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DESIGN FINANCIAL ACCOUNTING USING BLOCKCHAIN APPROACH IN EDUCATION

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Abstrak

Indonesia memasuki revolusi 4.0 yang membawa banyak sekali perubahan di segala bidang termasuk bidang teknologi. Teknologi keterbaharuan terbesar bersifat terdesentralisasi dengan ciri transparan, nyaman, permanen serta tidak bisa diganti yang biasa dikenal dengan Blockchain. Blockchain sudah diterapkan di banyak bidang semacam cryptocurrency, akuntansi serta tata kelola pendidikan. Tetapi, teknologi Blockchain saat ini sedang dalam sesi percobaan serta mempunyai sebagian permasalahan yang wajib dituntaskan tercantum kapasitas pemrosesan informasi yang terbatas, kerahasiaan data, serta kesusahan regulasi. Artikel ini menerangkan tentang kemampuan pelaksanaan teknologi Blockchain dalam akuntansi keuangan pendidikan pendidikan. Maka dari itu, penelitian ini mengusulkan desain framework bagi finansial pendidikan tinggi agar keamanan buku besar dapat ditingkatkan. Dalam jangka panjang, platform ini secara efisien bisa kurangi kesalahan dalam pengungkapan serta manajemen laba, tingkatkan mutu data akuntansi pendidikan serta kurangi asimetri data. Metode analisis dengan perhitungan skor SUS terhadap sistem Blockchain akuntansi menunjukkan 85, sehingga framework ini termasuk dalam kategori Net Promoter. Hasil akhir penelitian ini mampu mengoptimalkan finansial keuangan pada pendidikan tinggi dengan menggunakan Blockchain.

Kata Kunci: Akuntansi keuangan; Blockchain; Pendidikan; Teknologi.

Abstract

Indonesia is entering the 4.0 revolution, which brings many changes in all fields, including technology. The most extensive new technology is decentralized with transparent, convenient, permanent, and irreplaceable characteristics, commonly known as Blockchain. Blockchain has been applied in all fields, especially in the field of technology. But Blockchain technology is currently still in the pilot stage which has some issues and needs to be resolved. These include regulatory difficulties, limited information processing capacity, and data confidentiality. This article describes the ability to implement Blockchain technology in educational, financial accounting. Therefore, this study proposes a framework design for higher education finance to improve the security of the ledger. In the long term, this platform can efficiently reduce disclosure and earnings management errors, improve the quality of educational accounting data, and reduce data asymmetry. The analysis method by calculating the SUS score against the accounting Blockchain system shows 85, so this framework is included in the Net Promoter category. The final result of this research can optimize financial finance in higher education by using Blockchain.

Keywords : Blockchains; Education; Financial Accounting; Technology.

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INTRODUCTION

Recorded organizations can to a great extent decrease data deviation with outside data clients consistently giving scholastic training monetary reports that are inspected by free commentators (Komariah, 2018). Blockchain is the latest information technology, and is now starting to be widely applied in daily needs in various applied fields (Dehghantanha, 2018). This technology was developed in order to support the era of information disruption that provides alternative solutions from a centralized technology architecture (Sudaryono et al., 2019). Blockchain technology is realized with the concept of decentralization of information in data processing (Ocheja et al., 2018). Data in Blockchain is stored permanently in data records that will be communicated peer-to-peer in the internal network and collaborate actively (Nurhaeni et al., 2021). This is very different from the internet-based concept that developed in previous information technology. Blockchain technology is heralded as a technology that will replace the centralized information architecture that is currently dominantly developed, namely through the implementation of internet-based technology.

However, specific company problems undermine the active role of financial accounting education, education, and independent review (Suprivadi, 2020). As a decentralized ledger technology (in the future referred to as DLT), Blockchain technology has the characteristics of being transparent, secure, permanent, and immutable and can increase trust between actors (Lutfiani et al., 2020). Blockchain technology is a self-regulating and decentralized technology (Conoscenti et al., 2016), as well as create open records that have been executed of computerized events or all transactions and will be shared with participating parties. To show the authenticity of every transaction on the Blockchain, it will be verified with a digital signature. Information stored on the Blockchain will be sealed and immutable, due to the use of digital signatures and encryption (Lukita et al., 2020). In the world of education, the application of Blockchain technology is still not widely applied, other than because this technology is often exemplified for handling financial information, work contracts involving a collection of financial transactions and e-commerce, also due to the lack of concern for stakeholders in the world of education for the social benefits and potential of Blockchain technology.

