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PREFACE

Assalaamu ‘alaykum warahmatullahi wabarakatuh,

The ICMIS 2020 is in the general area of communication and information technology. It provides a forum for presenting and discussing the latest innovations, results and developments in IT Management & organizations, IT Applications, Cyber & IT Security, and ICT. The main objective of this conference is to provide a forum for engineers, academia, scientist, industry, and researchers to present the result of their research activities in the field of Computer and Information Technology. The primary focus of the conference is to create an effective medium for institutions and industries to share ideas, innovations, and problem solving techniques.

There are 282 papers submission and only 150 papers are accepted and 147 papers have been registered and presented. Accepted papers will be presented in one of the regular sessions and will be published in the conference proceedings volume. All accepted papers are submitted to IEEEXplore. IEEE Conference Number: # 43622. Catalog Number: CFP1837Z-PRT, ISBN: 978-1-5386-5433-0, CFP1837Z-USB, ISBN: 978-1-5386-5434-7.

On behalf of the ICMIS organizers, we wish to extend our warm welcome and would like to thank for the all Keynote Speakers, Reviewers, authors, and Committees, for their effort, guidance, contribution and valuable support. Last but not least, thanks to all lecturers and staffs of the Faculty of Science & Technology, Syarif Hidayatullah Jakarta State Islamic University and Universitas Potensi Utama-Medan and other parties that directly and indirectly make this event successful.

Wa billahi taufiq wal hidaayah. Wallahul muwaffiq ila aqwamit-tharieq. Wasalaamu ‘alaykumu warahmatullahi wabarakatuh.

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Covid-19 Patient Certification Authentication With Blockchain Protocol

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Abstract

By the time COVID-19 began to spread in the community, the issue of human body immunity had been debated, and every individual who had been exposed to the COVID-19 outbreak had begun to be discriminated against by the surrounding community either in the work environment or in the nearest location of the sufferer. Meanwhile, the quality for data storage of COVID-19 sufferers needs to be further researched. This study addresses the issues involved in providing privacy protection for COVID-19 sufferers and also authenticates the validity of patient data globally. The method used in developing this research uses blockchain technology that can facilitate verification of rapid test results with distributed systems. This allows covid-19 sufferers to be kept private and any individual who is concerned about the status of their condition during the COVID-19 period can check independently online after conducting tests. The result of this study is an application that can verify whether or not the individual is safe from this COVID-19 outbreak. Because each result of the test has been directly distributed to every community as well as the health industry so that further monitoring can be carried out as well as in-depth. This is much needed because it is one of the mitigations of the community in controlling the virus that has now spread throughout the world.

Keywords*: COVID-19, Patient Certification, Blockchain For Healthcare.*

1. Introduction

Blockchain is so associated with a crypto and belongs to the general ledger category of decentralized digital transactions without the control of an individual, group or company, where the thing recorded in the ledger is an information that must be ascertained the level of accuracy and validity[1]. Because if the information is submitted wrong then it will cause quite a crucial problem. As in previous research discussing The Blockchain Manifesto[2], it can be said that databases can only be added without being deleted so that each transaction will be summarized into a new block that continuously forms a chain, this eternity that makes the blockchain different from the regular database and immutability.

Various industries, businesses and even the government have been captivated by the charm and sophistication of blockchain technology, especially the healthcare industry which is currently struggling to deal with Coronavirus Disease 2019 (Covid-19), now learning to understand how the system works as well as the impact of blockchain technology.

Given the declining scale of the pandemic and finances, it makes sense that certification of COVID-19 patients using blockchain technology will be in high demand. In accordance with the possible ethical implications of such certification, whether for current pandemics or other health problems in the future, the concept of certification has a place that needs to be done development definitively[5].

Figure 1. Summary of Covid-19 Cases

Therefore, in the field of health also do not want to be left behind by the industrial revolution 4.0 that is currently being developed, especially in profiling people who have undergone an independent quarantine period or a series of health tests in this pandemic phase. Where profiling and a series of such tests produce complete patient history data in digital form equipped with blockchain sophistication. This covid-19 patient health certification is needed because as seen in figure 1. that so many corona sufferers in Indonesia, and every day the patient data will increase [7][8]. This led to the quality of the patient's profiling being questioned about its authenticity and whether the data could be safe from irresponsible coverage. This research confirms that covid-19 patient information distribution activities can be controlled and personalized using patient profiling based on blockchain technology, where such revolutionary technologies have a significant influence on public satisfaction and data security.

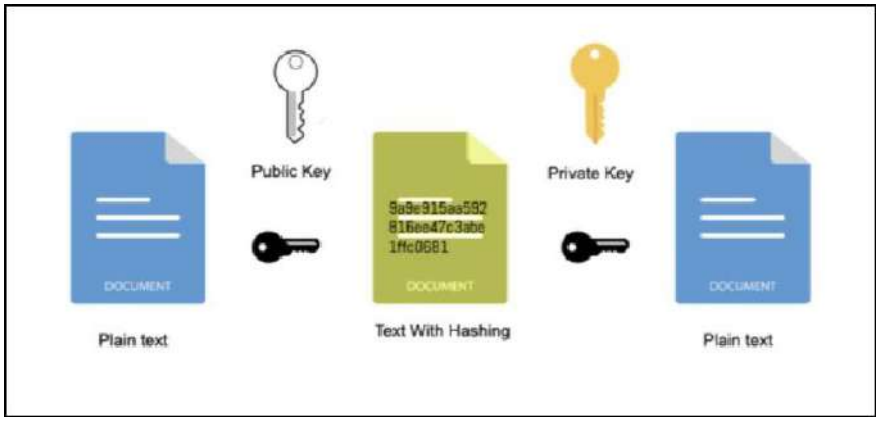

Figure 2. Blockchain Protocol Public Key and Private Key

Figure 2. Research is made where the results of profiling that want to be loaded need to be done in an encryption process as an effort to secure data so that it has 2 keys to be able to open it, namely public key and private key. Then the key needs to be enacted as well as hashing so that patient data cannot be falsified and misused by irresponsible parties. One of the methods used to improve the data security of covid-19 patients in Indonesia is the adoption of blockchain technology as an authentication medium in the form of SHA-256 hash, where the hash message is 256-bit long and contains a 64-digit hexadecimal code, so that the control of the Covid-19 virus for both the public and the government can be monitored in real time.

