

## **BAB 5**

### **KESIMPULAN DAN SARAN**

#### **5.1. Kesimpulan**

Berdasarkan penelitian yang telah dilakukan, dapat ditarik kesimpulan sebagai berikut:

1. Perkembangan penelitian audit berbasis teknologi di era industri 4.0 akan diuraikan berdasarkan frekuensi penelitian, wilayah penelitian, frekuensi penggunaan metode pengumpulan data, dan frekuensi penggunaan metode analisis. Dari frekuensi penelitian, secara keseluruhan, penelitian terkait audit berbasis teknologi di era industri 4.0 masih sedikit. Diasumsikan, sedikitnya penelitian terkait audit berbasis teknologi di era industri 4.0 dikarenakan karena masih sedikitnya pengaruh perubahan teknologi industri 4.0 terhadap audit berbasis teknologi secara global. Dari wilayah penelitian, penelitian audit berbasis teknologi di era industri 4.0 lebih banyak dilakukan di negara maju secara signifikan. Dari penggunaan metode pengumpulan data, penelitian audit berbasis teknologi di era industri 4.0 lebih banyak menggunakan metode pengumpulan data secara sekunder. Dan dari penggunaan metode analisis, penelitian audit berbasis teknologi di era industri 4.0 lebih banyak menggunakan metode analisis kualitatif.
2. Audit berbasis teknologi di era industri 4.0 dikelompokkan menjadi lima topik besar yaitu:
  - a. *Big data* (dengan kata kunci pencarian *used of “big data” in “audit”*)
  - b. *Cloud* (dengan kata kunci pencarian *used of “cloud” in “audit”*)
  - c. *Artificial Intelligence* (dengan kata kunci pencarian *used of artificial intelligence in audit*)
  - d. *Internet of Things* (dengan kata kunci pencarian *used of “internet of things” in “audit”*)
  - e. *Blockchain* (dengan kata kunci pencarian *used of “blockchain” in “audit”*)Pada *big data*, teknologi yang sudah diteliti terkait audit yaitu *big data* dan *big data analytics*. Pada *cloud*, teknologi yang sudah diteliti terkait audit yaitu *cloud-based supply chain management (C-SCM)*, *Cloud auditing providers*, *privacy and data security*, dan *cloud-enabled process integration*. Pada *artificial*

*intelligence*, teknologi yang sudah diteliti terkait audit yaitu *intelligent transaction*, *automated textual analysis*, *artificial intelligence accounting*, dan *artificial intelligence training and development practice*. Pada *internet of things (IoT)*, teknologi yang sudah diteliti terkait audit yaitu *internet of things (IoT)* terkait manajemen aset. Pada *blockchain*, teknologi yang sudah diteliti terkait audit yaitu pada *supply chain practice and policies*, *operations and supply chain management (OSCM)*, *international trade*, *accounting system*, *commercial real estate transaction*, dan *cybersecurity*.

## **5.2. Saran**

Berikut ini merupakan beberapa saran yang dapat diajukan kepada beberapa pihak seperti (1) peneliti selanjutnya, (2) auditor, (3) akademisi, dan (4) perusahaan.

### **5.2.1. Saran Bagi Peneliti Selanjutnya**

Penelitian ini memiliki keterbatasan dan memerlukan pengembangan lebih lanjut, sehingga penelitian ini mengajukan saran bagi peneliti, yaitu:

1. Melakukan penelitian yang lebih mendalam pada wilayah geografis yang lebih spesifik.
2. Melakukan penelitian yang lebih mendalam pada masing-masing variabel yang sudah dijabarkan dalam penelitian ini: dan/atau
3. Peneliti dapat melakukan metode yang serupa dengan penelitian ini, namun menggunakan database yang berbeda (selain Emerald).

