tersebut terjadi karena perusahaan membayarkan bunga obligasi yang nilainya cukup besar pada tahun 2019 sehingga hasil pengujian statistik menunjukkan false positive. Rekomendasi yang dapat diberikan adalah PII Corporation mengatur pembebanan nilai kupon obligasi secara bertahap.

Kata Kunci: Deteksi kecurangan

RESUMO

O súbito declínio no lucro da PII Corporation é uma questão importante que requer mais discussão. Este estudo tem como objetivo evidenciar se há indícios de fraude na elaboração das demonstrações de resultados da PII Corporation, o que pode ser comprovado por meio da Lei de Benford. Este estudo utiliza os métodos Teste Binomial, Teste de Sinais e Teste Qui-Quadrado para testar o alinhamento dos dados com a Lei de Benford. A amostra deste estudo consiste nas demonstrações de resultados de 2013-2019 da PII Corporation. Os resultados mostraram que 25 dos 28 testes não expressaram indícios de fraude, enquanto 3 testes indicaram fraude, detectadas no quarto dígito das despesas da empresa, nos primeiros 2 dígitos de suas despesas e nos 2 últimos dígitos de outras receitas e custos. Após uma investigação mais aprofundada, apurou-se que a diminuição significativa do lucro ocorreu porque a empresa pagou juros sobre títulos com valores bastante elevados em 2019, então os resultados dos testes estatísticos foram considerados falso-positivos. A recomendação que pode ser oferecida é que a PII Corporation regule a imposição do valor do cupom do título por etapas.

Palavras-chave: Detecção de fraude

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1. Introduction

Company's shareholders want to benefit from the results of their own company's operations, while managers or directors of finance want to get compensation for the work they have done. Sometimes there are discrepancies between these two parties. Shareholders cannot afford to continuously share more money with directors. This can underlie the emergence of allegations of accounting fraud, when directors want to get more financial compensation so that they manipulate numbers in financial statements in order to benefit themselves.

PII Corporation is a company that provides port services. Based on the company's 2013-2019 profit and loss reports, there was an increase in revenue by an average of 6.07% per year accompanied by an increase in operating expenses by an average of 2.24%. An increase in revenue outweighing an increase in expenses looks like a positive result. Indeed, considering profit before non-operating income and expenses, there is still a surplus. However, non-operating income presented an average decrease of 11.35%. This decrease represents a significant amount. In the end, the average increase in earnings before tax (EBT) was 6.92%. Until 2017, there was still an increase in EBT by an average of 26.92%, when it suddenly decreased by 6.99% in 2018 and by 59.19% in 2019. This sudden decline in profit can generate problems to the company if it cannot control its non-operating expenses in 2020.

Of course, this raises a question regarding PII Corporation's financial data. Did the decline in profits really occur because of the company's operational activities or could there be an indication of manipulation in their financial statements? Given the differences in interests between shareholders and management, this needs to be further investigated.

One method to detect whether there is indication of fraud is to use the distribution of data according to Benford's Law. Research related to Benford's Law is widely employed in the financial sector, as well as in other branches of science. Initially, this distribution was discovered by Newcomb (1881), but it has been more accredited since Benford (1938) applied it to several objects of his research. The use of this distribution was later developed in the accounting field by Mark John Nigrini (2012).

Research (Qin et al., 2019) shows that results follow the distribution of Benford's Law on 10-year data, but they do not follow Benford's Law on different lenghts of data. Research (Kuruppu, 2019) has also shown that sales data follow the distribution of Benford's Law but data from accounts receivables do not. Moreover, Cerioli, Barabesi, Cerasa, Menegatti & Perrotta (2019) state in their research that data on international trade follow Benford's Law. In addition, other researchers such as Kruger & Yadavalli (2017) and Striga & Podobnik (2018) have presented mixed results.

Research (Miller & Nigrini, 2008; Mark J. Nigrini, 2015; Mark J. Nigrini & Miller, 2007) proves that Benford's Law can be applied to several types of data other than financial data. Data such as annual average flows at stream gage sites, global lakes and wetlands, daily stock returns, stock volumes, expected returns, abnormal returns, balance sheets, income statements and cash flows can be tested via Benford's Law.

