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ANALISYS BENFORD LAW FOR COMPANY EVIDANCE FROM INDONESIA

Taufik Hidayat*, Amir Indra Budiman
*Accounting Departement, Pamulang University, Banten, Indonesia Telp/Fax 021-7412566
** Accounting Departement, Budi Luhur University, Jakarta Selatan, Indonesia Telp/Fax 021-5853753

ABSTRACT

This study aims to see how the auditors in accounting and IT must apply to the various procedures in the audit of financial statements with IT-assisted. When viewed as a whole all the computer-assisted audit tools (CAATs) has its own command as an example of this Benford law. The aim of this study was to try to describe how exactly the Benford's Law, when the Benford law can apply and what constraints should be considered before applying the financial audit of companies with IT-assisted. However, in this study the authors used a model for large-scale data analysis of financial statements.

KEYWORDS: Benford law, Fraud, Audit, Financial Statement.

INTRODUCTION

Various models of analysis in the numbering used in many fields, especially concerning the case or about everything in the world of finance. As examples of companies reporting their performance results by using figures, creditors and investors who trade in terms of numbers, as well as nearly all evaluated and associated with the number. In the financial report, the majority of these figures will surely represent some kind of currency for example, such as US dollars, which are then evaluated based on the number more in the form of financial ratios in the financial statements.

Step Award Number can be used for more than just determining the existing strengths in the financial statements of the company, although such a step can also be used to evaluate the quality of financial reporting. From the first there is one way that is so popular in the know with the application name Benford's Law. Application or this law states that the set number of various types of users must follow the mathematical distribution or logarithmic distribution which until recently was known as Benford law distribution.
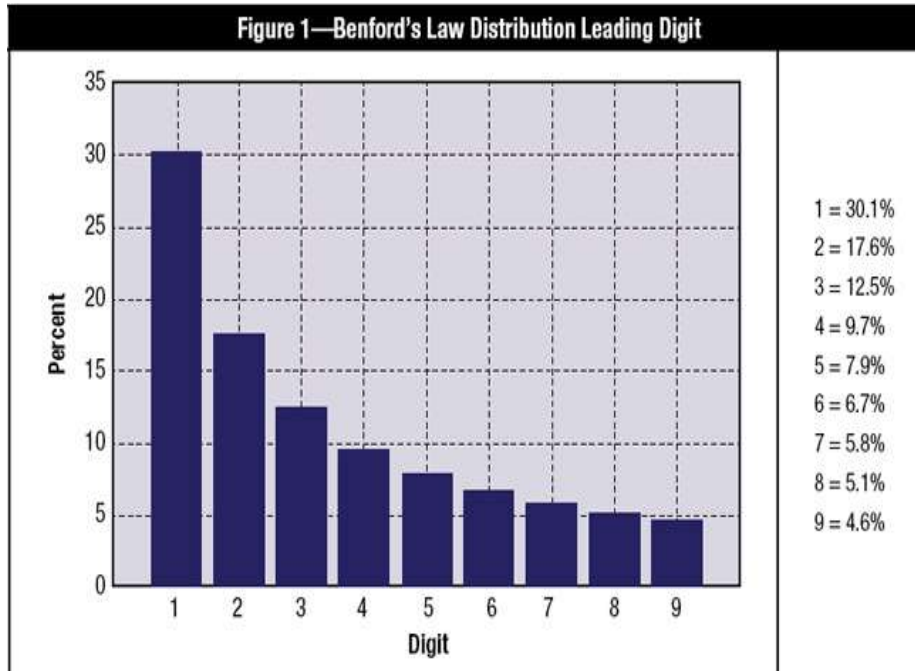
BENFORD LAW THEORY AND RESEARCH METHODS

BENFORD LAW THEORY
Benford's law what exactly

Usually called the law digits first or second digits law or popular term Benford's Law, this law was first introduced in 1938 by a physicist from abroad under the name of Frank Benford. Frank did step observation by observing a set of natural numbers that exist in a report, he found a surprising pattern arising in some frequencies that occur in the numbers one through nine as the first number that appears in the report in the list. If we see no basis, legal method gives an explanation that numbered lists can be made as a basis for providing real-life examples, if we take a sample of the financial statements. A financial statement data that consists of multiple sets of journals of cash disbursements and cash receipts journal, or their contract payments company in one out books, or expenses in the income statement of the company. Benford used as one of the leading figures that nearly 33 percent emerged from the analysis found.