### **5.2.2. Saran Bagi Auditor**

Auditor perlu mempunyai wawasan mengenai pengaruh perubahan teknologi pada audit di era industri 4.0. Ini dikarenakan dengan hadirnya teknologi industri 4.0, perubahan tersebut akan mengubah lingkungan bisnis, termasuk lingkungan audit. Dengan auditor mampu menghadapi tantangan audit di era industri 4.0, auditor dapat memberikan dampak positif bagi kinerja manajemen perusahaan. Untuk itu, penelitian ini mengajukan saran bagi auditor, yaitu:

1. Meningkatkan pengetahuan mengenai audit berbasis teknologi di era revolusi industri 4.0.

2. Meningkatkan kemampuan analisis, baik secara teknik maupun fundamental terkait audit berbasis teknologi di era revolusi industri 4.0.

### **5.2.3. Saran Bagi Akademisi**

Akademisi sebaiknya mencoba menelusuri perkembangan audit berbasis teknologi di era industri 4.0. hal tersebut perlu dilakukan agar mahasiswa akuntansi di era industri 4.0 mampu menghadapi tantangan audit di era industri 4.0. untuk itu, penelitian ini mengajukan saran bagi akademisi, yaitu:

1. Meningkatkan pengetahuan mengenai audit berbasis teknologi di era industri 4.0.
2. Mengintegrasikan pengetahuan mengenai audit berbasis teknologi di era revolusi industri 4.0 dalam kurikulum pembelajaran.

### **5.2.4. Saran Bagi Perusahaan**

Perusahaan sebaiknya mempertimbangkan perkembangan audit berbasis teknologi di era industri 4.0. Ini karena masuknya teknologi industri 4.0 dapat mengubah lingkungan bisnis, informasi yang semakin kompleks, dan kebutuhan akan informasi terkait audit baik itu internal maupun eksternal yang terus berubah.

## DAFTAR PUSTAKA

- Al-Khouri, A. M. (2012). *Data Ownership—Who Owns my data?. International Journal of Management and Information Technology*. The British Institute of Technology and E-Commerce, London, United Kingdom.
- Alles, M. G. (2015). Drivers of the Use and Facilitators and Obstacles of the Evolution of Big Data by the Audit Profession. *Accounting Horizons*, 29(2), 439–449. <https://doi.org/10.2308/acch-51067>. Diakses 20 Oktober 2019
- Amadio William J. (2019). Data Analytics and the Cash Collections Process: An Adaptable Case Employing Excel and Tableau. *Advances in Accounting Education: Teaching and Curriculum Innovations*, 22, 45–70. <https://doi.org/10.1108/S1085-462220190000022003>. Diakses 10 November 2019
- Ani Uchenna Daniel. (2019). Human factor security: Evaluating the cybersecurity capacity of the industrial workforce. *Journal of Systems and Information Technology*, 21(1), 2–35. <https://doi.org/10.1108/JSIT-02-2018-0028>. Diakses 21 Oktober 2019.
- Encyclopedia Britannica (2019). Artificial Intelligence Definition, Examples, and Applications. <https://www.britannica.com/technology/artificial-intelligence>. Diakses 31 Oktober 2019
- Bambara, J. J., & Allen, P. R. (2018). *Blockchain: A Practical Guide To Developing Business, Law, And Technology Solution*. United States of America: McGraw-Hill Education.
- Bodnar, G. H., & Hopwood, W. S. (2013). *Accounting Information Systems: Pearson New International Edition*. New Jersey: Pearson Education, Inc.
- Bonsón Enrique. (2019). Blockchain and its implications for accounting and auditing. *Meditari Accountancy Research*, 27(5), 725–740. <https://doi.org/10.1108/MEDAR-11-2018-0406>. Diakses 21 Oktober.
- Boskou, G., Kirkos, E., & Spathis, C. (2019). *Classifying internal audit quality using textual analysis: The case of auditor selection*. Alexander Technological Educational Institute of Thessaloniki, Thessaloniki, Greece.
- Boston Consulting Group. (2019). The Nine Technologies Transforming Industrial <https://www.bcg.com/capabilities/operations/embracing-industry-4.0-rediscovering-growth.aspx>. Diakses 7 Oktober 2019
- Brous Paul. (2019). Internet of Things adoption for reconfiguring decision-making processes in asset management. *Business Process Management Journal*, 25(3), 495–511. <https://doi.org/10.1108/BPMJ-11-2017-0328> Diakses 21 Oktober 2019
- Cărăușu, D. (2015). *Monitor And Control In Companies: An Agency Theory Approach. Joudnal of Public Administration, Finance and Law*. Alexandru Ioan Cuza University of Iasi, Iasi, Romania.