This study discusses implementing blockchain technology in financial accounting education and its potential influence on independent reviewers (Puryati et

al., 2019). Blockchain innovation in instructive, monetary bookkeeping is reformist because of restricted information handling limit, data privacy, and administrative troubles (Aini, Badrianto, et al., 2020). Schooling can utilize Blockchain as a stage to willfully demonstrate instructive money and training non-monetary data for the time being (Aini, Rahardja, et al., 2020). This is a great sign that permits training to settle trust with outside data clients (Riza, 2020). Blockchain innovation and savvy contracts in the long haul can decrease mistakes in revelation and income the board which adequately improves the idealness, dependability, and equivalence of bookkeeping data, in this way lessening its data unevenness (Nugraha, 2020).

However, the application of Blockchain in educational, financial accounting can pose a threat to the industry wanting to build transactions to get the desired accounting number (Aini, Lutfiani, et al., 2021). This will shift the focus of independent external audits from identifying significant industry misstatements to analyzing blockchain technology and making comparisons in management accounting (Dudhat et al., 2021). This article describes how educational finance blockchain technology can reduce information asymmetry between the industry and outside information users. Smart contracts are programs that automate many transactions or processes (Aprialim, 2020). Under certain circumstances, the smart contract code can be executed automatically by the Blockchain network without the involvement of a third party (Aini, Riza Bob, et al., 2020).

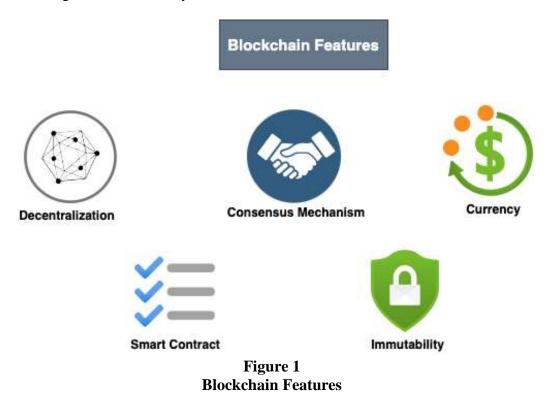
Reasonableness and legitimacy of exchanges and business occasions. Simultaneously, Accountants' instructive, monetary obligations will likewise move from recording exchanges and getting ready scholarly, monetary reports to Assuring the realness of source documents and the reasonableness of savvy contracts utilized in them (Sahela et al., 2021). Blockchain Accounting We also recommend implementing some blockchains that are permitted to reduce data confidentiality and surveillance issues which are difficult. Still, this increase will undermine the advantages brought by blockchain accounting (Ke et al., 2021). The next section presents the mechanisms, features, and applications of today's Blockchain technology. The third section describes the potential applications of Blockchain technology in educational finance and introduces threats in the application. Finally, the last section summarizes.

LITERATURE REVIEW AND HYPOTHESES

Blockchain

In research (Rahardja et al., 2020) Blockchain is a direct transaction record that is a peer-to-peer connection in a decentralized manner where a cryptography technique secures every transaction in it. In addition, Blockchain is an innovation from technological developments that can be used in the future for various purposes (Isma, 2020). The Blockchain has a Node, a computer connected to the network, and is responsible for verifying and communicating data on the Blockchain (Guustaaf et al., 2021). Blockchain is made up of blocks that are linked together using the hash method, resulting in a chain of blocks (Putra et al., 2018). Every node in the Blockchain network has a large new copy of data. If a data node on the Blockchain has been damaged, then the final hash value of that node will be different from the hash value of the node that has not been replaced (Arenas & Fernandez, 2018). This mechanism justifies the traceability of the vandalism flash detection. Blockchain can ensure that data is transparent, convenient, and immutable (Aini, Rahardja, et al., 2021). There are three basic types of Blockchain, namely:

- 1. A permitted blockchain is a blockchain that cannot issue transactions that they carry out themselves or view their records and join a community freely, is an action blockchain that is allowed and will act as a closed ecosystem.
- 2. An unauthorized blockchain is a blockchain that is not public or open to anyone who wants to access it.
- 3. Hybrid Blockchain is a blockchain that uses a combination of two blockchains, namely the public blockchain and the private blockchain. In this network, Blockchain data that is not allowed can still be accessed from the Blockchain place by using certain stored access rights. This type of Blockchain is not open to everyone, but it provides the basic features quietly like smoothness, integration and security.