In other respects, there quantiti in larger quantities occurs as the leading digit frequency slightly experienced reductions of up to nine first number is less than 5 percent of the analysis will be undertaken during the year. One of the professors from renowned universities in the United States, namely the University of California Berkeley School of Information, in 1970 named Hal Varian gave his opinion that the use of the law of Benford can be used in detecting the possibility of fraud in the list provides information financially and in social and economic information.

Since then, the law of Benford much in use and applied to large amounts of data to detect unusual patterns that often arise from the failure of a report that is produced or, worse, he said there had been a fraud in terms of frame numbers. In connection with the work they are doing the financial auditor or IT auditor often use scientific tools and methods that enable and help them to detect a fraud case. However, the use of Benford's law may be some form of scary at first, the financial auditors and IT auditors do not need to have a high degree or data analysis tools are costly to use Benford's law. Because as part of steps to conduct investigations regarding fraud that may occur can be able to use Microsoft Excel so that the work steps are implemented to be effective and efficient.

Inside using Benford's Law, a physicist named Frank Benford use the theory in 1938. Where the Minister is of the mathematical theory concerning the leading digits. If it can be interpreted as a specific set of data, a leading figure (s) are the result of a distribution in a uniform way by a certain time. In another case a few people with their befikir appear number 1 will appear as the first digit 11 percent of the time, or in other words one of the nine numbers that might arise from the estimation process. After doing the study, the model actually gave rise to nearly 30 percent of the time doing data in the analysis, as we can see on [see Figure 1]. The emergence of nine digits, on the other hand is considered the first digit is less than 5 percent of the time in doing it analyzes data. This theory step is the use of the first digit, second digit, the first two digits, the last digit as well as the combination of other models of the digits of the numbers in because this theory is basically using the logarithm systems digits.

Figure 1—Benford's Law Distribution Leading Digit

1 = 30.1%
2 = 17.6%
3 = 12.5%
4 = 9.7%
5 = 7.9%
6 = 6.7%
7 = 5.8%
8 = 5.1%
9 = 4.6%

As explained by the author in [Figure 1] above, Law Benford may or may apply for use in a data set that may arise exponentially as an example of the data is double, then doubled again in the span of time in doing it analyzes the data, but it it would apply to some of the many cases in which the pattern of exponential growth that occurs in the data is not clear. Benford's Law is one method that can be applied to multiple data sets into categories of data is pretty much the number of samples or in other words in terms of population, the distribution numbers. However, this method showed the theory or some steps for the implementation of the various data sets except when not all of the data set to follow this theory.

In using Benford's Law can be accepted as evidence in a criminal case in the United States at the federal level in one state and local. In the incident substantiates the potential usefulness of using Benford's Law is highly guaranteed. In some uses, legal benfords is quite easy and can determine the fit model. Sebgai example, when we will carry out the financial audit or audit IT, one for detecting fraud in the expenditure cycle, financial auditors had been able to use the Law of Benford's menjealskan of fraud occurring, but by measuring the actual occurrence of a number of leading through the steps of a translation the probability of the figures. In some cases the good which included the threshold

and the upper or lower limit banking policy, certainly it would refer to loans at or above the nominal $ 50,000, for example, for the provision of a credit committee. By using the upper limit and lower limit can be considered as the threshold of an agreement that gives the loan officer has the potential to find fraudulent loans that have been given earlier. If the process of loan fraud has been implemented then, testing Benford's Law can be in a better perspective when leading digit or first two digits of the leading has the potential to uncover fraud. If we look at [Figure 2] shows how to test Benford's Law very easily uncover a number of the first digit numbers to the numbers last digits as a result in utnjukkan in [Figure 2] in certain scenarios. The presence of lines in [Figure 2] is an actual incident. Seen how the possibility of manipulation starts with 5 (US $ 50,000 loan) may be switched to just below the cutoff or indicate that the suspect could spend a lot of $ 49,999.99 loan fictiously embezzling funds.