- Chang Shuchih Ernest. (2019). Exploring blockchain technology in international trade. *Industrial Management & Data Systems*, 119(8), 1712–1733. <https://doi.org/10.1108/IMDS-12-2018-0568>. Diakses 21 Oktober 2019
- Cole Rosanna. (2019). Blockchain technology: Implications for operations and supply chain management. *Supply Chain Management: An International Journal*, 24(4), 469–483. <https://doi.org/10.1108/SCM-09-2018-0309>. Diakses 21 Oktober 2019.
- Dagilienė Lina. (2019a). Motivation to use big data and big data analytics in external auditing. *Managerial Auditing Journal*, 34(7), 750–782. <https://doi.org/10.1108/MAJ-01-2018-1773>. Diakses 24 Agustus 2019
- Dagilienė Lina. (2019b). Motivation to use big data and big data analytics in external auditing. *Managerial Auditing Journal*, 34(7), 750–782. <https://doi.org/10.1108/MAJ-01-2018-1773>. Diakses 12 September 2019
- Dai, J., & Vasarhelyi, M. (2016a). Imagineering Audit 4.0. *Journal of Emerging Technologies in Accounting*, 13, 1–15. <https://doi.org/10.2308/jeta-10494>. Diakses 3 Oktober 2019
- Dietrich, D., Heller, B., & Yang, B. (2015). *Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data*. 10475 Crosspoint Boulevard, Indianapolis: John Wiley & Sons, Inc.
- Dopico, J. R. R., Calle, J. D. de la, & Sierra, A. P. (2009). *Encyclopedia of Artificial Intelligence*. New York, United States of America: Information Science Reference.
- Ducas, E., & Wilner, A. (2017). *The Security and Financial Implication of Blockchain Technologies: Regulating Emerging Technologies in Canada*. *International Journal*, 74(2), 538-562. Carleton University, Canada.
- Eisenhardt, K. (1989). *Agency Theory: An Assessment and Review*. *The Academy of Management Review* 14(1) 57-74. Standford University, California.
- Erboz, G. (2017). *How To Define Industry 4.0: Main Pillars Of Industry 4.0*. Szent Istvan University, Gödöllő, Hungary.
- Franklin, M., Graybeal, P., & Cooper, D. (2019). *Principles of Accounting, Volume 1: Financial Accounting*. Houston, Texas: OpenStax, Rice University.
- Franks, B. (2012). *Taming The Big Data Tidal Wave: Finding Opportunities in Huge Data Streams With Advanced Analytics*. United States of America: John Wiley & Sons, Inc.
- Giannakis Mihalīs. (2019). A cloud-based supply chain management system: Effects on supply chain responsiveness. *Journal of Enterprise Information Management*, 32(4), 585–607. <https://doi.org/10.1108/JEIM-05-2018-0106>. Diakses 19 Desember 2019
- Gilchrist, A. (2016). *Industry 4.0: The Industrial Internet of Thighs*. Thailand: Apress. Bangken, Nonthaburi, Thailand.
- Green Steve. (2018a). Big Data, digital demand and decision-making (Garcia Luis, Penerj.). *International Journal of Accounting & Information Management*,