2. Related Work

This research is the first step towards a more transparent and technologically advanced health system. Where is the application of a decentralized health system[10], and this research has the potential to be developed better than previous research.

The embodiment of previous discoveries regarding data certification can be implemented in terminal users without the need for specialized hardware or software and is called "Zero-footprint data certification methods". Where the method is a form of providing electronic signatures to the server as an identification tool [11]. Previous studies have revealed relatively low demand and willingness for two-stage data certificates. It found that the public did not believe the second stage certificate could improve tenurial security relative to the first stage certificate except in cases where the first stage certification was poorly applied. This needs to be fixed and rely on blockchains that have trust characteristics[12].

The emergence of distributed ledger technology based on blockchain data structure, has given rise to a new approach to identity management aimed at providing digital identity to improve decentralization, data transparency and user control in every transaction involving the user's identity information. If a user in a system can enjoy high transparency, control, and security of personal data, the service provider becomes much more vulnerable in information security responsibilities[14], thus the use of blockchain can be the solution to the problem. Biomedical research has now increasingly leaned on a number of databases, more of which are public and continue to be enriched through scientific contributions. Given the dynamic nature of the data and its sensitive use in the health domain, it is important to be able to ensure the integrity of the retrieved and non-repudiation data i.e. that the data retrieved cannot be modified.

Over time, each health sector is required to be able to display information in a concise and necessary manner in the effective and efficient presentation of information. Information about the historical report results of each COVID-19 patient needs to be easily accessible using the official website. Therefore the use of appropriate technology and current developments is urgently needed, as is blockchain technology. Implementing blockchain to facilitate biomedical related to COVID-19 which is currently the world's discussion is able to optimize the delivery of information that is currently still one way. While there are a number of online technologies in use, digital disruption remains, with many challenges related to information security and privacy. The presence of blockchain in smartphone-integrated security work will be able to optimize existing security systems, authentication, and information that has been distributed in connection with covid-19 patient certification that can be guaranteed originality.

Blockchain technology can store learning records in a reliable, distributed way, provide credible digital certificates, realize the sharing of covid-19 patient history resources with smart contracts, and protect patient privacy as a service management and patient care effort. Facing critical needs for innovation in this pandemic outbreak, such as personalization and data science encourages patients to engage in the details of patient care and health recovery over authentication of personal medical data. So it takes a revolutionary technology to be able to handle that.

As a potential solution to address key challenges in healthcare, such as mapped communication, inefficient delivery of clinical reports, and fragmented health records, patient certification authentication is relied upon using blockchain technology. From previous research on data and health, it can ultimately be collaborated with blockchain technology. In order to maintain service management, administration can be managed effectively and efficiently, and aims to develop health activities that can help prevent the spread of COVID-19 virus with blockchain technology. Some blockchains for health applications have been presented in the description of 10 previous studies [23].

3. Material and Methods

In helping the health sector in dealing with pandemic problems that have already troubled the whole world, they need less energy, and therefore efforts in the prevention and control of viruses must always be considered by the government. One of the efforts is to transform the profiling of COVID-19 patient data that has been obtained and super-strict safeguards, because the mass media always want to highlight the problem until itores one's privacy is blockchain technology that is perceived to be the most appropriate solution in dealing with it.

Armed with a blockchain technology manifesto that has been done by previous research. That an application or system initiated by blockchain technology needs to have the following 5 characteristics:

1. Decentralization: Where every data profiling patients with COVID-19 should not be centered in one database alone. Any patient data should be accessible to all cooperating hospitals in the Republic of Indonesia. Wherever the patient is with only internet access all information is easier to obtain without having to go to the hospital.

2. Intermediation: There is no need for third parties to help access any data of covid-19 patients because healthcare blockchain technology and blockchain technology are all independently accessible to reduce data fraud.
3. Trust: Each patient only needs to believe in the healthcare blockchain that each patient's privacy has been maintained and secure by the system. And can no longer be abused by irresponsible people.
4. Immutability: Any check history can't be deleted, because it's immutable. Therefore, if there is an error in diagnosing or recording all history it remains in the system.
5. CR/UD: In the healthcare blockchain every data of the history of covid-19 patients will always increase. Because in blockchain systems know only Create and Also Read, therefore if a data has been linked to the blockchain then everyone can see the data as long as it has a public key and also a private key from the authorities. So that all data is transparent, and the hash help has been created [30].

Therefore, the implementation of the blockchain manifesto method is considered very suitable to secure the certification of covid-19 patients from irresponsible parties so that it is maintained originality. And blockchain technology too, COVID-19 patient certification authentication can be done independently anywhere, and anytime. Thus, it facilitates the management of patient services and care recommended by the government in efforts to prevent and control viruses in Indonesia.

4. Results and Discussion

In such a precarious situation due to the COVID-19 virus, community mitigation efforts in virus control need to lead to "Online". Supported by Artificial Intelligence as well as advanced technology devices today profiling patient data can be easily done by the healthcare industry.