Figure 2—Benford's Law Test/Comparison
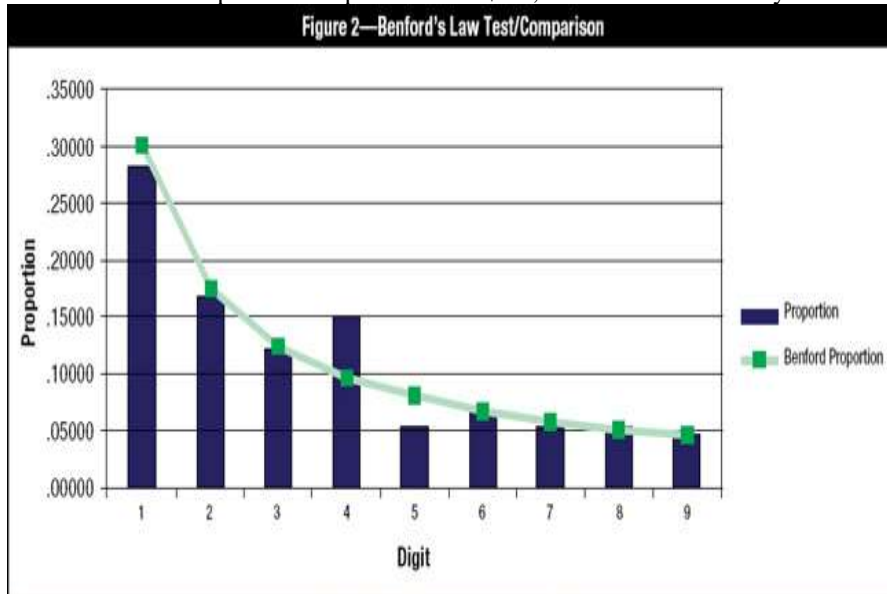
In other respects the cut-off value of US $ 2,500 may be used for purchases in which the purchase order is required for any purchase at or above this price point. Thus, the test method of this Benford of the model one by double digits in the face can reveal the occurrence of a process may uncover anomalies or manipulation or fraud involving this cutoff. It is important to note that as the cutoff has two locks on the first digit and the second digit. Analysis steps above can berlakuka if an auditor would make the analysis in terms of: a credit card transaction, Purchase Order, Data Loans, customer balances, journal entries, stock price, transaction accounts payable, inventory price, return customers. In other respects apabilan form Sample data may not be suitable for Benford's Law include: Airline passengers per flight number, phone number, data set with 500 or fewer transactions, data generated by a formula, data are limited by the maximum or minimum.

An auditor in the finance and accounting, using technology usually assisted audit to determine whether the financial statements to be audited are elements of a fraud. For it can be used a test model Benford law one digit or two-digit. To test the double digits in the Benford law will usually give more detailed results, after a test of one digit in doing. Usually after test one digit and two git done an auditor would need to determine whether the results have been displayed feasible and can provide evidence or information relating to the purpose of the audit is being carried on. A financial auditor and accounting will definitely want to get independent information about why something value numbers 1 through 9 experienced a significant jump.

In some theory of numbers is always applied digital analysis model, namely, a logarithmic study what happens to the numbers by position in a number that has been set. This problem is considered something quite significant, because it can be noted as one of the information will be provided using the assumption of Benford's Law. Usually the numbers on large data sets generated randomly according to the theory of Benford's law. For example we will conduct an audit of promotional costs, the cost of these promotions will connect with the minimum and maximum possible value is generated in a data set. The author assumes that the data set is not completely random generated must be specified limit and the average figure that may inhabit the upper limit and lower limit. Usually the law Benford methods are now widely applied in some countries, assuming the amount of data that will be done pretty much the audit process and large. This method will be applied also in the number of corporations with thousands or

even millions of files, and also this method can be used in the audit hundreds of transactions consisting of the customer invoice, the buyer and payment. According to the author of an auditor in the finance and accounting bit should analyze samples that will be made in the analyzer, so it must use Benford's Law.

RESEARCH METHOD
Data and Time Research
The author uses the data in this study began the year ended 2006-2010 for 25 companies listed on the Indonesian stock exchange. To undertake this work on time in January 2016. Here's a list of companies that the intent by the author:

Table 1 : Company list

No	Company List
1	AKR Corporindo Tbk
2	Argha Karya Prima Industry Tbk
3	Betonjaya Manunggal Tbk
4	Bukit Asam (Persero) Tbk
5	Colorpak Indonesia Tbk
6	Darya-Varia Laboratoria Tbk
7	Dayaindo Resources International
8	Ekadharma International
9	Enseval Putera Megatrading Tbk PT
10	Fajar Surya Wisesa Tbk
11	Gunawan Dianjaya Steel Tbk
12	Indo Kordsa Tbk
13	Jaya Pari Steel Tbk
14	Kimia Farma (Persero) Tbk
15	Pelat Timah Nusantara Tbk
16	Prima Alloy Steel Universal Tbk
17	Pyridam Farma Tbk
18	Schering Plough Indonesia Tbk
19	Sumi Indo Kabel Tbk
20	Suparma Tbk
21	Taisho Pharmaceutical Indonesia Tbk
22	Timah (Persero) Tbk
23	Tira Austenite Tbk
24	Tirta Mahakam Resources Tbk
25	Trias Sentosa Tbk

Sources : www.BEI.GO.ID

Technique Analisys Data
Data in the form of financial statements that have been obtained by the authors, in the analysis if the authors using Benford law. From the analysis that has been done and the obtained results on the results of research and discussion in the form of precision score results between the model number is applied, using Benford law and figure score in the can by the author.