- 26(4), 541–555. <https://doi.org/10.1108/IJAIM-02-2017-0019>. Diakses 24 Agustus 2019
- Green Steve. (2018b). Big Data, digital demand and decision-making (Garcia Luis, Penerj.). *International Journal of Accounting & Information Management*, 26(4), 541–555. <https://doi.org/10.1108/IJAIM-02-2017-0019>. Diakses 12 September 2019
- Hofmann, E., & Rüsçh, M. (2017). *Industry 4.0 and the current status as well as future prospects on logistics*. *Computers in Industry* 89, 23-34. University of St.Gallen, St. Gallen, Switzerland.
- Hu, K. H., Chen, F. H., & Tzeng, G. H. (2019). *CPA Firm Cloud Auditing Provider For Performance Evaluation And Improvement: An Empirical Case of China*. <https://doi.org/10.3846/tede.2018.6619>. Diakses 17 Oktober 2019
- Jahera, J., John, & Colbert, J. (1988). The Role of the Audit and Agency Theory. *Journal of Applied Business Research*, 4.
- Jensen, M., & Meckling, W. (1976). *Theory of the Firm: Managerial Behavior, Agency Cost and Ownership Structure*. *Journal of Financial Economics*, 3, 305-360.
- Kanellou, A., & Spathis, C. (2011). Auditing in enterprise system environment: A synthesis. *Journal of Enterprise Information Management* 24(6), 494-519.
- Khukarova, K. (2017). Audit Data Analytics: Opportunities and Tips. [http://siteresources.worldbank.org/EXTCENFINREPREF/Resources/4152117-1427109489814/SMPs\\_spreads\\_digital.pdf](http://siteresources.worldbank.org/EXTCENFINREPREF/Resources/4152117-1427109489814/SMPs_spreads_digital.pdf). Diakses 18 April 2019
- Knezevic, D. (2018). Impact of Blockchain Technology Platform in Changing the Financial Sector and Other Industries. *Montenegrin Journal of Economics*, 14.
- Komite.id. (2018). Penting Peran Audit Teknologi di era Revolusi Industri 4.0 | Komite.<https://www.komite.id/2018/12/07/pentingnya-peran-audit-teknologi-di-era-revolusi-industri-4-0/>. Diakses 15 April 2019.
- Le, D. N., Le, C. V., Tromp, J. G., & Nguyen, G. N. (2018). *Emerging Technologies for Health and Medicine: Virtual Reality, Augmented Reality, Artificial Intelligence, Internet of Things, Robotics, Industry 4.0*. United States of America: Scrivener Publishing, WILEY.
- Li, H., Dai, J., Tatiana, G., & Vasarhelyi, M. A. (2018). *Understanding Usage and Value of Audit Analytics for Internal Auditors: An Organizational Approach*. *International Journal of Accounting Information Systems*, 28, 59-76.
- Liu, Q. (2013). *The Application of Exploratory Data Analysis in Auditing*. 183. *Rutgers Studies in Accounting Analytics: Audit Analytics in the Financial Industry*, Emerald Publishing Limited, pp. 3-15.
- Louwers, T. J., Blay, A. D., Sinason, D. H., Strawser, J. R., & Thibodeau, J. C. (2018). *Auditing and Assurance Services* (7 ed.). New York, United States of America: McGraw-Hill Education.

