Fraud Detection in healthcare organization: A Bibliometric Analysis Approach

Yustin Nur Faizah[1], Siti Musyarofah[2], Alexander Anggono[3]
[1]faizah.yustin@gmail.com, [2]sitimusyarofah@trunojoyo.ac.id,
[3]alexander.anggono@trunojoyo.ac.id
[1,2,3]Universitas Trunojoyo Madura

Abstract: The purpose of this research is to provide research possibilities for research in the next season. This study uses bibliometrics. Sample journal or article after selection process with purposive sampling it's 51 journals or articles. The source data comes from journals and articles published in Science Direct, Emerald Insight and Google Scholar. The result of this research is that Google Scholar is the source of the most popular journals or articles. The most frequent research where qualitative research. 2019 was the year with the most journals or articles. IEEE became a publication in health care fraud detection publications. Health insurance became a fraud into health fraud as much as 41%. healthcare fraud detection is analysed using big data analysis. It's possible that further research could apply some of the new batches sorted out for health care fraud data types.

Keywords: Fraud Detection, Healthcare Fraud, Healthcare Insurance.

Introduction

Fraud Healthcare can be defined as an act to defraud a health care program or to obtain counterfeit representation money or other property owned by a healthcare benefit program. This type of fraud involves fraud or false statements and negatively impacts individuals, entities, or other parties (ACFE, 2007). According to the ACFE Report To the Nations (2020),fraud occurred in 145 health organizations with losses of up to $200,000. Some cases are Billing (33%), Cash Larceny (10%), Check and payment tampering (14%), Corruption (40%), Reimbursement (22%), Financial Report Fraud (14%), Cashless (24%), Payroll (15%), Register Disbursement (6%), Skimming (10%).

In a U.S. study as many as 30% of respondents reported that they had intentionally allowed others (family/friends) to use their personal information to obtain medical services including care, health care products or pharmaceuticals. Some of the most commonly used Alibi are because many people or families do not have insurance, and cannot afford to pay for health care or in emergencies such as accidents. (Daramola et al., 2019).

Fraud is identified and occurs in health care organizations and it becomes a major challenge in the global world. Medical identity theft is one of the fastest growing crimes stemming from patient identity theft, acknowledging the tremendous burden on health care organizations and health insurance programs in developed countries. This is supported by several reported cases, and some evidence of medical fraud variants can be accessed in the Health Insurance Scheme. (Fursov et al., 2019; Hancock & Khoshgoftaar, 2020; Saldamli et al., 2020).

Several healthcare frauds have occurred in several countries including Indonesia. Cheating in Healthcare among the coding errors on this issue as many as 528,285 cases or (49.77%) / in 2016. Other cheating is Service unbuilding or Fragmentation As much as 265,572 or (25.02%)/ year. Other cheating is Phantom Billing as much as 6,105 or (0.66%)/year BPJS Kesehatan filed a patient claim with NIK (Population Master Number) of different patients. BPJS Kesehatan deliberately

made in order to make such claims so as to get more payments (BPJS Kesehatan, 2016).

Research from Nurfarida (2014) shows that health care problems received by participants, other problems that are also of concern is related to the claims of participants by health care providers who provide health services for participants. Claims submitted by Health Service Providers (PPK) to BPJS Kesehatan encountered various problems, such as claims file problems, the number of follow-up claims, incompatibility of rates submitted by hospitals with INA CBGs rates or paid by BPJS Kesehatan for coding the diagnosis of diseases, or delays in payment of claims by BPJS Kesehatan (Nurfaridaa, 2014)

The purpose of this study provides an overview of the development of big data research in the field of finance and provides several research opportunities that can be followed up by subsequent researchers. This research is expected to at least be able to map which areas of science have been studied and can provide research opportunities for further research. The contribution of this research is to add literature on the development of detection research on healthcare fraud and provide an overview of future research opportunities.