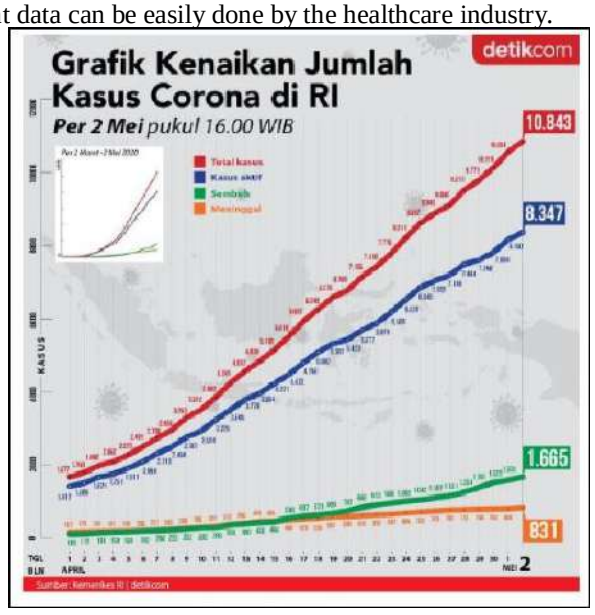

Figure 3. 'I don't know if I'm going to die'

Seen in (figure 3) That the increase in the number of COVID-19 cases in the Republic of Indonesia is increasing and unsettling the comfort of the surrounding community. Health workers from both researchers such as doctors and nurses should always check the health of patients every day. Therefore, it is not uncommon that any patient history data obtained after examination will be easy to change or leak to the general public.

The technical feasibility of information security can be improved through blockchain technology, ensured to have high integrity in achieving the confidentiality of the data of patients suffering

from Covid-19. This is in line with the management of patient services and care recommended by the WHO. Immutable code can be used to prevent undetectable updates to health industry databases.

Figure 3. Home Applications

(Figure 3) Describes the initial view where after logging in there will be a notification in the form of a notification on the bell icon regarding the updated status of the patient's health. To use this app requires access to the location as well as bluetooth so that if somewhere detected experiencing a red zone the notification will sound and immediately be checked in an internet-connected application.

Figure 4. Notification History

(Figure 4) Containing the latest notification notifications about each patient's health status, there is a SHA-256 hash derived from each patient's profiling. If the hash displays it, it can be seen in the patient data located at that location and illustrated through the hash code line. Don't be afraid for the privacy data of every registered patient to be misused, because basically with blockchain technology that can unlock that data only every patient and also health workers such as authorized doctors use public keys as well as private keys.

Examples of clickable hashes are as follows:

27AD6CFDA61D1B0F88DA3555EFE9F75E248F48D5E2246FFA52F7E6ECFEAADB2B

Figure 5. Patient Health Status

Figure 5. From existing notifications, detailed information can be obtained from patients who have been examined. Where there is a health status of healthy category, ODP, or PDP. Such information can only be opened by the relevant doctor/patient who has a private key. Blockchain has acted as a public key registry to sign every COVID-19 patient history. Therefore, with applications developed by researchers, when a person checks authentication and certifies his or her health history, it is only necessary to check that the certificate hash matches the hash created when the certification is issued. Like previous blockchain researchers, researchers are highly motivated to contribute to resolving this global pandemic. It looks at how existing technologies can be reused to aid immunity certification, as well as to assist in the prevention of viruses that are currently being launched by the government.

5. Conclusion and Related Work

Based on the discussion that has been described, the impact felt by the public, namely the data security of covid-19 patients collaborated with blockchain technology has immutable character. Patient data created in the form of digital blockchain technology allows it to be stored in the long run. Blockchain technology can maximize the service management and care of covid-19 infected patients. Blockchain technology has the potential, not only to align with the development of IoT, but in conjunction with the internet, to form a layer base to enable it to reach its full potential in service management and patient care in every healthcare sector.

In the implementation, any patient data that has been obtained after observation and testing can be connected to the blockchain network. So the data and health history obtained is still original to reduce cheating that often occurs in the field of health, especially for critical times such as pandemics that require guaranteeing the privacy of patients suffering from COVID-19.

Authentication of COVID-19 patient certification using blockchain does not currently stop the need for more research on blockchain technology. Instead, the next important step is to understand the interaction between chains to solve other problems that arise in the field of health. Not only to secure the privacy of covid-19 patients, applications built on research in decentralized certification, ready to be scaled, can be applied in general, and wait for testing as a form of virus control efforts as recommended by the government as well as as an effort to educate the public to quickly respond in monitoring personal health status. By implementing blockchain technology can help explore all variants of the health sector data security implementation better.

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References

[1] Ladita, P. (2020). Analisis penerapan aplikasi android tokocrypto menggunakan pendekatan design thinking dibantu dengan platform design toolkit v. 2 (Bachelor's thesis, Fakultas Sains dan Teknologi Universitas Islam Negeri Syarif Hidayatullah Jakarta).

[2] Isada, L. (2014). Perancangan Buku Ilustrasi Dengan Tema Peristiwa Kerusuhan Mei 1998. Jurnal DKV Adiwarna, 1(4), 11.

[3] Budiarta, K., Ginting, S. O., & Simarmata, J. (2020). Ekonomi dan Bisnis Digital. Yayasan Kita Menulis.

[4] Content, A. Review of the HATE NEWS CONFERENCE by Disruption Network Lab.

[5] Hattingh, M., Matthee, M., Smuts, H., Pappas, I., Dwivedi, Y. K., & Mäntymäki, M. (2020). Responsible Design, Implementation and Use of Information and Communication Technology.

[6] Gilchrist, A. (2016). Industry 4.0: the industrial internet of things. Apress.

[7] Kumar, S. (2020). Will COVID-19 pandemic diminish by summer-monsoon in India? Lesson from the first lockdown. medRxiv.

[8] Roser, M., Ritchie, H., Ortiz-Ospina, E., & Hasell, J. (2020). Coronavirus disease (COVID-19). Our World in data.

[9] Nurdiyanto, H., & Rahim, R. (2017, October). Enhanced pixel value differencing steganography with government standard algorithm. In 2017 3rd International Conference on Science in Information Technology (ICSITech) (pp. 366-371). IEEE.

[10] Syafaruddin, S., Asrul, A., Mesiono, M., Wijaya, C., & Usiono, U. (2016). Inovasi pendidikan: suatu analisis terhadap kebijakan baru pendidikan.