Based on the description of the phenomenon and the gaps among studies, it will be interesting to further discuss the application of Benford's Law in forensic accounting in order to detect indications of fraud at PII Corporation. The motivation of this study is to apply behavioral concepts in the data analysis. Another motivation is to consider almost up to the fifth and last digits in the data analysis.

1.1 Problem Formulation

Based on the description of the phenomenon, the formulation of the research problem is whether there are indications of accounting fraud at PII Corporation.

1.2 Research Purposes

Based on the phenomenon and the formulation of the problem, the purpose of this research is to find out any indications of accounting fraud at PII Corporation.

1.3 Research Benefit

The benefit of this research from a theoretical view is to prove that Benford's Law testing can be used to detect indications of accounting fraud. Moreover, its practical benefit is to provide an overview to PII Corporation, so that it can better control its allocation of funds and financial statements recording in order to reduce indications of fraud.

2. Literature review

2.1 Agency Theory

One theory that explains fraudulent behavior is the agency theory, which describes a collaborative relationship between shareholders as owners and managers as agents. The relationship between owners and agents emerges. When several parties are bound by a contract and agree to cooperate, a conflict of interest between the parties is inevitable. Conflicts of interest occur because of differences in interests. Improving the company's financial performance in the form of a high rate of return on an investment is the owner's expectation, while managers expect large financial compensation for work they have done. On this basis, it could underlie fraudulent behavior (Renaldo, Sudarno, et al., 2021).

2.2 Fraud

Fraud has existed for generations. Before the Industrial Revolution, financial scandals had plagued the world economy. Fraud is a known misrepresentation of the truth or concealment of material facts that induces others to act in a way that harms themselves. A misrepresentation carelessly made without belief in its veracity causes others to act. It emerges from known misstatements, concealment of material facts or reckless misstatements which are made to encourage others to act to their detriment (Sumartono, Urumsah, & Hamdani, 2020).

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Both fraudulent financial reporting and misappropriation of assets have become huge costs for many organizations. Several fraud prevention and detection techniques are now used to reduce the direct and indirect costs associated with all forms of fraud. These techniques include, but are not limited to, fraud policies, hotlines, employee reference checks, fraud vulnerability reviews, vendor contract reviews and sanctions, analytical reviews (financial ratio analysis), password protection, firewalls, digital analysis and other forms of software technology, and discovery sampling. Organizations that have not been victims of fraud tend to rely more heavily on intangible prevention tools such as codes of conduct or fraud reporting policies, whereas organizations that have experienced fraud have implemented more tangible measures such as violation reporting policies and fraud prevention and detection training. (Bierstaker, Brody, & Pacini, 2006).

2.3 Forensic Accounting

"Forensic" means "suitable for use in a court of law", and it is that standard and potential outcome that forensic accountants generally must work towards. Forensic accounting uses accounting, auditing, and investigative skills to conduct investigations on theft and fraud. This includes tracking money laundering and identity theft activities as well as tax evasion. Insurance companies hire forensic accountants to detect insurance fraud such as arson, and law firms hire forensic accountants to identify marital property in divorce cases (Sujatha & Gomez, 2013).

Forensic accounting has become very important in the corporate agenda after the issue of financial reporting has arisen. In order to avoid fraud and theft, and to restore much-needed public trust, some companies are taking steps towards drastically improving their internal control and accounting system infrastructure. This development increases the importance of accountants who have chosen to specialize in forensic accounting and who are consequently referred to as "forensic accountants". Forensic accounting relies on the fraud triangle to identify weak points in business systems and find possible suspects in fraud cases. It consists of three core concepts that together create a situation prone to fraud: incentive, opportunity and rationalization. People must have an incentive and opportunity to commit a financial fraud, as well as the ability to justify it. Just because someone has the opportunity or incentive to steal does not mean that they have the ability to do it (Sujatha & Gomez, 2013).

Forensic accounting and fraud examination are different but related. Forensic accounting work is performed by accountants in anticipation of litigation and can include fraud, judgment, bankruptcy, and a number of other professional services. Fraud checks can be carried out by accountants or non-accountants and refer only to anti-fraud matters.