Literature Review

Healthcare Fraud

According to the National Health Care Anti-Fraud Association (2017) Healthcare fraud has the behavior of different fraudsters changed and is very difficult to detect. This becomes a special topic yang should be on the look in various countries (Yang, 2003). According to the National Health Care Anti-Fraud Association (2017) There are various types of fraud that occur in the health industry. The following fraud can be classified based on which group or individual is involved in fraud as follows:

Fraud by Service Providers

- Service providers may charge medical services that are not actually performed to patients
- The service provider can charge for each stage of the medical procedure as if it were a separate treatment (Unbundling)
- Service providers can charge for expensive medical services rather than medical care that is actually done to patients
- Service provider can perform unnecessary medical services, this is to do an insurance Claim
- Service provider may misrepresent health care that is not covered as medically covered care to patients for the purposes of claiming insurance
- To validate medical procedures that are not actually necessary by means of the service provider can falsify the patient's diagnosis and/or treatment history for the purposes of Claim Insurance

According to a study by Thornton (2015) some of the most common types of fraud are:

- **Payment for treatments that are more expensive than** necessary (**upcoding)).** This includes hyperbolic diagnosis to increase the cost of claims.
- **Forgery** of diagnosis: basically, checking several diagnoses, to collect procedures that are not medically necessary.
- **Refunds for services that have not been** done: this type of fraud can be achieved by falsifying claims using real patient information, making false claims from the beginning or by completing actual claims with procedures that never occur.

- **Incorrect statements about unnecessary treatment**: this is a request for unnecessary procedures, for example scanning the brain with magnetic resonance, as part of a medically necessary procedure for heart surgery
- **Payment procedure**: this is an indication of the most courageous fraud carried out in health insurance, where medical professionals carry out treatment of healthy patients exclusively for the purpose of filing a claim.

Fraud and misuse of medical claims are a major concern for health insurance companies. The outlier-based predictor (Dallas Thornton, 2015) to succeed as a fraud classification technology, though he explores an important role as a technology supporting decisions for the allocation of forensic audit resources.

C. Phua (2005) presents a comprehensive literature review of fraud detection issues, which includes 51 studies incorporating data mining approaches to fraud detection issues. Among these 51 studies, only 14 were related to fraud detection (C. Phua, 2005) context of insurance, and only five were in the health insurance domain. The same study states that researchers typically complain about the lack of data to analyze and the lack of well-examined methods and techniques in published literature. However, only seven of the 51 studies examined have actually been conducted (only two of them are in the insurance business and none are in health insurance).

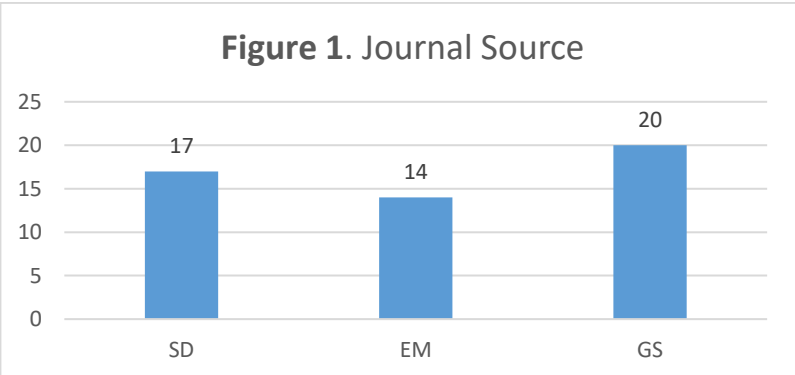
Methods

This research uses bibliometric approach based on science mapping analysis and performance indicators used with the aim of uncovering the status of healthcare fraud detection research in healthcare organizational, this research will map from (1) type of research conducted per year, (3) publication,(4) Publication,, (5) Type fraud, (6) Type of Detection used.

Data sources come from journals and articles published in Science Direct, Emerald Insight and Google Scholar. In Science Direct purposive sampling is done because only journals that have been officially published are not journals and articles that belong to the category article in press, accepted manuscript and journal pre-proof. Search engines used are "fraud detection in Health Assurance", "fraud detection in healthcare", "fraud detection in health claims", and "detection healthcare fraud". The year range used is from 2015-2020.