[11] Tuliani, J. R., & Bursell, M. (2014). U.S. Patent No. 8,635,457. Washington, DC: U.S. Patent and Trademark Office.

[12] Bezu, S., & Holden, S. (2014). Demand for second-stage land certification in Ethiopia: Evidence from household panel data. Land Use Policy, 41, 193-205.

[13] Dunphy, P., & Petitcolas, F. A. (2018). A first look at identity management schemes on the blockchain. IEEE Security & Privacy, 16(4), 20-29.

[14] Lazarovich, A. (2015). Invisible Ink: blockchain for data privacy (Doctoral dissertation, Massachusetts Institute of Technology).

[15] Nurhaeni, T., Karts, K. W., & Hardini, M. (2019). Viewboard Effectiveness on Raharja Internet Cafe Website as Sales Information Submission Media. Aptisi Transactions On Technopreneurship (ATT), 1(1), 20-26.

[16] HASANAH, U. (2018). Pengaruh Motor Relearning Programme (MRP) Terhadap Kemampuan Activity Of Daily Living (ADL) Pada pasien Post Stroke Di Makassar. Skripsi: Universitas Hasanuddin Makassar.

[17] Mytis-Gkometh, P., Drosatos, G., Efraimidis, P. S., & Kaldoudi, E. (2018). Notarization of knowledge retrieval from biomedical repositories using blockchain technology. In Precision Medicine Powered by pHealth and Connected Health (pp. 69-73). Springer, Singapore.

[18] Aini, Q., Rahardja, U., Handayani, I., Hardini, M., & Ali, A. Utilization of Google Spreadsheets as Activity Information Media at the Official Site Alphabet Incubator.

[19] Sunarya, P. A., Rahardja, U., Sunarya, L., & Hardini, M. (2020). The Role Of Blockchain As A Security Support For Student Profiles In Technology Education Systems. InfoTekJar: Jurnal Nasional Informatika dan Teknologi Jaringan, 4(2), 13-17.

[20] Application of Blockchain Technology in Online Education

[21] Ekblaw, A., Azaria, A., Halamka, J. D., & Lippman, A. (2016, August). A Case Study for Blockchain in Healthcare:"MedRec" prototype for electronic health records and medical research data. In Proceedings of IEEE open & big data conference (Vol. 13, p. 13).

[22] Zhang, P., Walker, M. A., White, J., Schmidt, D. C., & Lenz, G. (2017, October). Metrics for assessing blockchain-based healthcare decentralized apps. In 2017 IEEE 19th International Conference on e-Health Networking, Applications and Services (Healthcom) (pp. 1-4). IEEE.

[23] Swan, M. (2015). Blockchain: Blueprint for a new economy. " O'Reilly Media, Inc.".

[24] Rahardja, U., Hidayanto, A. N., Hariguna, T., & Aini, Q. (2019, November). Design Framework on Tertiary Education System in Indonesia Using Blockchain Technology. In 2019 7th International Conference on Cyber and IT Service Management (CITSM) (Vol. 7, pp. 1-4). IEEE.

[25] Elpa, H. (2016). Penerapan Transparansi dan Akuntabilitas Dalam Pelayanan Publik Pada Instalansi Gawat Darurat Rumah Sakit Umum Daerah Sungai Dareh Kabupaten Dharmasraya (Doctoral dissertation, Universitas Andalas).

[26] Rizki, M. P., & Fakhruddin, F. (2015). Intermediasi perbankan syariah terhadap pertumbuhan ekonomi Indonesia. Jurnal Ekonomi dan Kebijakan Publik Indonesia, 2(1), 42-55.

[27] Sunarya, P.A. & Rahardja, Untung & Desrianti, D.I.. (2016). Development assessment module portfolio e-IMEi students with learning to improve the quality of concentration case study mavib. 13. 3597-3606.

[28] Harshini, V. M., Danai, S., Usha, H. R., & Kounte, M. R. (2019, April). Health Record Management through Blockchain Technology. In 2019 3rd International Conference on Trends in Electronics and Informatics (ICOEI) (pp. 1411-1415). IEEE.

[29] 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.

[30] Dinh, T. T. A., Liu, R., Zhang, M., Chen, G., Ooi, B. C., & Wang, J. (2018). Untangling blockchain: A data processing view of blockchain systems. IEEE Transactions on Knowledge and Data Engineering, 30(7), 1366-138.

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Application of Blockchain Technology for Digital Transaction Security on Business Incubator Websites

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Abstract

The application of Blockchain technology in the context of providing security for transactions in the digital era 4.0 to prevent manipulation of transaction recording reports by irresponsible parties. By using research methods 10 (ten) literature reviews and methods of formulating problems, designing research, collecting data, processing & presenting data, analysis & research reports are expected to solve security problems in transactions. At present security in transactions is still very minimal, therefore a blockchain technology is needed to secure transactions where data can still be manipulated. Specifically, there are 2 (two) benefits of this research that use blockchain technology, (1) transactions become safer in the presence of encryption codes, (2) transactions become more transparent with blockchain. This research implements the encryption code into the payment system using AI Coin, where payment is now cashless, to make it more secure and transparent in transactions.

Keywords*: Blockchain, AI Coin, Encryption code*

1. Introduction

Information-based technology in the digital era 4.0 currently has a very high influence on life. With the existing developments, now contributes to the payment system in daily activities. One of them aims to increase the effectiveness and efficiency [1]. This happens because technological sophistication requires the right time [2]. At present, cashless is becoming a very important payment alternative [3]. Cashless is a proof that someone has made or made a payment [4]. In addition there is a technology that is used as a reliable alternative, Blockchain Technology. These developments are able to encourage us to continue to learn and balance changes so as not to be left behind.

2. Research Method

Explaining research chronological, including research design, research procedure (in the form of algorithms, Pseudocode or other), how to test and data acquisition. The description of the course of research should be supported by references, so the explanation can be accepted scientifically. Tables and Figures are presented in the center, as shown below and cited in the manuscript as (Table 1) and (Figure 1).