2.4 Benford's Law

To detect fraudulent behavior in accounting data, one can compare the digit distribution of the dataset with the theoretical distribution of Benford's Law. If the accounting dataset does not conform to Benford's Law, there is some degree of suspicion (Geyer & Drechsler, 2014; Renaldo, Sudarno, et al., 2021).

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2.5 Hypothesis Development

Being a phenomenon that can be detrimental to the company, this analysis will be important because financial statements must present the correct numbers. If fraud is discovered in them, it will be detrimental to various parties. Benford's Law is one method that can detect such fraud. Research (Geyer & Drechsler, 2014) shows a numerical anomaly in the second digit for Total Long Term Debt. Other research (Kuruppu, 2019) also concluded that there are numerical anomalies in a company's receivable data. Finally, another study (Davydov & Swidler, 2017) has found an anomaly in the quality of bank financial statements. Based on this description, the hypothesis in this study is H1: There are indications of fraud at PII Corporation according to Benford's Law.

3. Research methods

This research was conducted at PII Corporation by observing the company's profit and loss reports from 2013-2019. The used data is secondary in the form of company profit and loss reports, obtained directly from PII Corporation.

The first step of data processing is to collect 7 years of the company's revenue data to analyze their first to the fifth digits, then the first two digits, and finally the last digit. Secondly, data on 7 years of operating expenses are collected also aiming to analyze the first to the fifth digit, then the first two digits, and finally the last digit. Thirdly, the collection of 7 years of non-operating income and expenses is analyzed likewise. Finally, all financial data from profit and loss statements are combined for the analysis of their first to the fifth digit, then the first two digits, and finally the last digit.

To test the fitness of the actual data distribution to Benford's Law, the Chi-Squared test is used. If certain data do not meet the Chi-Squared test assumptions, especially the amount of data, the Binomial test or Sign test are used.

In the first digit test using the Chi-Squared test, the minimum amount of datapoints required to testing is 26 datapoints under the assumption that at the 9th digit the probability of a number 9 appearance will be smaller, and number 9 must appear 1 time. The minimum number of datapoints for the second digit test is 19 under the same assumptions. Meanwhile, for the first two digits test, the minimum amount of datapoints to produce a fair distribution is 281.

Some of the formulas that will be used include:
The frequency for the first digit follows a logarithmic relationship (Benford, 1938):

$$F_a = \log\left(\frac{a+1}{a}\right) \qquad (1)$$

F_a : Frequency of digit 'a' in the first position
a : first digit

The formula can also be simplified to:

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$$F_a = \log\left(1 + a^{-1}\right) \qquad (2)$$

After obtaining the dataset frequency and the correspondent frequency according to Benford's Law, the Hypothesis Test of Unequal Expected Frequencies (Chi-Squared Analysis) will be used through the following formula (Lind, Marchal, & Wathen, 2018):

$$X^2 = \sum \left[\frac{\left(f_o - f_e\right)^2}{f_e} \right] \qquad (3)$$

X^2 : Chi-Squared Statistic
f_o : Observed Frequencies
f_e : Expected Frequencies

If it is the case that one of the datasets contains numbers that cannot be analysed using a Chi-Squared test, then the Binomial Probability Test and a simple Sign Test will be used. The formula to be used is (Lind et al., 2018):
Binomial Probability Distribution

$$P(x) = C_x^n \pi^x (1-\pi)^{n-x} \qquad (4)$$

P(x): Binomial Probability if n <10
C : Combination
x : Random variable defined as the number of successes or + sign(s)
π : Probability of success on each trial (50%)

Table 1. Benford's Law Probability Distribution for the First to the Fifth and Last Digits

Benford's Law	Probability of Appearance in the nth-digit					Probability of Appearance in the last digit
Digit	**1**	**2**	**3**	**4**	**5**	
0		0,119679	0,101784	0,100176	0,100018	1/10
1	0,301030	0,113890	0,101376	0,100137	0,100014	1/10
2	0,176091	0,108821	0,100972	0,100098	0,100010	1/10
3	0,124939	0,104330	0,100573	0,100059	0,100006	1/10
4	0,096910	0,100308	0,100178	0,100019	0,100002	1/10
5	0,079181	0,096677	0,099788	0,099980	0,099998	1/10
6	0,066947	0,093375	0,099401	0,099941	0,099994	1/10
7	0,057992	0,090352	0,099019	0,099902	0,099990	1/10