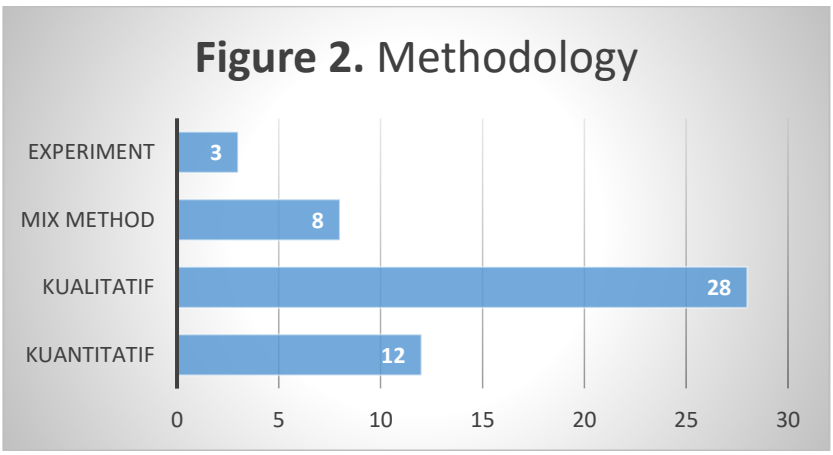
Findings

Sample journals or articles after passing the selection process with purposive sampling is as many as 51 journals or articles. Based on figure 1, the number of journals or articles from Science Direct (SD) as many as 17 journals or articles, Emerald Insight (E) 14 journals or articles and Google Scholar (GS) 20 journals or articles.



Source : Processed by researchers, 2020

The mapping results are sorted from (1) types of research, (2) the number of studies conducted per year, (3) publications, (4) types of fraud, (5) detection of healthcare fraud.

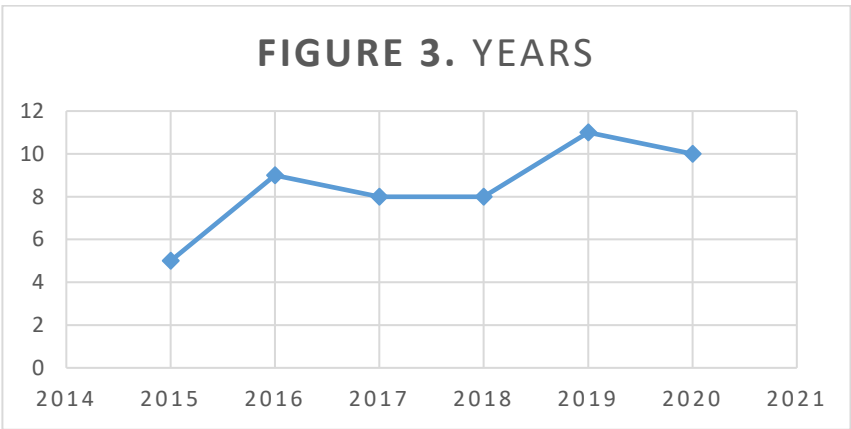


Source : Processed by researchers, 2020

Based on Figure 2, it can be seen that the most frequent type of research is qualitative research with the number of 28. While the type of quantitative research amounted to 12, Mix method with the number of 8 and experiment amounted to 3.

Qualitative research is a frequent research, because some research focuses on literature review related to fraud detection in healthcare organizational. In addition, there is still a lack of research on disclosure of causes related to fraud in healthcare organizational so that researchers have some limitations to conduct research empirically.