Figure 1. Logo AI Coin

ABC (Alphabet Blockchain) is a blockchain technology that is carried by a campus incubator called the Alphabet Incubator which is used to protect all activities in the campus environment and the wider community. This system can issue security codes using blockchain technology, one of which is a certificate and AI Coin [5].

Figure 2. AI Coin Logo

AI Coin is a product produced by Alphabet Blockchain. AI Coin itself already uses blockchain technology where in the AI Coin there is an encryption code that can protect its use. There are 2 (two) problems, the first is that there is no online system for verifying the authenticity of AI Coin or it is still being done conventionally. The second is payment security and records that do not yet exist, so manipulation by irresponsible parties can occur. In addition, the recording process is also difficult to do because it can only be done by the central government [6].

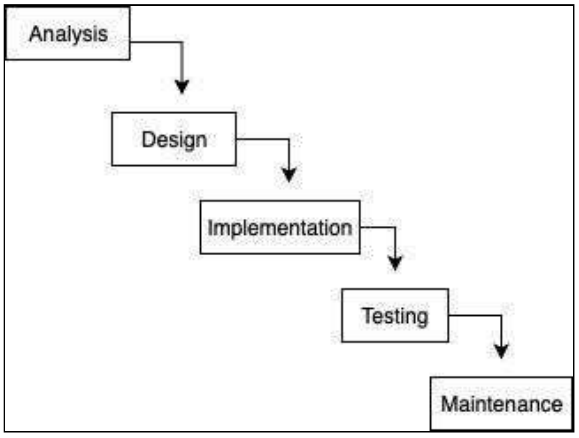

Figure 3. Waterfall Development Method

2. Research Method

2.1 Literature review

This research was conducted using literature review with the literature review method [13]. According to Rahardja, U. (2016), Literature Review discusses the subject of a journal or scientific work with the discussion to be studied relevant to previous or existing research topics [14]. The research that has been carried out becomes the foundation for the achievement of this research. There are 10 (ten) literature studies that are used as information for this research, including:

1. The study was conducted by Zyskind, G., & Nathan, O. (2015). This study describes a decentralized personal data management system that ensures users own and control their data. We implement a protocol that converts block chains into automatic access control that does not require trust in third parties [15].
2. The study was conducted by Wright, A., & De Filippi, P. (2015). This research is about Blockchain which enables the development of new governance systems with more democratic or participatory, and decentralized (autonomous) decision making that operate through computer networks without human intervention [16].
3. The study was conducted by Forte, P., Romano, D., & Schmid, G. (2015). This research implements blockchain technology that can be used not only for cryptocurrency, but to register, confirm and transfer all types of contacts and properties [17].
4. The study was conducted by Huckle, S., Bhattacharya, R., White, M., & Beloff, N. (2016). The focus of this research is understanding how blockchain can be exploited to create decentralized and shared economic applications that allow people to monetize, safely, their goods to create more wealth [18].
5. The study was conducted by Samaniego, M., & Deters, R. (2016). This research manages device configuration, stores sensor data and activates micro.
6. payments. Which presents the idea to use blockchain as a service for IoT and evaluate the performance of cloud and edge blockchain implementations.
7. The study was conducted by Ouadah, A., Elkalam, A. A., & Ouahman, A. A. (2017). This research discusses how blockchain can be very interesting to face the challenges that arise. Therefore Fair Access as a new decentralized pseudonym framework and privacy preservation that maintains the consistency of blockchain technology to manage access control on behalf of restricted devices payments [20]. Which presents the idea to use blockchain as a service for IoT and evaluate the performance of cloud and edge blockchain implementations [19].
8. The study was conducted by Ouadah, A., Elkalam, A. A., & Ouahman, A. A. (2017). This research discusses how blockchain can be very interesting to face the challenges that arise. Therefore Fair Access as a new decentralized pseudonym framework and privacy preservation that maintains the consistency of blockchain technology to manage access control on behalf of restricted devices [20].
9. The study was conducted by Huh, S., Cho, S., & Kim, S. (2017). This research uses a blockchain, which can control and configure IoT devices. Manage keys using RSA public key cryptosystem where public keys are stored in Ethereum and private keys are stored on individual devices [21].
10. Research conducted by Padeli, Sudaryono and Indri Handayani in 2014 Discusses a Program that is able to provide convenience to consumers who seek and want to buy products that are sold so that sales, orders as well as service information and information that is presented the latest or up to date [22]
11. Discussion on a College Grants website, is a website created to serve and provide information. Various developments and updates are carried out by the manager in order to present interesting information, in its application the website management does not yet know exactly how the visitor activity cycle is [23].
12. Research conducted in 2016, that reports using Rinfo Sheets are easier than using Microsoft Excel because they can be accessed and stored online [24].

From the 10 (ten) review literature, it can be concluded that blockchain technology is very influential on transactions that use AI Coin. There is an advantage in this AI Coin that has already implemented a security system using blockchain technology that can not be manipulated by anyone.