- Lucke, D., Constantinescu, C., & Westkämper, E. (2008). *Smart Factory—A Step towards the Next Generation of Manufacturing*. *Manufacturing Systems and Technologies for the New Frontier*, 115-118.
- Macaulay, M. T. (2016). How Technology Is Transforming the Audit. <https://www.forbes.com/sites/kpmg/2016/11/23/how-technology-is-transforming-the-audit/>. Diakses 4 Juli 2019
- Maity Souvik. (2019). Identifying opportunities for artificial intelligence in the evolution of training and development practices. *Journal of Management Development*, 38(8), 651–663. <https://doi.org/10.1108/JMD-03-2019-0069>. Diakses 20 Oktober 2019.
- Maresova, P., Soukal, I., Svobodova, L., Hedvicakova, M., Javanmardi, E., Selamat, A., & Krejcar, O. (2018). *Consequences of Industry 4.0 in Business and Economics*. *Economies*. 6. 46.10.3390/economies6030046.
- Marrone Mauricio. (2019). The disruptive and transformative potential of new technologies for accounting, accountants and accountability. *Meditari Accountancy Research*, 27(5), 677–694. <https://doi.org/10.1108/MEDAR-06-2019-0508>. Diakses 21 Oktober 2019
- Maslen, L. (2005). *Audit Quality: Agency Theory And The Role of Audit*. Dipresentasikan pada England. England: The Institute of Chartered Accountants.
- McGuigan, N., & Ghio, A. (2019). *Art, accounting and technology: Unravelling the paradoxical “in-between.”*. *Meditari Accountancy Research*, 27(5), 789-840.
- Messier, W. F., Glover, S. M., & Prawitt, D. F. (2017). *Auditing & Assurance Services: A Systematic Approach* (10 ed., Vol. 1–830). New York, United States of America: McGraw-Hill Education.
- Mitnick, B. (1975). *The Theory of Agency: A Framework*. *Public Choice*, 24, 27-42. University of Pittsburgh, Pittsburgh, Pennsylvania, United States of America.
- Moffit, K. C., & Vasarhelyi, M. A. (2013). *AIS in an age of big data*. *Journal of Information Systems* 27(2).
- Nielsen, M. A., & Chuang, I. L. (2010). *Quantum Computation and Quantum Information* (10 ed.). New York: Cambridge University Press.
- Nixon, B., & Burns, J. (2012). *The Paradox of Strategic Management Accounting*. *Management Accounting Research* 23(4), 229-224.
- Novak, M. (2012). Information overload: A recurring fear. <http://www.bbc.com/future/story/20120306-information-overload-fears>. Diakses 15 April 2019
- O’Leary, D. E. (2013). *Big Data, The Internet of Things and The Internet of Signs, Intelligent Systems in Accounting, Finance and Management*. 20.
- Pereira, A. C., & Romero, F. (2017). *A review of the meanings and the implications of the Industry 4.0 concept*. *Procedia Manufacturing*, 13, 1206-1214.
- Qiu Leiju. (2019). Intelligent transaction: Definition, modes, and research directions (Sun Baowen & Wu Xiaolin, Penerj.). *International Journal of Crowd Science*,

- 3(1), 36–48. <https://doi.org/10.1108/IJCS-08-2018-0017>. Diakses 19 September 2019
- Rega, F., Riccardi, N., Li, J., & Carlo, F. (2018). *Blockchain in the banking industry: An Overview*. <https://doi.org/10.13140/RG.2.2.25542.32328>. Diakses 19 Desember 2019.
- Rezaee Zabihollah. (2019a). Relevance of big data to forensic accounting practice and education. *Managerial Auditing Journal*, 34(3), 268–288. <https://doi.org/10.1108/MAJ-08-2017-1633>. Diakses 24 Agustus 2019
- Rezaee Zabihollah. (2019b). Relevance of big data to forensic accounting practice and education. *Managerial Auditing Journal*, 34(3), 268–288. <https://doi.org/10.1108/MAJ-08-2017-1633>. Diakses 19 September 2019
- Romney, M. B., & Steinbart, P. J. (2018). *Accounting Information Systems* (14 ed.). New Jersey 07458, United States of America: Pearson Education, Inc.
- Ross, S. (1973). *The Economic Theory of Agency: The Principal's Problem*. *American Economic Review*, *American Economic Association*, 63(2), 134-139.
- Ruparelia, N. (2016). *Cloud Computing*. United States of America: The MIT Press, Massachusetts Institute of Technology.
- Sathi, A. (2014). *Engaging Customers Using Big Data: How Marketing Analytics Are Transforming Business*. New York: Palgrave Macmillan.
- Schwab, K. (2016). *The Fourth Industrial Revolution* (Vol. 1–172). Switzerland: World Economic Forum.
- Schwab, K. (2019). *The Global Competitiveness Report*. Switzerland: World Economic Forum.
- Scott, W. (2012). *Financial Accounting Theory* (6 ed.). Toronto, Ontario, Canada: Pearson Canada Inc.
- Sekaran, U., & Bougie, R. (2016). *Research Methods for Business* (7th ed.). New York: John Wiley & Sons.
- Shee Himanshu. (2018). The impact of cloud-enabled process integration on supply chain performance and firm sustainability: The moderating role of top management (Pujawan Nyoman, Penerj.). *Supply Chain Management: An International Journal*, 23(6), 500–517. <https://doi.org/10.1108/SCM-09-2017-0309>. Diakses 19 Agustus 2019.
- Simkin, M. G., Rose, J. M., & Norman, C. S. (2012). *Core Concepts of Accounting Information Systems* (12 ed.). United States of America: John Wiley & Sons, Inc.
- Skilton, M., & Hovsepian, F. (2018). *The 4th Industrial Revolution: Responding to the Impact of Artificial Intelligence on Business*. Switzerland: Springer International Publishing AG.
- Stanescu, T. D. (2017). *Introduction to Topological Quantum Matter & Quantum Computation*. United States of America: CRC Press, Taylor & Francis Group.