Some of the basic features of Blockchain, namely:

1. Decentralized: Control on Blockchain does not lie with the government, but is decentralized. This decentralization refers to the procedures for storing, preserving, confirming data and transmitting, which occur within its Blockchain depending on the structure of a distributed framework (Adiyanto & Febrianto, 2020), (Lestari et al., 2021).

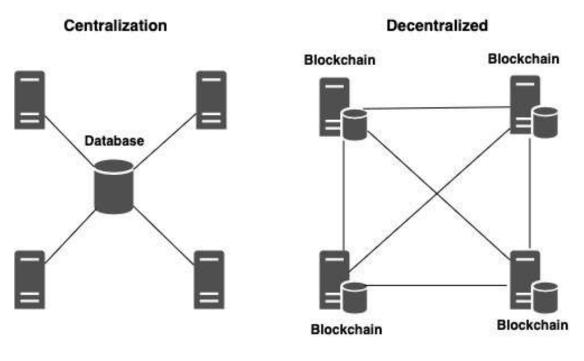


Figure 2 Decentralization Concept on Blockchain

- 2. Consensus Mechanism: A consensus mechanism is used in the Blockchain with the aim to reach an agreement on a single data set where the network is between multi-agent frameworks or distributed processes. This mechanism is very helpful in the process. There are several procedures in this mechanism, namely DPOS, POW, and POS (Yumna et al., 2019), (Grech & Camilleri, 2017).
- 3. Currency:In today's revolutionary era, of all the proposed cryptocurrencies, bitcoin is the world's first digital currency. Bitcoin Blockchain technology which is a virtual or digital currency, where this technology ensures end-to-end transactions that make these transactions protected and trustworthy, this is part of the property of cryptocurrencies. In the formation of this currency a different development algorithm is used. Therefore, the combined product of cryptocurrency and Blockchain can be used in several aspects, for example financial and accounting aspects (Chen et al., 2018).
- 4. Smart Contract: This is the Blockchain protocol needed to allow developers to code financial agreements on the Blockchain, which will be activated by all parties involved (Lin & Liao, 2017). This contract ensures significant quality and security of transactions, not only reduces the external costs involved in conventional transactions. This Smart Contract was built to secure transactions that occur on the Blockchain, in the mid-1990s this protocol was first developed by Nick Zabo (Harahap et al., 2020).
- 5. Immutability: Once the data has been entered, it cannot be changed anymore (Mohanty, 2018). Existing data is also impossible to manipulate, because it is controlled by everyone concerned. If you want to destroy (make changes to be invalid) then you need to change the records that have been stored in the system by more than 51 percent (Rahardja et al., 2019).

Blockchain in Education

The application of Blockchain technology by (Rizky et al., 2021) in the world of education makes the world of education benefit from such an enormous positive impact, such as trust, security of information data using fingerprints that can be backed up by Blockchain technology, and high decentralization. For example, there is a problem of certificates in forged education, but Blockchain provides a Smart Contract for authenticity verification on paper certificates with QRCode (Cheng et al., 2018). In addition, the Blockchain approach to teaching is essential to connect learning data from various platforms (Ocheja et al., 2018). In the end, academic credentials need to be verified with a decentralized Blockchain-based, so that there is evidence of digital education data that is easily verified (Arenas & Fernandez, 2018).

Blockchain Accounting

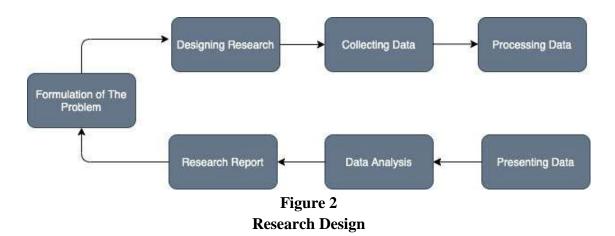
The use of Blockchain innovation in monetary bookkeeping in schooling can decrease estimation blunders since savvy contracts consequently create scholarly monetary reports and can diminish operational danger (Ambarwati & Wicaksono, 2020). In addition, the timely provision of accounting data partially reduces the time gap between the creation and reporting of accounting data. Traceability and transparency on educational accounting blockchains will reduce the risk of fraud and largely tackle counterfeit payments. With fewer opportunities and higher payouts, earnings management will shrink (Fauziah et al., 2020). Utilizing Blockchain in instructive, monetary bookkeeping implies that there will be a great many holds once posted on the public Blockchain, and all organization individuals can see all exchanges (Hom et al., 2020). All exchanges are checked and observed by all hubs in the instructive monetary bookkeeping blockchain, which will build the unwavering quality of school bookkeeping information. Not just that, with the utilization of Blockchain innovation, instructive monetary reports can be created rapidly, rather than customary schooling monetary announcing each year, which builds the idealness of the information (Ugli & Mukhiddin, 2020). And more radically, external data users can mix industry transactions into educational financial reports at any time (Cahyadi et al., 2021). Furthermore, traceability of accounting policies and assumptions in smart contracts will make accounting options and evaluations more transparent and increase accounting data's comparability (Indonesia, 2021). So there is no further research that discusses Blockchain-based educational accounting (Nugroho & Setyowati, 2019).