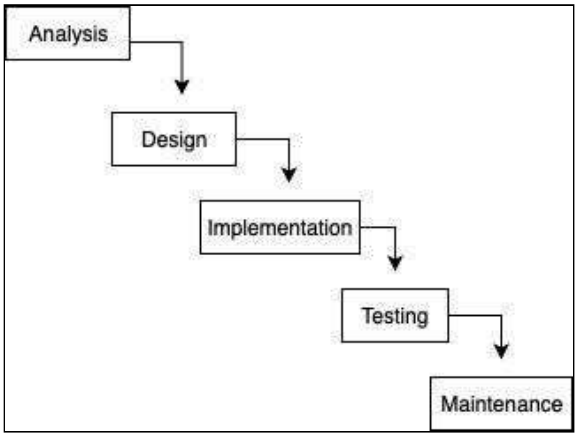

Figure 3. Waterfall Development Method

There are 5 (five) information in this research method:

1. Analysis
   In this analysis, it is necessary to make observations in order to find out the background of what problems occur in recording transactions before using blockchain technology.
2. Design
   Designing payment concepts to make it easier to apply in everyday life.
3. Implementation
   Preparation of data needed in designing AI Coin.
4. Testing
   Merge between AI Coin with a digital payment system to fulfill the recording of transactions. If the data has been processed, information that will be useful to the general public will appear. And the information presented must be clear and easy to understand.
5. Maintenance
   Improved software updates and improved implementation of the blockchain system

3. Results and Analysis

3.1 Problem Analysis

If seen from the current problems, the payment system does not yet have a high security system and a conventional recording system. This method was less successful in utilizing technology in the increasingly sophisticated digital era [25] [26] [27]. Currently the system is running well but still has shortcomings such as payments that do not have security that is easily manipulated.

3.2 Blockchain integration into AI Coin

AI Coin convicted will continue to grow. At present, AI Coin uses a centralized system. In terms of consumers, there is a view of a lack of trust that is easily understood [28]. Therefore, transparency is needed security.

3.3 Solution to problem

In the verification path that is run very detailed, will cause problems. Therefore, a system that can minimize the problem is found by implementing encryption codes for digital payment security systems. This is done transparently and can distribute data safely. Blockchain with a distributed system is the right solution at this time.

The concept of digital transaction security through encryption codes reduces the risk of manipulation and duplication of digital documents. Where the encryption code will have a unique ID that is different [29] [30].

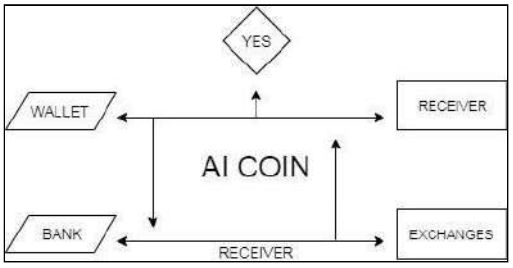

Figure 4. Flow of AI Coin.

The picture above explains how AI Coin works, starting from the wallet that will send funds to the recipient, before the funds are received will be checked by a system that has used blockchain technology, then after display implementation in the Alphabet Blockchain website which has many kinds of features.

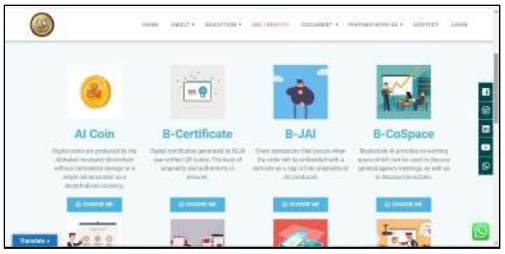

Figure 5. Display the BCAI Platform menu.

In the BCAI Platform menu display there are 10 Identities from the Alphabet Incubator Blockchain.

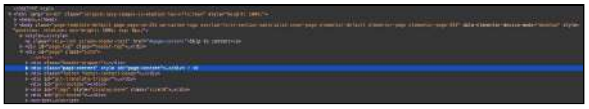

Figure 6. Listing of BCAI Platform menu programs

It is listed in the BCAI Platform menu, where AI Coin is a service for the wider community and can be obtained through the Alphabet Blockchain website.

Figure 7. Display of the AI Ledger Blockchain

Figure 8. Listing of the AI Ledger Blockchain program

AI Ledger to record all transactions that run on the Alphabet Blockchain website. The public can also see transactions in digital form that can be scanned and verified so that if there is fraud on the transaction then the public can know that [31]. The encryption code will be sent to the user to verify their account, the results of the evaluation of the AI Ledger blockchain system can be viewed on the website.

3.4 AI Coin Test

XsactionSheet LEDGER ABC									
ABC	Total Coin	Harga		Total Harga		Presentasi			
Saham	1,000	25,000		25,000,000		100%			
Pengeluaran	12	25,000		300,000		1.20%			
Sisa Saham	988	25,000		24,700,000		98.80%			
Members									7
Rain	Vio	Erin	Dilo	Elo	Bilo	Aui	Alni	Shanti	Firman
2	2	1	7	0	0	0	0	0	0
Khop	Dugen	Kriss	Sasa	Dhiko	Rio	Se	Cheetah	Miles	Pipit
0	0	0	0	0	0	0	0	0	0

Figure 9. ABC Ledger

In AI Ledger there are shares, expenditures and remaining shares that are already well represented. So that transactions are transparently seen by members increases and decreases from AI Coin. 1 AI Coin in the amount of IDR 25,000. The achievement of 7 (seven) member contributions proves that AI Coin is going well with the Blockchain.

4. Conclusion

With the integration of Blockchain Technology in everyday life, changes in the industrial and academic world are bound to happen. In the application of Blockchain Technology as a security in a digital transaction system produces 3 (three) conclusions, namely:

1. Blockchain technology as a security in digital payment systems and transaction recording is a medium that can be used to verify payments online.
2. With the Blockchain technology, it is able to increase payment security, in order to avoid official or informal manipulation
3. Blockchain technology is a system that can connect computer networks in a centralized and distributed manner.

References

[1] Rahardja, U., Aini, Q., & Santoso, N. P. L. (2018). Pengintegrasian YII Framework Berbasis API pada Sistem Penilaian Absensi. SISFOTENIKA, 8(2), 140-152.

[2] Rahardja, U., Aini, Q., & Khoirunisa, A. (2017). Implementasi Business Intelligence Menggunakan Highchart pada Sistem Penilaian Absensi berbasis YII Framework. CSRID (Computer Science Research and Its Development Journal), 9(2), 115-124.

[3] Handayani, I., Febriyanto, E., & Solichin, K. R. P. (2018). Penerapan Viewboard Sebagai Media Informasi Sidang Skripsi Pada PESSTA+ di Perguruan Tinggi. Technomedia Journal, 2(2), 52-62.