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Benford's Law	Probability of Appearance in the nth-digit					Probability of
Digit	1	2	3	4	5	Appeara
8	0,051153	0,087570	0,098641	0,099863	0,099986	1/10
9	0,045757	0,084997	0,098267	0,099824	0,099982	1/10
Total	**1,000000**	**1,000000**	**1,000000**	**1,000000**	**1,000000**	**1,000000**

Source: Benford's Law calculation results, 2022

Based on Benford's Law, especially in the first digit, many initially thought it would follow a Uniform distribution, where each digit has the same probability to appear once. However, it does not behave like that and, more specifically, the Uniform distribution can be found in the last digit. The distribution of the second digit is still less close to the Uniform distribution, but the distribution of the third, fourth and fifth digits approach the Uniform distribution, even though they are never identical.

Table 2. Benford's Law Probability Distribution for the First 2 Digits

Digit	Prob.	Digit	Prob.	Digit	Prob.	Digit	Prob.	Digit	Prob.	Digit	Prob.
10	0,04139	25	0,01703	40	0,01072	55	0,00783	70	0,00616	85	0,00508
11	0,03779	26	0,01639	41	0,01047	56	0,00769	71	0,00607	86	0,00502
12	0,03476	27	0,01579	42	0,01022	57	0,00755	72	0,00599	87	0,00496
13	0,03218	28	0,01524	43	0,00998	58	0,00742	73	0,00591	88	0,00491
14	0,02996	29	0,01472	44	0,00976	59	0,00730	74	0,00583	89	0,00485
15	0,02803	30	0,01424	45	0,00955	60	0,00718	75	0,00575	90	0,00480
16	0,02633	31	0,01379	46	0,00934	61	0,00706	76	0,00568	91	0,00475
17	0,02482	32	0,01336	47	0,00914	62	0,00695	77	0,00560	92	0,00470
18	0,02348	33	0,01296	48	0,00895	63	0,00684	78	0,00553	93	0,00464
19	0,02228	34	0,01259	49	0,00877	64	0,00673	79	0,00546	94	0,00460
20	0,02119	35	0,01223	50	0,00860	65	0,00663	80	0,00540	95	0,00455
21	0,02020	36	0,01190	51	0,00843	66	0,00653	81	0,00533	96	0,00450
22	0,01931	37	0,01158	52	0,00827	67	0,00643	82	0,00526	97	0,00445
23	0,01848	38	0,01128	53	0,00812	68	0,00634	83	0,00520	98	0,00441
24	0,01773	39	0,01100	54	0,00797	69	0,00625	84	0,00514	99	0,00436

Source: Benford's Law calculation results, 2022

The distribution of the first two digits under Benford's Law is similar to the distribution of the first digit, where smaller numbers will appear more often than larger numbers. The analysis will be assisted by Microsoft Excel and SPSS programs. The hypothesis will be accepted if the value of Sig. value < alpha (Hafni, Renaldo, Chandra, & Thaief, 2020). All tests will be reinforced with Bootstrap and Monte Carlo simulation if needed. Bootstrap experiments generate samples by re-sampling the observed data several times. The sample is treated as an unknown population that can be drawn with replacement. The Bootstrap method is used when the underlying data distribution is unknown. The Monte Carlo experiment is an alternative method for generating new samples from historical data. The main difference is that the sample in a Monte Carlo simulation is generated by drawing elements from the distribution of the analytic hypothesis (Pažický, 2017).

3.1 Results and Discussion

Based on the results of Benford's Law, the analyses for the first digit (d1), the second digit (d2), the third digit (d3), the fourth digit (d4), the fifth digit (d5), the first two digits (d1d2), and the last digit (last), for the accounts of revenue (Rev), expenses (Cost), other incomes and expenses (Comp), and all financial statement figures (All), are shown in table 3.