RESEARCH METHOD

Research Design

In this study to overcome existing problems, using research, namely formulating problems, designing research, collecting data, processing data, presenting data, analyzing data and the last is research reports.

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Here are 7 (seven) information in the research method as follows: (1) Formulating the problem, in formulating the problem we need to make observations to find out the background of the problems that occur in the previous system that has been running, many users are involved in transactions so that it makes less security student data. (2) Designing Research by Designing the concept of a student payment system into a framework or Blockchain so that the ledger's security can be improved. (3) Data collection by preparing the data needed in the design of the payment system, such as student data which will then be checked for the total bill of each student. (4) Data processing by integrating student invoices with the proposed framework. (5) Presenting Data with If the data has been processed, students will display helpful information. Where the information presented must be clear, such as student data and appropriations bills. (6) Data analysis by analyzing the initial process of formulating existing problems and distributing them to selected respondents. (7) Research Report by Reporting the results of all research in detail, which was completed well.

Research Sample

The sample in this study were all students at the University of Raharja. From 256 students the University of Raharja were selected as research samples. The sample selection in this study used simple random sampling which means that every student has the opportunity to be a sample in this study. While the types and sources of data, the data collected in the study are the semesters financial statements.

Method of Collecting Data

In this study, the data analysis used the SUS method. The System Usability Scale (SUS) method is a way to test the usability of an application. SUS was developed as a "quick and dirty" usability measurement (Handayani & Adelin, 2019). SUS is a questionnaire that can be used to measure the usefulness of a computer system from the user's subjective point of view. The SUS instrument is a questionnaire consisting of 10 questions. Until now, SUS is widely used to measure usability and shows several advantages, including: (1) SUS can be used easily, because the results are in the form of a score of 0-100. (2) SUS is very easy to use, does not require complicated calculations (Vlachogianni & Tselios, 2021); (3) SUS is available free of charge, no extra charge is required. (4) SUS is proven to be valid and reliable, even with a small

sample size (Miftah & Sari, 2020). The testing scale starts from a range of 1 (strongly disagree) to 5 (strongly agree) (Lewis, 2018). As shown in Table 1.

System researcher by filling out a Google Form questionnaire. Then proceed with collecting the amount of data that has participated in the activities of 256 populations. In the next stage, the data will be processed to determine the number of samples according to SUS. It is calculated through the slovin formula, where in the slovin formula n = the number of data samples, N = the number of the general population, e = the calculation tolerance limit that has been obtained according to the number of samples. so the size of entering the number of people in the variable n = 256, and the required error tolerance limit of 10% is as follows:

$$n = \frac{256}{1 + 256. (0,01)^2}$$
$$n = \frac{256}{3,56}$$
$$= 71.9 \stackrel{?}{\rightarrow} 72$$

n

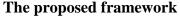
So the total sample data on the educational accounting blockchain system is 71.9, which is rounded up to 72. Then the data will be used to look for SUS (System Usability Scale), which aims for researchers to implement the system properly. Here's the formula for finding the overall SUS value:

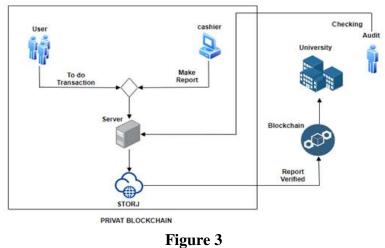
$$x = \frac{\left(((R1) + (R2) + (R3) + (R4) + (R5) + (R6) + (R7) + (R8) + (R9) + (R10)\right) * 2,5) * N}{N}$$

Where X = total score on SUS, N = number of certificate data, R1 to R10 are variables from respondents' statements on the questionnaires that have been given.

So the total sample data on the educational accounting blockchain system is 71.9, which is rounded up to 72 data samples so that if the percentage is obtained, the following numbers will be accepted:

RESULT AND DISCUSSION





The proposed framework

Researchers make a proposed framework. First, users can make online transactions anytime, morning, afternoon, evening, or night via cellphone to pay their bills without having to come to the College Cashier and automatically record without having to confirm again with the campus or cashier. Of course, this process is more efficient and effective, making it easier for students to transact.