[4] Rahardja, U., Moein, A., & Lutfiani, N. (2018). Leadership, Competency, Working Motivation and Performance of High Private Education Lecturer with Institution Accreditation B: Area Kopertis IV Banten Province. Man India, 97(24), 179-192.

[5] Rahardja, U., Aini, Q., Hayat, A., & Santoso, N. P. L. PENERAPAN GAMIFIKASI PADA PENILAIAN ABSENSI UNTUK MENINGKATKAN MOTIVASI BIMBINGAN. EDUTECH, 18(1), 12-24.

[6] Rahardja, U., & Harahap, E. P. (2019, July). Implementation Of Information Planning and Strategies Industrial Technology 4.0 to Improve Business Intelligence Performance on Official Site APTISI. In Journal of Physics: Conference Series (Vol. 1179, No. 1, p. 012111). IOP Publishing.

[7] Rahardja, U., Aini, Q., Azizah, N., & Santoso, N. P. L. (2018). Efektivitas Akuntansi Online dalam Menunjang Proses Rekonsiliasi. Nusantara Journal of Computers and its Applications, 3(2)
[8] Yusup, M., Naufal, R. S., & Hardini, M. (2019). Management of Utilizing Data Analysis and Hypothesis Testing in Improving the Quality of Research Reports. Aptisi Transactions On Management, 2(2), 159-167.
[9] Warsito, A. B., Fajarita, L., & Nazori, A. Z. (2016). Proteksi Keamanan Dokumen Sertifikat File Jpeg pada Perguruan Tinggi dengan Menggunakan Steganografi dan Kriptografi. Telematika MKOM, 4(1), 83-89.
[10] Damara, Y. R., & Abadi, A. M. (2017). PENERAPAN QR CODE PADA SISTEM PEMESANAN DI INDUSTRI RETAIL. Jurnal Matematika Vol, 6(6)
[11] Widuri. (3 Maret 2014). CEI: Central Event Information. Diperoleh 15 Oktober 2018. https://widuri.raharja.info/index.php/CEI:_Central_Event_Information
[12] Raharja, U., Harahap, E. P., & Devi, R. E. C. (2018). Pengaruh Pelayanan dan Fasilitas pada Raharja Internet Cafe Terhadap Kegiatan Perkuliahan Pada Perguruan Tinggi. Jurnal Teknoinfo, 12(2), 60-65.
[13] A. Watkins, "Technological Forecasting & Social Change Identifying potentially disruptive trends by means of keyword network analysis," 2017.
[14] Aini, Q., Simbolon, R., & Dewi, S. R. (2019). Effects of Credit Memos on Performance Accountant on Uncollectible Receivables. Aptisi Transactions on Management (ATM), 3(2), 149-158. Zyskind, G., & Nathan, O. (2015, May). Decentralizing privacy: Using blockchain to protect personal data. In 2015 IEEE Security and Privacy Workshops (pp. 180-184). IEEE.
[15] Wright, A., & De Filippi, P. (2015). Decentralized blockchain technology and the rise of lex cryptographia. Available at SSRN 2580664.
[16] Forte, P., Romano, D., & Schmid, G. (2015). Beyond Bitcoin-Part I: A critical look at blockchain-based systems. IACR Cryptology ePrint Archive, 2015, 1164.
[17] Huckle, S., Bhattacharya, R., White, M., & Beloff, N. (2016). Internet of things, blockchain and shared economy applications. Procedia computer science, 98, 461-466.
[18] Samaniego, M., & Deters, R. (2016, December). Blockchain as a Service for IoT. In 2016 IEEE International Conference on Internet of Things (iThings) and IEEE Green Computing and Communications (GreenCom) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData) (pp. 433-436). IEEE.
[19] Ouaddah, A., Elkalam, A. A., & Ouahman, A. A. (2017). Towards a novelprivacy-preserving access control model based on blockchain technology in IoT. In Europe and MENA Cooperation Advances in Information and Communication Technologies (pp. 523-533). Springer, Cham.
[20] Huh, S., Cho, S., & Kim, S. (2017, February). Managing IoT devices using blockchain platform. In 2017 19th international conference on advanced communication technology (ICACT) (pp. 464-467). IEEE.
[21] Untung, R. (2011). Definisi iLearning. Raharja Enrichment Centre (REC).Tangerang.
[22] Tiara, K., Nurhayati, S., Heriyani, N., 2016. Optimalisasi Business Intelligence Pada Widuri Berbasis Mediawiki Dalam Monitoring Rekapitulasi Data. Creative Information Technology Journal, No. 1, Vol. 4, Hal.72-81
[23] Kristiadi, D., & Mustofa, K. Platform Gamifikasi untuk Perkuliahan. IJCCS(Indonesian Journal of Computing and Cybernetics Systems), 11(2), 131-142.
[24] Rahardja, U., Aini, Q., & Faradilla, F. (2018). Implementasi Viewboard Berbasis Interaktif Javascript Charts Pada Sistem Penilaian Perkuliahan. Jurnal Ilmiah Teknologi Informasi Asia, 12(2), 91-102.
[25] Rudito, P., & Sinaga, M. F. (2017). Digital Mastery, Membangun Kepemimpinan Digital Untuk Memenangkan Era Disrupsi. Gramedia Pustaka Utama.