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Table 3. Benford's Law Analyses Results related to PII Corporation's Profit and Loss Statements

Attribute	Sig. Value	Attribute	Sig. Value	Attribute	Sig. Value	Attribute	Sig. Value
Revd1	,246a	Costd1	,468b	Compd1	,246a	Alld1	,789b
Revd2	,839b	Costd2	,727b	Compd2	,246a	Alld2	,641b
Revd3	,187b	Costd3	,956b	Compd3	,117a	Alld3	,797b
Revd4	,959b	Costd4	,084b	Compd4	,205a	Alld4	,976b
Revd5	,471b	Costd5	,640b	Compd5	,917b	Alld5	,459b
Revd1d2	,754c	Costd1d2	,007c	Compd1d2	,000c	Alld1d2	,754c
RevLast	,110b	CostLast	,406b	CompLast	,476b	AllLast	,367b

a. Binomial Test; Exact Results are provided instead of Monte Carlo for this test.
b. Chi-Squared Test; Monte Carlo based on 10000 sampled tables.
c. Sign Test; Monte Carlo based on 10000 sampled tables.

Source: Data processing results, 2022

Based on table 3, it can be seen that most results follow the distribution of Benford's Law, including the revenue section, the expense section, other incomes and costs sections and the overall financial statements for the first, second, third, fourth, fifth, first 2 digits and last digits. Out of 28 tests, 25 indicate that the distribution of data follows Benford's Law. The hypothesis which states that there are indications of fraud at PII Corporation according to Benford's Law is rejected. This is in line with previous results (González, 2020; Kruger & Yadavalli, 2017; Kuruppu, 2019; Qin et al., 2019; Striga & Podobnik, 2018). Meanwhile, 3 tests have shown that some data are not in line with Benford's Law distribution, also corroborated by previous research (Alali & Romero, 2013; Davydov & Swidler, 2017; Geyer & Drechsler, 2014; Silva, 2016; Slijepcevic & Blaskovic, 2014).

From the revenue section, there is no indication of fraudulent financial statements. Revenue at PII Corporation is dominated by revenue in the form of container terminal services, ship services, and other port services. Fourth digit analysis results in the distribution of data being almost identical to Benford's Law, which is evident by the value of Sig. being the biggest, followed by the second digit and the first 2 digits. On the other hand, last digit analysis has exhibited a smaller value of Sig. but still quite similar to the Uniform distribution. In first digit analysis, number 5 was found to be slightly more common than it should have been. This figure is found in the revenue of the loading and unloading business service centers and the revenue of the container terminal service centers. In second digit analysis, number 8 was found to be less recurrent than it should have been. This figure is found in the revenue of ship service centers and logistics business centers. In third digit analysis, number 8 was found to be less common than it should have been. This figure is found in the revenue of goods service centers. In fourth digit analysis, number 9 was found to appear more frequently than it should have. This figure is found in ship service centers revenue, goods service centers revenue, loading and unloading business service centers revenue, TBAL service centers revenue, special port service centers revenue / *pendapatan pusat pelayanan pelabuhan khusus* (PELSUS), docks for self-interest / *dermaga untuk kepentingan sendiri* (DUKS), and miscellaneous service centers revenue.

In fifth digit analysis, number 9 was found to be more recurrent than it should have been. This figure appears in the revenue of the goods service centers, the revenue of the container terminal service centers, the revenue of the TBAL service centers, the revenue of the Special Port Service Centers / *Pendapatan Pusat Pelayanan Pelabuhan Khusus* (PELSUS) and the

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Pier for Own Interests / *Dermaga untuk Kepentingan Sendiri* (DUKS), the income of the various business service centers, and the income of the logistic business centers.

In the first two digits analysis, number 55 appeared more times than it should have. This figure appears in the revenue of the container terminal service centers and the revenue of the logistics business centers. Finally, in last digit analysis, number 0 appeared more times than it should have. This number appears in all data from the revenue section. This is an expected result for rupiah transactions in Indonesia, given the weak currency value, because there are usually many 0s in the end of a large number.