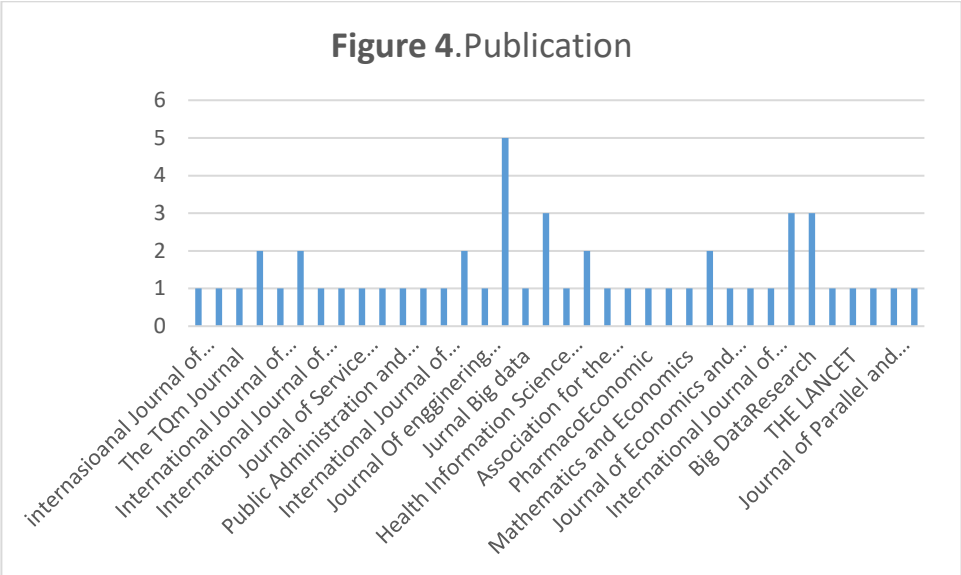
This release can be multiplied by conducting research experiments. From the data obtained that the experiment was conducted only once from 2013-2020. If fraud detection research on healthcare fraud is done by experiment then the data will cover the limitations that exist.



Source : Processed by researchers, 2020

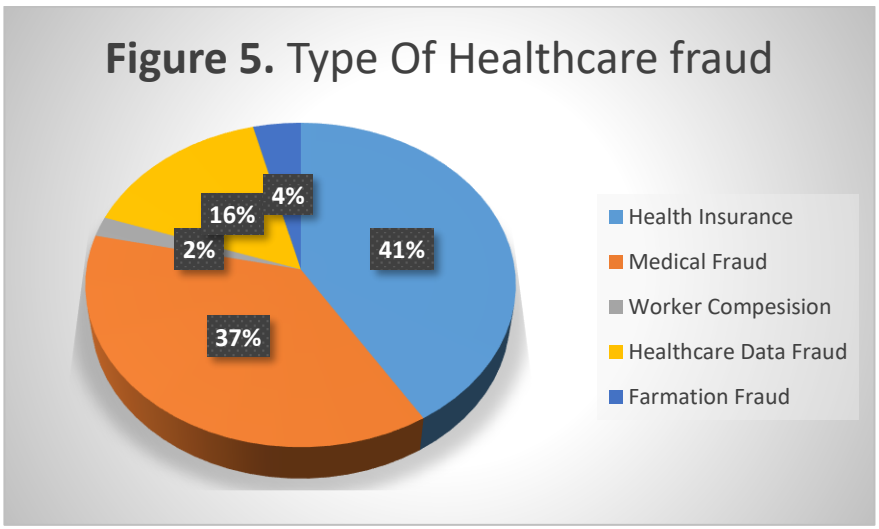
Based on Figure 3, it can be seen sequentially from 2015-2020. In 2015 there were 5 studies, in 2016 there were 9 studies, in 2017 there were 8 studies, in 2018 there were 8 studies, in 2019 there were 11 studies, and in 2020 there were 10 studies.

The highest number of studies was in 2019. The development of research starting from 2015-2019 has increased due to the growing fraud related to healthcare fraud (Daramola et al., 2019; García, 2019; Thornton, 2015; van Capelleveen et al., 2016). But in 2019-2020 had decrease due to reduced research related to disclosure of healthcare fraud.