Second, the cashier can generate report data or input student data to make online payments as university data successfully. Then the data will enter the Blockchain; with Blockchain technology, it can be more transparent and traceable because it is verified and monitored by all nodes in the accounting Blockchain. This makes it easier for companies to carry out ratifying essential documents without having to print the first, whose legality is legal in the eyes of the law. In addition, document storage with distributed Blockchain makes important documents more secure and stored on a public Blockchain network that is difficult to hack or modify.

Not just that, with the execution of Blockchain innovation, instructive, monetary reports can be made instantly, rather than conventional schooling monetary reports each month, which builds the idealness of information. Furthermore, and all the more profoundly, outside information clients can even blend exchanges into instructive, monetary reports whenever. Moreover, recognizability of instructive bookkeeping strategies and suspicions in shrewd agreements will make bookkeeping alternatives and assessments more straightforward and improve instructive bookkeeping information's similarity.

So, the appearance of Blockchain innovation will altogether affect the estimation, show, and divulgence in instructive, monetary bookkeeping, which decreases mistakes in exposure and profit of the executives, generally improves the subjective attributes of the information, and lessens the issue of information imbalance.

Blockchain financial accounting Education

Accounting procedures set by accounting standards must be practiced by companies for presentation, recording, and disclosure in educational financial accounting, because they still have discretion over accounting procedures such as estimates, accounting policies used and accounting judgments made (Alhelou et al., 2021). The listed industry only distributes regular education financial reports to the market but does not publish accounting procedures for preparing reports. While these institutional arrangements can protect proprietary data, there are some negative consequences as well. In conclusion, especially if there is an external audit, the auditor will not be able to find out all the frauds and errors that have occurred or may not have the freedom to inform the market about the problems encountered.

The emergence of Blockchain technology provides new ideas for educational, financial accounting (Kamil et al., 2021). It will significantly impact the recognition, measurement, presentation, and disclosure that can reduce disclosure and earnings management errors, thereby significantly improving the quality of data (Chandra et al., 2020).

The results of the percentage of questionnaire data samples distributed to selected respondents are as follows:

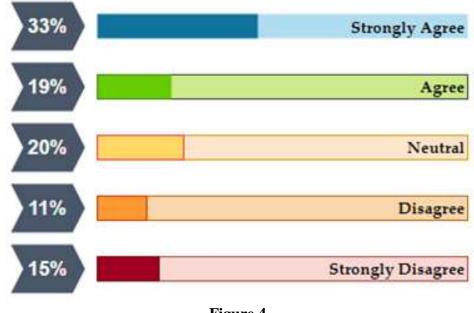


Figure 4 Diagram respondent

Based on the diagram in the picture above, 33.5% of respondents gave statements on a 5-point Likert scale, 19.8% with 4 points, 20% with 3 points, and 11.5% with 2 points, 15.1% with 1 point. Therefore, from the information obtained, we enter the variables R1-R10 to find the total SUS:

$$x = \frac{(((2) + (5) + (3) + (4) + (5) + (3) + (5) + (3) + (4) + (2)) * 2,5) * 72}{72}$$
$$x = \frac{6.120}{72} = 85$$

Calculations were carried out using the SUS formula from a questionnaire distributed to the entire population so that X was obtained as the SUS score. These results indicate that the mean is 80, where the SUS score is a global subjective assessment of usability aspects such as efficiency, effectiveness, and user satisfaction with the system used.

SCORE SUS Not Acceptable : < 50 Detractor : < 67 Acceptable : > 70 Net Promoter : > 82 10 20 30 40 50 60 70 80 90 100Figure 5

Score SUS

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The SUS Calculation Score on the educational accounting Blockchain system is 85, and it can be said that this system is included in the Net Promoter category which can be used easily by users so that it is expected to support educational accounting.

CONCLUSION, LIMITATIONS AND SUGGESTIONS

Conclusion

This study describes the impact of Blockchain technology on educational, financial accounting. Because the technology is still in an experimental session, the application of Blockchain technology in educational, financial accounting will continue to be progressive. Blockchain technology can be used voluntarily in the short term, which is a high-quality signal that allows the industry to resolve trust issues with investors. However, in a long time, its implementation can significantly impact educational, financial accounting. From various previous studies, there has also been no specific research on the application of Blockchain-based academic accounting. This study proposes a design framework for Blockchain-based educational accounting to secure and verify auditing. In addition, auditing activities from related institutions help avoid falsifying accounting reports in education because they have implemented Blockchain. Thus, there is a revolutionary change that disrupts the education sector, especially in the accounting field. This research can certainly be developed further by implementing applications designed for Blockchain-based educational finance using the Agile method.