In the analysis of the income section, many values slightly deviate from the income of goods service centers, container terminals, and logistics business centers. These three types of income exceed 70% of PII Corporation's turnover. This should be a concern for managers so as not to lose control over how to keep this income coming.

In the operating expenses section, it is possible that there are 2 indications of fraud, suggesting fraudulent financial statements, namely in the fourth digit and in the first 2 digits. The first indication of fraud was found in the fourth digit of expenses at a 10% significancy, which appeared in material expenses, maintenance expenses, insurance expenses, business partner cooperation expenses and general expenses. On the other hand, the analysis of the first two digits suggests the highest anomaly at combination 32, which is significant at 1%, found in material load and maintenance expense accounts. Material expenses and maintenance expenses can occur twice, indicating an abnormality or an indication of fraudulent reporting. The commissioners are obliged to especially evaluate these two types of expenses in order to reduce the misuse of accounting information (Chandra, Renaldo, & Putra, 2018).

At the same time, in other analyses, no indications of fraud were found, but they will be discussed in more detail. In first digit analysis, number 3 appears more times than it should. This figure emerges in material expenses, maintenance expenses, rental expenses and general expenses. In second digit analysis, number 7 appears less times than it should. This figure is found in the material load. In third digit analysis, number 9 appears more frequently than it should. This figure appears in personnel expenses, material expenses, maintenance expenses, depreciation and amortization expenses, rental expenses, business partner cooperation expenses, office administration expenses and general expenses. In fifth digit analysis, number 2 appears more times than it should. This figure is found in materials expenses, maintenance expenses, depreciation and amortization expenses, and rental expenses. In last digit analysis, number 5 was found to appear more times than it should have. This figure appears in material expenses, maintenance expenses, depreciation and amortization expenses, rental expenses, business partner cooperation expenses, office administration expenses, and general expenses.

Analysing the operating expenses section, the material expenses account often deviates from Benford's Law, followed by the burden of maintenance. Both material and maintenance costs are burdens from the field and are likely accounts for fraudulent actions to occur. Especially regarding recording notes and money that comes out, there can be a discrepancy. The field section must have an independent control unit so that checking values can be more accurate.

In the non-operating income and expenses section, there is 1 indication of fraud, namely in the first two digits, there was an anomaly found at combination 30, which is significant at 1%. This figure is found in non-operating expenses but it is not detailed in the profit and loss

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statements. In other digit analyses, no indication of fraud was found, but it will also be discussed in more detail. In first digit analysis, number 6 appears more times than it should. This number appears a lot in other income components. In second digit analysis, number 1 does not appear at all. In third digit analysis, number 8 does not appear at all. In fourth digit analysis, number 6 appeared more times than it should have. This number has also the same properties as number 6 in first digit analysis, which appears in almost all sections. In fifth digit analysis, number 7 appears more than it should, and this number appears in almost all figures in the non-operating income and expenses section. In last digit analysis, number 2 appears more than it should. This figure also appears in almost every element of this section.

Non-operating income and expenses do not represent neither the main income nor the main expenses of a company, but under some conditions, especially in the case of PII Corporation, it can cause a significant decrease in operating profit. After further checking, in 2019, there was a significant decline in profit, given that 9.6 billion rupiah were used for payment of bond coupons.

Although no anomalies were detected in the entire dataset analyses, they will still be discussed to analyse the distribution of certain numbers. In first digit analysis, number 5 occured more times than it should have. In second digit analysis, number 4 appeared more times than it should have. Third digit analysis shows that number 8 appears less than it should. Fourth digit analysis indicates that number 4 appeared more times than it should have. Analysis of the fifth digit concluded that number 9 appears more often than it should. The first two digits analysis presents combination 55 as appearing a lot in the dataset, and last digit analysis reveals number 7 appears less times than it should. Some of the distributions of this dataset have appeared in the analysis of income and operating expenses.

There were 3 tests that resulted in significant results, although they were not proven to be true. This is an example of a type I error, or false positive, when the researcher refuses to accept H_0 even though H0 is true. In the case of PII Corporation, H_1, which reads that there is an indication of fraud at PII Corporation, should be rejected, but the hypothesis is accepted. Several factors can cause this to happen, such as the selection of an inaccurate research method or insufficient sampling. Although this research has strengthened the analysis using the Monte Carlo technique, there need to be further development regarding this methodology.