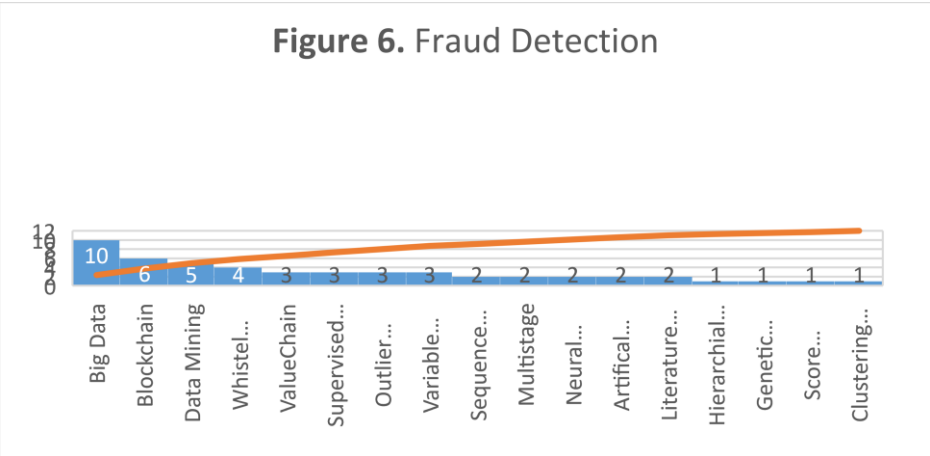
Source : Processed by researchers, 2020

Based on Figure 4, you can see which publications are publishing journals or articles. IEEE contributes the most journals or articles with 5 journals or articles. Procedia Computer Science (3), Big Data Research (3), Health Services and Outcomes Research Methodology (3), International Journal of Bank Marketing (2), Journal of Financial Crime (2), Journal of Econometrics (2), Journal of Computational Science (2), Decision Support Systems (2). By looking at the source of this publication proves that the journal used as a sample is a quality journal or article. In addition, it can provide reference references for future researchers.



Source : Processed by researchers, 2020

Based on Figure 5. Health assurance became the most fraud in healthcare fraud as much as 41%. Health assurance occurs because there are too many fictitious claims for health insurance premiums, there is upcoding in the practice of health insurance claims, and most cases of health insurance participants using their identity for others (Bauder et al., 2017; Daramola et al., 2019; Hancock & Khoshgoftaar, 2020; Sowah et al., 2019). According to the data above *worker compensation fraud* can be the next research opportunity because in various countries it is already included in the criminal law. Worker compensation fraud occurs in a very simple and very complex scheme that often requires a difficult and lengthy investigation. In addition, white-collar criminals (Doctors, and pharmacies) also play in worker compensation *fraud* by making false claims schemes or, too many prescribing drugs that are dangerous and addictive for patients (Santana et al., 2018).



Source : Processed by researchers, 2020

Based on Figure 6 in healthcare fraud detection analyzed using big data Analysis. Big data analyzes by data type, data source, fraud type, method and algorithm used. The results of the proposed study show that claims anomalies detected using this app allow health insurance funds to recover hidden cost overruns that cannot be easily detected using traditional methods. Potential benefits of big data analytics include detecting healthcare fraud more quickly and efficiently. In addition, big data analytics could make it possible to make billions of dollars a year in global health care expenditures (Cui et al., 2016; Duman & Sağiroğlu, 2017; Peng & You, 2016). Therefore, big data analytics in healthcare fraud should be investigated in more detail and opportunities for further research could apply some of the proposed new methods for different types of healthcare fraud data.

Conclusion

Based on the results of research that has been done by mapping and analysis of 51 journal or article used. Google Scholar is the source of the most journals or articles. The most frequent research is qualitative research. The year 2019 became the year that provided the most journals or articles. IEEE became the largest publication in the publication of detection healthcare fraud. Health assurance became the most fraud in healthcare fraud as much as 41%. in healthcare fraud detection analyzed using big data Analysis. Opportunities for further research could apply some new methods proposed for various types of healthcare fraud data

References

ACFE. (2007). *Fraud Examiners Manual (UK)*.

ACFE. (2020). *Report To The Nations*.

Bauder, R., Khoshgoftaar, T. M., & Seliya, N. (2017). A survey on the state of healthcare upcoding fraud analysis and detection. *Health Services and Outcomes Research Methodology*, *17*(1), 31–55. https://doi.org/10.1007/s10742-016-0154-8

BPJS Kesehatan. (2016). *BPJS Report*.

C. Phua. (2005). Comprehensive Survey of Data Mining- Based Fraud Detection Research in Technical Report. In *Monash University*.

Cui, H., Li, Q., Li, H., & Yan, Z. (2016). Healthcare fraud detection based on trustworthiness of doctors. *Proceedings - 15th IEEE International Conference on Trust, Security and Privacy in Computing and Communications, 10th IEEE International Conference on Big Data Science and Engineering and 14th IEEE International Symposium on Parallel and Distributed Processing with Applications, IEEE TrustCom/BigDataSE/ISPA 2016*, 74–81. https://doi.org/10.1109/TrustCom.2016.0048

Dallas Thornton. (2015). Outlierbased Health Insurance Fraud Detection for U.S. Medicaid Data. *International Journal on Enterprise Information Systems*.