Limitations

The limitation of this study is the reduced number of samples due to the large number of students who have not paid their semester fees.

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Suggestions For Further Research

- 1. The number of samples is increased.
- 2. It is expected to use a semester or a longer period so as not to cause results that are too different between one semester and another.
- 3. Use a simpler disclosure theme. Conducting different disclosure tests between students for further research.

REFERENCES

- Adiyanto, A., & Febrianto, R. (2020). Authentication Of Transaction Process In Emarketplace Based On Blockchain technology. *Aptisi Transactions On Technopreneurship (ATT)*, 2(1), 68–74.
- Aini, Q., Badrianto, A., Budiarty, F., Khoirunisa, A., & Rahardja, U. (2020). Alleviate Fake Diploma Problem In Education Using Block Chain Technology. *Journal of Advanced Research in Dynamical and Control Systems*, 12(2), 1821–1826. https://doi.org/10.5373/JARDCS/V12I2/S20201225

- Aini, Q., Lutfiani, N., Santoso, N. P. L., Sulistiawati, S., & Astriyani, E. (2021). Blockchain For Education Purpose: Essential Topology. *Aptisi Transactions on Management (ATM)*, 5(2), 112–120.
- Aini, Q., Rahardja, U., Santoso, N. P. L., & Oktariyani, A. (2021). Aplikasi Berbasis Blockchain dalam Dunia Pendidikan dengan Metode Systematics Review. CESS (Journal of Computer Engineering, System and Science), 6(1), 58–66.
- Aini, Q., Rahardja, U., Tangkaw, M. R., Santoso, N. P. L., & Khoirunisa, A. (2020). Embedding a Blockchain Technology Pattern Into the QR Code for an Authentication Certificate. *Jurnal Online Informatika*, 5(2).
- Aini, Q., Riza Bob, S., Santoso, N. P. L., Faturahman, A., & Rahardja, U. (2020). Digitalization of Smart Student Assessment Quality in Era 4.0. International Journal of Advanced Trends in Computer Science and Engineering, 9(1.2), 257– 265. https://doi.org/10.30534/ijatcse/2020/3891.22020
- Alhelou, E. M. S., Rashwan, A.-R., & Abu-Naser, S. S. (2021). The Role of Using Cloud Computing in Improving the Quality of Accounting Education in Palestinian Universities in Light of the Covid-19 Pandemic. *Journal of Economics, Finance and Accounting Studies*, 3(1), 11–32. https://doi.org/10.32996/jefas
- Ambarwati, A., & Wicaksono, C. A. (2020). Relationship Analysis of Eco-Control, Company Age, Company Size, Carbon Emission Disclosure, and Economic Consequences. *The Indonesian Journal of Accounting Research*, 23(2).
- Aprialim, F. (2020). Penerapan Blockchain dengan Integrasi Smart Contract pada Sistem Crowdfunding. Universitas Hasanuddin.
- Arenas, R., & Fernandez, P. (2018). CredenceLedger: a permissioned blockchain for verifiable academic credentials. 2018 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC), 1–6.
- Cahyadi, D., Faturahman, A., Haryani, H., & Dolan, E. (2021). BCS: Blockchain Smart Curriculum System for Verification Student Accreditation. 1(April), 65–83.
- Chandra, L., Amroni, Frizca, B., Aini, Q., & Rahardja, U. (2020). Utilization Of Blockchain Decentralized System In Repairing Management Of Certificate Issuance System. Journal of Advanced Research in Dynamical and Control Systems, 12(2), 1922–1927. https://doi.org/10.5373/JARDCS/V12I2/S20201235
- Chen, G., Xu, B., Lu, M., & Chen, N.-S. (2018). Exploring blockchain technology and its potential applications for education. *Smart Learning Environments*, 5(1), 1–10.
- Cheng, J.-C., Lee, N.-Y., Chi, C., & Chen, Y.-H. (2018). Blockchain and smart contract for digital certificate. 2018 IEEE International Conference on Applied System Invention (ICASI), 1046–1051.
- Conoscenti, M., Vetro, A., & De Martin, J. C. (2016). Blockchain for the Internet of Things: A systematic literature review. 2016 IEEE/ACS 13th International Conference of Computer Systems and Applications (AICCSA), 1–6.
- Dehghantanha, R. M. P. and A. (2018). On the Understanding of Gamification in Blockchain Systems. 2018 6th International Conference on Future Internet of Things and Cloud Workshops (FiCloudW), Barcelona, 214–219. https://doi.org/10.1109/W-FiCloud.2018.00041
- Dudhat, A., Santoso, N. P. L., Santoso, S., & Setiawati, R. (2021). Blockchain in Indonesia University: A Design Viewboard of Digital Technology Education. *Aptisi Transactions on Technopreneurship (ATT)*, 3(1), 68–80.
- Fauziah, Z., Latifah, H., Omar, X., Khoirunisa, A., & Millah, S. (2020). Application of Blockchain Technology in Smart Contracts: A Systematic Literature Review.