RESULTS AND DISCUSSION

In doing this Benford's Law analysis the authors use the model of the first-digit law which in phenomenological measure of the frequency distribution of first digits are much in use, but not all of them are real numbers in a set of numerical data. In the rule states that in many collections of natural numbering numbers of small numbers occur disproportionately often as significant leading accordance with the desired digit. If we take a sample set of data that complies with the law number 1 will appear as the most significant digits of approximately 30% from time to time according to the proportion of this law. Whereas in the case of other numbers greater proportion say will appear in the rare position as number 8 or 9, in certain will appear less than 5% of each time. For that we can see in [Table 2] below, how the law Benford also concerning the expected distribution beyond the first digit, which is closer to a uniform distribution. Proportions years in use for sample financial statements from 2006 to 2010. Figures scores can be seen in [Table 2] represented by the proportion that has been generated in the form of legal accuracy ersentase Benford above method is applied on a sample of 25 companies under this:

Table 2 : Result score benford law after analisys

No	Comany Name	Score Conformity Benford For Year Ended				
		2006	**2007**	**2008**	**2009**	**2010**
1	AKR Corporindo Tbk	66,13	68,55	65,58	65,00	67,75
2	Argha Karya Prima Industry Tbk	67,15	65,25	63,46	69,33	63,65
3	Betonjaya Manunggal Tbk	62,55	63,78	70,24	68,00	62,91
4	Bukit Asam (Persero) Tbk	66,75	76,27	69,01	66,87	64,43
5	Colorpak Indonesia Tbk	69,27	62,36	64,06	62,66	65,36
6	Darya-Varia Laboratoria Tbk	60,05	56,62	63,74	64,10	64,13
7	Dayaindo Resources International	59,53	62,29	61,33	61,14	68,19
8	Ekadharma International	62,98	68,99	63,56	58,54	63,19
9	Enseval Putera Megatrading Tbk PT	64,03	61,99	64,53	68,13	66,92
10	Fajar Surya Wisesa Tbk	63,03	64,97	57,84	69,57	66,64
11	Gunawan Dianjaya Steel Tbk	62,60	58,89	67,59	61,23	61,40
12	Indo Kordsa Tbk	70,36	66,30	60,93	65,65	65,57
13	Jaya Pari Steel Tbk	62,05	60,90	66,09	67,83	63,55
14	Kimia Farma (Persero) Tbk	63,30	60,86	56,03	61,21	63,16
15	Pelat Timah Nusantara Tbk	61,80	70,42	62,54	64,75	63,78
16	Prima Alloy Steel Universal Tbk	61,61	63,53	62,00	66,97	63,63
17	Pyridam Farma Tbk	67,46	62,99	62,02	66,50	60,19
18	Schering Plough Indonesia Tbk	62,93	60,82	63,27	60,77	63,23
19	Sumi Indo Kabel Tbk	63,05	65,05	65,51	60,76	64,42
20	Suparma Tbk	62,63	61,85	62,57	62,68	62,10
21	Taisho Pharmaceutical Indonesia Tbk	70,07	60,57	66,74	66,71	63,51
22	Timah (Persero) Tbk	70,75	60,18	64,48	65,59	64,38
23	Tira Austenite Tbk	63,01	66,17	68,17	57,15	59,36
24	Tirta Mahakam Resources Tbk	66,62	64,49	59,69	69,38	64,71
25	Trias Sentosa Tbk	63,22	68,32	64,30	68,67	63,76
		1.612,94	1.602,40	1.595,26	1.619,19	1.599,93

Low Score	59,53	56,62	56,03	57,15	59,36
High Score	70,75	76,27	70,24	69,57	68,19
Average Score	64,52	64,10	63,81	64,77	64,00

Sources : Proceed by author

If we see the value of Quantity PH (d) is proportional to the space between d and d + 1 on a logarithmic scale in each figure. On a scale of distribution expected if the value of the logarithm of the number uniformly and randomly distributed seen in [Table 2]. If we look at the range of numbers scores are generated for each company and for each year nearly equal the total nominal value of 60% -70% range, accuracy scores were produced by the method of analysis Benford law and author. If the number of x, constrained to lie between 1 and 10, starting with the digit 1 if $1 \le x < 2$, and starting with the digit 9 if $9 \le x < 10$. Therefore, x begins with the digit 1 if the log $1 \le \log x < \log 2$, or starting with a 9 if the log $9 \le \log x < \log$ interval 10. [log 1, log 2] is much wider than the interval [log 9, log 10] (respectively 0.30 and 0.05); Therefore, if the log x uniformly and randomly distributed, much more likely to fall into the interval wider than the narrow interval, which is more likely to start with one rather than with 9. probability proportional to the width of the interval, and this gives equation on. For more details regarding the above discussion it is assumed x is between 1 and 10, but the result is the same no matter how many digits x had before the decimal point in the form [Figure 1] the bar chart below:

Figure 1 : Table percetage benford law
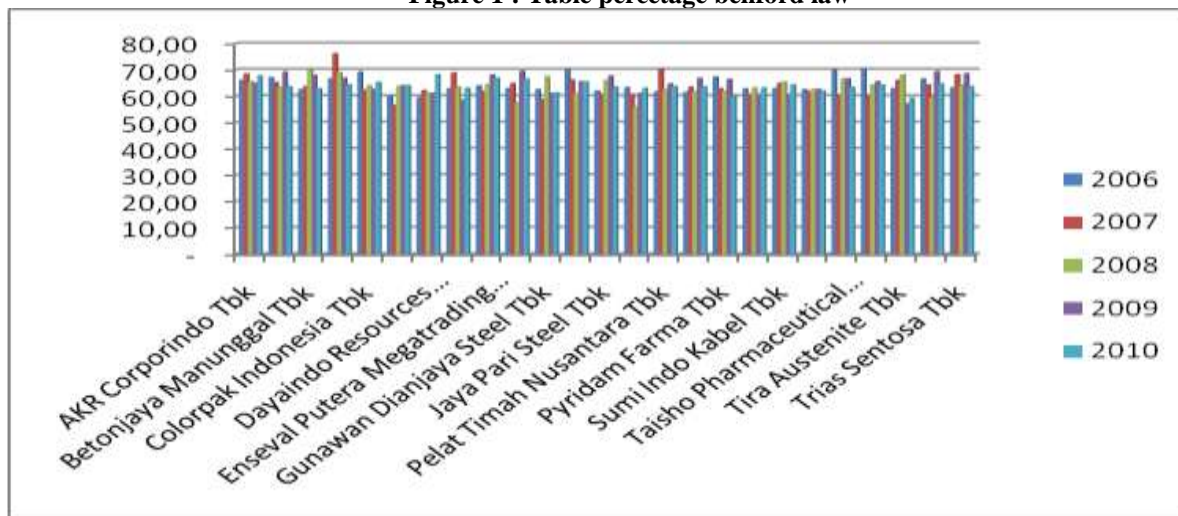
Sources : Proceed by author

In accordance with the rules of Benford's Law states that the fractional part of the logarithm data is distributed nearly uniformly percentage of 60% -70% in the years from 2006 to 2010. So can we be sure that the emergence of a tendency to apply the most accurate data is distributed evenly across many companies are made in the sample by the author. As a consequence the projected figure scores Benford law with the processed authors, there is a similarity in the range of 60% -70% likelihood of fraud at the level of the financial statements in meticulously by the author.

CONCLUSION

Methods of data analysis using Benford's Law can identify the probability of unlikely or extremely unlikely at the level of frequency numbers in some data sets in have. The purpose of probability is based on a mathematical logarithm of the number in a random number in the data set very much. The users are not aware of the methods of Benford's law can be and or deliberately manipulate numbers that vulnerability to be knew by the application of

Benford's Law. The auditors in the financial statements and the auditor IT auditors can also apply Benford's Law in the tests of controls and tests related to other IT from the data set. Note that, IT auditors need to ensure that the constraints or mathematical assumptions of the theory that is compatible with the data set to be tested it.

ACKNOWLEDGEMENTS

REFERENCES

[1] For an article on using Excel formulas and commands to perform Benford's Law, see: Simkin, Mark G.; "Using Spreadsheets and Benford's Law to Test Accounting Data," *ISACA Journal*, Volume 1, 2010. Sometimes the command is referred to as "digital analysis."
[2] Actually, Simon Newcomb was the first to posit the leading digits theory in 1881.
[3] Mark J. Nigrini, "I've Got Your Number," *Journal of Accountancy*, May 1999
[4] For more on Benford's Law, especially constraints, see: Hasan, Bassam; "Assessing Data Authenticity with Benford's Law,"*Information System Control Journal*, 2002, volume 6.
[5] *Op cit*, Simkin
   Additional website :
[6] https://iaonline.theiia.org/putting-benfords-law-to-work