- Sugiyono. (2015). *METODE PENELITIAN PENDIDIKAN (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. ALFABETA, cv.
- Tang Jiali. (2019a). Financial fraud detection and big data analytics – implications on auditors’ use of fraud brainstorming session. *Managerial Auditing Journal*, 34(3), 324–337. <https://doi.org/10.1108/MAJ-01-2018-1767>. Diakses 24 Agustus 2019
- Tang Jiali. (2019b). Financial fraud detection and big data analytics – implications on auditors’ use of fraud brainstorming session. *Managerial Auditing Journal*, 34(3), 324–337. <https://doi.org/10.1108/MAJ-01-2018-1767>. Diakses 19 September 2019
- Terahara, J. (2015). *Application of Information and Communication Technology in Developing Countries* [Project Research]. Japan International Cooperation Agency.
- Titera, W. R. (2013). *Updating Audit Standard-Enabling Audit Data Analysis*. *Journal of Information Systems* 27(1), 325-331.
- Torre, M. L., botas, V. L., Dumay, J., & Odendaal, E. (2019). *Protecting a new Achilles heel: The role of auditors within the practice of data protection*.
- Universitas Gadjah Mada (2018). Revolusi Industri 4.0, Era Ekonomi Berbagi. <http://ugm.ac.id/id/berita/17335-revolusi.industri.40.era.ekonomi.berbagi>. Diakses 13 April 2019
- KPMG United States (2017). U.S. CEO Outlook 2017. <https://home.kpmg/us/en/home/insights/2017/06/us-ceo-outlook-2017.html>. Diakses 4 Juli 2019
- Van Harmelen, M. D., & Workman. (2012). *Analytics for Understanding Research*. University of Manchester, Manchester, United Kingdom.
- Wang, S., Wan, J., Li, D., & Zhang, C. (2016). Implementing Smart Factory of Industrie 4.0: An Outlook. *International Journal of Distributed Sensor Networks*, 12(1), 3159805. <https://doi.org/10.1155/2016/3159805>. Diakses 3 Oktober 2019
- Wang Yingli. (2019). Understanding blockchain technology for future supply chains: A systematic literature review and research agenda. *Supply Chain Management: An International Journal*, 24(1), 62–84. <https://doi.org/10.1108/SCM-03-2018-0148>. Diakses 21 Oktober 2019.
- Wickramasinghe, D., & Alawattage, C. (2007). *Management accounting change: Approaches and perspectives*. <https://doi.org/10.4324/9780203815274>. Diakses 21 Oktober 2019
- Wouda Hugo Pieter. (2019). Blockchain technology in commercial real estate transactions. *Journal of Property Investment & Finance*, 37(6), 570–579. <https://doi.org/10.1108/JPIF-06-2019-0085>. Diakses 21 Oktober 2019.
- Zanni, T., & Grandi, F. (2019). The top 10 technologies for business transformation: Insight on the latest disruptive technologies for company executives and VC Investors. *KPMG*.

Zhang, J., Yang, X., & Appelbaum, D. (2015). Toward effective big data analysis in continuous auditing. *Accounting Horizons*, 29.