Aptisi Transactions on Technopreneurship (ATT), 2(2), 160–166.

- Grech, A., & Camilleri, A. F. (2017). *Blockchain in education*. Luxembourg: Publications Office of the European Union.
- Guustaaf, E., Rahardja, U., Aini, Q., Maharani, H. W., & Santoso, N. A. (2021). Blockchain-based Education Project. *Aptisi Transactions on Management (ATM)*, 5(1 January), 46–61.
- Handayani, F. S., & Adelin, A. (2019). Interpretasi Pengujian Usabilitas Wibatara Menggunakan System Usability Scale. *Techno. Com*, 18(4), 340–347.
- Harahap, E. P., Aini, Q., & Anam, R. K. (2020). Pemanfaatan Teknologi Blockchain Pada Platform Crowdfunding. *Technomedia Journal*, 4(2 Februari), 199–210.
- Hom, J., Anong, B., Rii, K. B., Choi, L. K., & Zelina, K. (2020). The Octave Allegro Method in Risk Management Assessment of Educational Institutions. *Aptisi Transactions on Technopreneurship (ATT)*, 2(2), 167–179.
- Indonesia, U. H. (2021). *Hita Akuntansi dan Keuangan Universitas Hindu Indonesia Edisi April 2021. April*, 94–116.
- Isma, I. (2020). Sistem Sertifikasi Halal Pada Rumah Potong Hewan Dengan Menggunakan Teknologi Blockchain. UNIVERSITAS AIRLANGGA.
- Kamil, M., Bist, A. S., Rahardja, U., Santoso, N. P. L., & Iqbal, M. (2021). Covid-19: Implementation e-voting Blockchain Concept. *International Journal of Artificial Intelligence Research*, 5(1).
- Ke, Y., Xianghui, D., Wenxin, G., & Wei, T. (2021). Research on the Financing Mode and Path Innovation of Small and Medium-sized Private Enterprises under the Background of Blockchain Finance. *Academic Journal of Business & Management*, 3(2), 38–43. https://doi.org/10.25236/AJBM.2021.030208
- Komariah, N. (2018). Konsep Manajemen Keuangan Pendidikan. *Al-Afkar: Jurnal Keislaman & Peradaban*, 6(1), 67–94.
- Lestari, N. P., Durachman, Y., Watini, S., & Millah, S. (2021). Manajemen Kontrol Akses Berbasis Blockchain untuk Pendidikan Online Terdesentralisasi. *Technomedia Journal*, 6(1), 111–123.
- Lewis, J. R. (2018). The system usability scale: past, present, and future. *International Journal of Human–Computer Interaction*, 34(7), 577–590.
- Lin, I.-C., & Liao, T.-C. (2017). A survey of blockchain security issues and challenges. *Int. J. Netw. Secur.*, 19(5), 653–659.
- Lukita, C., Hatta, M., Harahap, E. P., & Rahardja, U. (2020). Crowd funding management platform based on block chain technology using smart contracts. *Journal of Advanced Research in Dynamical and Control Systems*, 12(2). https://doi.org/10.5373/JARDCS/V12I2/S20201236
- Lutfiani, N., Oganda, F. P., Lukita, C., Aini, Q., & Rahardja, U. (2020). Desain dan Metodologi Teknologi Blockchain Untuk Monitoring Manajemen Rantai Pasokan Makanan yang Terdesentralisasi. *InfoTekJar: Jurnal Nasional Informatika Dan Teknologi Jaringan*, 5(1), 18–25.
- Miftah, Z., & Sari, I. P. (2020). Analisis Sistem Pembelajaran Daring Menggunakan Metode SUS. *Research and Development Journal of Education*, 1(1), 40–48.
- Mohanty, D. (2018). Ethereum Use Cases. In *Ethereum for Architects and Developers* (pp. 203–243). Springer.
- Nugraha, A. C. (2020). Penerapan Teknologi Blockchain dalam Lingkungan Pendidikan: Studi Kasus Jurusan Teknik Komputer dan Informatika POLBAN. *Produktif: Jurnal Ilmiah Pendidikan Teknologi Informasi*, 4(1), 15–20.