Daramola, O. E., Abu, J. M., Daramola, L. O., & Akande, T. M. (2019). Medical Identity Fraud in Health Insurance Schemes : Creating Awareness in Nigeria. *Asian Journal of Case Reports in Medicine and Health*, *2*(1), 1–6.

Duman, E. A., & Sağiroğlu, Ş. (2017). Heath care Fraud detection methods and new approaches. *2nd International Conference on Computer Science and Engineering, UBMK 2017*, 839–844. https://doi.org/10.1109/UBMK.2017.8093544

Fursov, I., Zaytsev, A., Khasyanov, R., Spindler, M., & Burnaev, E. (2019). Sequence embeddings help to identify fraudulent cases in healthcare insurance. *ArXiv*, 1–28.

García, P. J. (2019). Corruption in global health: the open secret. *The Lancet*, *394*(10214), 2119–2124. https://doi.org/10.1016/S0140-6736(19)32527-9

Hancock, J., & Khoshgoftaar, T. M. (2020). Medicare Fraud Detection using CatBoost. *Proceedings - 2020 IEEE 21st International Conference on Information Reuse and Integration for Data Science, IRI 2020*, *11*(4), 97–103. https://doi.org/10.1109/IRI49571.2020.00022

National Health Care Anti-Fraud Association. (2017). *Health Care Fraud–A Serious and Costly Reality For All Americans*.

Nurfarida, I. (2014). Pengaruh Potensi Fraud Dalam Penerapan Sistem Jaminan Kesehatan Nasional Terhadap Mutu Layanan Di Rsj Dr. Radjiman Wediodiningrat Lawang, Malang. *Jurnal Kebijakan Kesehatan Indonesia Desember*, *03*(183), 183–191. https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/54086/IDL-54086.pdf?sequence=1

Peng, H., & You, M. (2016). The health care fraud detection using the pharmacopoeia spectrum tree and neural network analytic contribution Hierarchy process. *Proceedings - 15th IEEE International Conference on Trust, Security and Privacy in Computing and Communications, 10th IEEE International Conference on Big Data Science and Engineering and 14th IEEE International Symposium on Parallel and Distributed Processing with Applications, IEEE TrustCom/BigDataSE/ISPA 2016*, 2006–2011. https://doi.org/10.1109/TrustCom.2016.0306

Saldamli, G., Reddy, V., Bojja, K. S., Gururaja, M. K., Doddaveerappa, Y., & Tawalbeh, L. (2020). *Health Care Insurance Fraud Detection Using Blockchain*. 145–152. https://doi.org/10.1109/sds49854.2020.9143900

Santana, V. F. de, Appel, A. P., Moyano, L. G., Ito, M., & Pinhanez, C. S. (2018). Revealing Physicians Referrals from Health Insurance Claims Data. *Big Data Research*, *13*, 3–10. https://doi.org/10.1016/j.bdr.2018.03.002

Sowah, R. A., Kuuboore, M., Ofoli, A., Kwofie, S., Asiedu, L., Koumadi, K. M., & Apeadu, K. O. (2019). Decision Support System (DSS) for Fraud Detection in

Health Insurance Claims Using Genetic Support Vector Machines (GSVMs). *Journal of Engineering (United Kingdom)*, *2019*(January 2007). https://doi.org/10.1155/2019/1432597

Thornton, D. (2015). Categorizing and describing the types of fraud in healthcare. *Procedia Computer Science*, *713–720*.

van Capelleveen, G., Poel, M., Mueller, R. M., Thornton, D., & van Hillegersberg, J. (2016). Outlier detection in healthcare fraud: A case study in the Medicaid dental domain. *International Journal of Accounting Information Systems*, *21*, 18–31. https://doi.org/10.1016/j.accinf.2016.04.001

Yang, W. . (2003). No TitleA Process Pattern Mining Framework for the Detection of Health Care Fraud and Abuse. *National Sun Yat-Sen University*.