Table 4. Distribution of the First Digits of Research Data Based on Benford's Law

Digit	Rev	Cost	Comp	All	Total	Benford's Law	Difference
1	0,273	0,381	0,176	0,311	0,285	0,301	-0,016
2	0,200	0,159	0,059	0,163	0,145	0,176	-0,031
3	0,073	0,190	0,176	0,141	0,145	0,125	0,020
4	0,091	0,079	0,000	0,074	0,061	0,097	-0,036
5	0,145	0,063	0,176	0,111	0,124	0,079	0,045
6	0,073	0,032	0,235	0,074	0,103	0,067	0,037
7	0,109	0,016	0,059	0,059	0,061	0,058	0,003
8	0,036	0,032	0,118	0,044	0,058	0,051	0,006
9	0,000	0,048	0,000	0,022	0,017	0,046	-0,028
Total	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**0,000**

Source: Data Processing Results, 2020

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Benford's Law analysis refers primarily to the first digit. From the partial test, some digits still have a distribution that is not very similar to Benford's Law, but this is not significant, and it is still acceptable. Meanwhile, if all the distributions of these numbers are combined, their position is close to Benford's Law with insignificant differences. This proves that Benford's Law can be applied to data from a company's financial statements to detect the presence or absence of accounting fraud. From the results of this study, it was also proved that PII Corporation does not have agency problems (Mardiyaningsih & Kamil, 2020; Renaldo, Suhardjo, Putri, Juventia, & Nur, 2021) because everything has been well disclosed.

Digit 9, which was found quite a lot throughout this study, can refer to the habit of rounding the value of transactions, which is also often found in the process of writing prices of goods in supermarkets. In this sense, using number 9, in cases where the number is close to a multiple of 10, affects the psychology of financial statements readers. In the income or operating expenses section, readers might think the reported value is smaller than it really is, even though the actual value remains the same. If the reader is careful in his or her analysis, the reported numbers will remain the same, but their subconscious conclusion could be affected. This is called charm pricing, where the value is set in a way to cause a psychological impact on the reader.

Number 9 is used to lower the leftmost nominal digit. If the leftmost digit does not change, the impression of a nominal change or difference is not significant. For example, Rp. 2,699,000 does not feel different compared to Rp. 2,700,000. This psychological effect is only significant when the leftmost digit of the nominal value changes. Humans have a habit of reading quickly or at a glance (skimming). Generally, humans only read information they consider important, for example, the beginning of a sentence or numbers. This effect is taken advantage of in charm pricing. Therefore, the reader must remain rational because a nominal change does not encourage consumers to be careful about the actual value. Financial statement presenters must create reports that are easily understood by the reader, without making the reader ask for anothe one. These good practices (Nyoto, Renaldo, Karuppannan, Bhuiyan, & Kumarasamy, 2021) can be applied especially by managers of financial statements so that a company can display good future value (Suyono, Renaldo, Sevendy, Putri, & Sitompul, 2021).

4. Conclusions and recommendations

Based on the results of the analyses, there are indications of fraud at PII Corporation in 3 out of 28 tests. Further investigation has found out that these 3 tests were false positives because the losses incurred to PII Corporation were due to payment of bond coupons, so that the detection of indications of fraud can still be explained. Also, several digits 9 were found in financial statements due to a charm pricing phenomenon, given that readers generally only briefly read them. The company explained the material value of whether these findings could have a significant impact on the company's operations and performance, and endanger the sustainability of the business going forward.

The recommendation that can be given with regard to these findings is that PII Corporation should regulate the imposition of bond coupon values in stages so that they do not accumulate over a year. Because readers of financial statements tend to read balance sheets and profit and loss reports, it can cause concern to see a fairly large decline in profit. Notes to the financial

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statements do explain these operations in more detail, but investors rarely read reports in full. The weakness in this research is that the method is still traditional and it is still necessary to develop a method that can detect fraud more accurately without experiencing false positives.

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