- Nugroho, F. A., & Setyowati, W. (2019). Pengaruh Komitmen Organisasional, Sistem Informasi Akuntansi, Dan Peran Audit Internal Terhadap Kualitas Laporan Keuangan. *ECONBANK: Journal of Economics and Banking*, 1(2), 125–134. https://doi.org/10.35829/econbank.v1i2.45
- Nurhaeni, T., Nirmalasari, L., Faturahman, A., & Avionita, S. (2021). Transformation Framework Design on Digital Copyright Entities Using Blockchain Technology. *Blockchain Frontier Technology*, 1(01), 35–43.
- Ocheja, P., Flanagan, B., & Ogata, H. (2018). Connecting decentralized learning records: a blockchain based learning analytics platform. *Proceedings of the 8th International Conference on Learning Analytics and Knowledge*, 265–269.
- Puryati, D., Ramdani, D., Maulani, T. S., & Prawirasasra, K. P. (2019). PROSPEK DAN TANTANGAN PENDIDIKAN VOKASI AKUNTANSI DI ERA REVOLUSI INDUSTRI 4.0. *Riset Akuntansi Dan Perbankan*, 13(2), 109–127.
- Putra, G. D., Sumaryono, S., & Widyawan, W. (2018). Rancang Bangun Identity and Access Management IoT Berbasis KSI dan Permissioned Blockchain. Jurnal Nasional Teknik Elektro Dan Teknologi Informasi (JNTETI), 7(4), 384–390. https://doi.org/10.22146/jnteti.v7i4.455
- Rahardja, U., Harahap, E. P., & Christianto, D. D. (2020). PENGARUH TEKNOLOGI BLOCKCHAIN TERHADAP TINGKAT KEASLIAN IJAZAH. *Technomedia Journal*, 4(2), 211–222.
- Rahardja, U., Hidayanto, A. N., Hariguna, T., & Aini, Q. (2019). Design Framework on Tertiary Education System in Indonesia Using Blockchain Technology. 2019 7th International Conference on Cyber and IT Service Management, CITSM 2019, 5–8. https://doi.org/10.1109/CITSM47753.2019.8965380
- Riza, B. S. (2020). Blockchain Dalam Pendidikan: Lapisan Logis di Bawahnya. ADI Bisnis Digital Interdisiplin Jurnal, 1(1), 41–47.
- Rizky, A., Kurniawan, S., Gumelar, R. D., Andriyan, V., & Prakoso, M. B. (2021). Use of Blockchain Technology in Implementing Information System Security On Education. *BEST Journal (Biology Education, Sains and Technology)*, 4(1), 62–70.
- Sahela, K. Z., Susanti, R., & Adjie, A. R. (2021). The Influence of Government Dimension on Financial Education and Empowerment of Micro-, Smalland Medium-Sized Enterprises in Indonesia. *Journal of Asian Finance, Economics and Business*, 8(3), 637–643. https://doi.org/10.13106/jafeb.2021.vol8.no3.0637
- Sudaryono, Rahardja, U., & Harahap, E. P. (2019). Implementation of Information Planning and Strategies Industrial Technology 4.0 to Improve Business Intelligence Performance on Official Site APTISI. *Journal of Physics: Conference Series*, 1179(1), 0–7. https://doi.org/10.1088/1742-6596/1179/1/012111
- Supriyadi, S. (2020). The Effect of Individual and Organizational Factors on Internal Auditors' Moral Courage. *The Indonesian Journal of Accounting Research*, 23(2).
- Ugli, R. D. J., & Mukhiddin, K. A. (2020). Development of the digital economy in Uzbekistan as a key factor of economic growth and increase of living standards of the population. *IJAR*, 6(6), 30–33.
- Vlachogianni, P., & Tselios, N. (2021). Perceived usability evaluation of educational technology using the System Usability Scale (SUS): A systematic review. *Journal of Research on Technology in Education*, 1–18.
- Yumna, H., Khan, M. M., Ikram, M., & Ilyas, S. (2019). Use of blockchain in education: a systematic literature review. Asian Conference on Intelligent Information and Database Systems, 191–202.