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Verification Of Independent Study Assessment Using Blockchain Technology

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Abstract

Current technological developments greatly impact the assessment verification system. To find out the student benchmarks in the results of teaching and learning activities during the learning system assessment process is very important in the scope of higher education. With the existence of blockchain technology widely applied in the world of Education, having the advantage of a decentralized system and strong cryptography can help universities in building infrastructure. Universitas Raharja is one of the educational institutions that has implemented an online assessment system (PEN +), which will use blockchain technology to verify the assessment of independent studies. which provides services to Raharja University lecturers in verifying student grades that can be accessed anywhere and at any time. However, currently the verification process for the independent study assessment that has been carried out is still done manually which results in verification not with very strong security. The existence of an independent study assessment verification uses blockchain technology to produce strong data security that did not occur before. In the PEN + lecturer assessment system for the independent study assessment verification process, it cannot yet enter the value of Independent study (IS) in real time. Therefore, there is a need for development in this blockchain technology for the verification process of independent study assessment. In this study there were 10 (ten) literary studies on verification of valuation. Thus there are several benefits that lecturers need not hesitate to verify the assessment, the process by using blockchain technology produces very strong security

Keywords*: Blockchain, Independent Study, Verification Of Grades*

1. Introduction

The development of information and communication technology has greatly encouraged various educational institutions to obtain concepts in the field of assistance to improve their usefulness [1]. The rapid growth of information technology and computers enables the development of computer-based academic systems that facilitate the process of storing, organizing, and processing various data [2]. One of them is the assessment system at Raharja University for the Independent Study [IS] verification process [3]. As in the current era, competition is one of the keys to success in every college that is always required to be able to compete broadly and globally. However, universities must be able to provide and present efficient and fast services to students [4].

In its implementation it must also be equipped with several facilities to support the level of success of program objectives and services provided effectively [5]. Using blockchain technology can make the assessment system for the verification process of Independent Study (IS) assessment better [6]. This assessment system includes a very important part in the teaching and learning process activities that students undertake [7]. Assessment of student benchmarks in measuring abilities during the process of teaching and learning activities and information needed by students within the scope of tertiary institutions [8].

In an effective assessment process at Raharja University not only applies a standardized system method, but will also use the process of verifying the Independent Study assessment using blockchain technology [9]. In addition, Raharja University always strives to meet the need for information systems that can improve the process of academic performance [10]. The process of evaluating and verifying the Independent Study (IS) assessment at Raharja University is still done manually and has not been

computerized. It is very ineffective and inefficient and does not produce strong data security because it will spend time and money just to come to campus. Such a process must be carried out in an easier and more practical way if there is a system for verifying the assessment of independent studies using blockchain technology and conveying information online. In the process of sending good and effective information is determined by the system and model used [11].

For the sake of assessment, modern methods must be applied to change those that are not effective, so that there is a medium to enter grades and convey information to students quickly and accurately [12]. There needs to be a system update where lecturers can enter online grades through the website, to facilitate and efficiently access lecturers anywhere and anytime. Through the improvement of the conventional assessment process system will be transformed into online so that the verification of the Independent Study assessment at Raharja University can be done easily by lecturers [13].

2. Research Method

The process of research stages can be seen in (Figure 1).

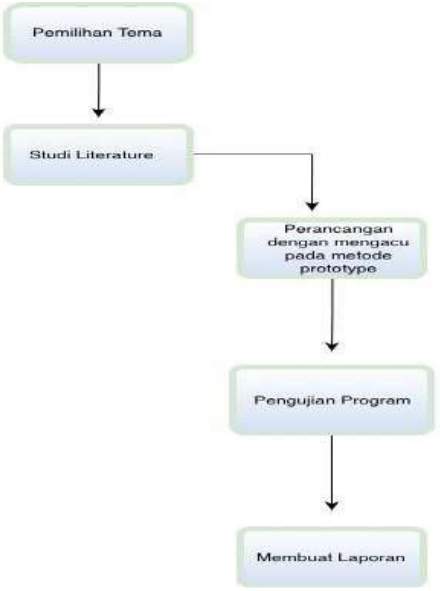

Figure 1. Stages of research

Description : For point number 1 to determine the problem, then select the theme to be taken, namely input verification Independent Study assessment. In point number 2, literary studies is used to find references in the PEN+ system. At point number 3 which uses blockchain technology that can be adapted to problems and programs. In point number 4 which is program testing, this stage is carried of the program that has been made. At point number 5 make a report in the form of an online document.

2.1 Literature Review

Here are 10 (ten) Review literature used in this study :

1. Research conducted by Untung Rahardja, Nikita Jova Dejo Suwito, Fernanda Setyobudi Armansyah in 2017 with the title "Application design PEN + Mobile based to facilitate the performance of lecturers at higher education". This research discusses the design of online assessment based mobile applications that can be accessed in a smartphone to be able to input the value by lecturers [14].
2. Research conducted by Qurotul Aini, Untung Rahardja, Anoesyirwan Moeins, the goddess Mariana Apriani in 2018 with the title "Application of Gamification in Information systems assessment of student exams to improve lecturer performance". This research discusses the application of gamification to improve the performance of lecturers in conducting student value input on time so that lecturers get appreciation so that students can see the value quickly [15].

3. Research conducted by Diah Aryani, Qurotul Aini, Fernanda Setyobudi Armansyah in 2017 titled "Designing Android Package Mobile Web on a higher Education assessment system". This research discusses the Android package-based assessment system to make it more accessible to lecturers through a smartphone [16].
4. Research conducted by Anoesyirwan, Sudaryono, Alfiah Khoirunisa in 2018 under the title "Utilization of Management of Writing Scientific in the Learning Process in Higher Education". This research discusses the management of scientific work writing needed in the preparation of scientific papers to create good works by following the development of the industrial ERA 4.0 [17].
5. Research conducted by Untung Rahardja, Qurotul Aini, Vivid Christian Alfad Zebua year 2019 under the title "Implementation of student checking system of the YII-based school Framework for higher education". This research discusses how the system can determine which students can be sure to follow the CTF conducted by the head of Department [18].
6. Research conducted by Untung Rahardja, Qurotul Aini, Nuke Puji Lestari Santoso in 2018 under the title "Integrating YII-based Framework APIS into attendance assessment systems". Research discusses the utilization of Google + in the student Attendance assessment system so that there is a profile that makes it easy for lecturers to be informed about student guidance [19].
7. Research conducted by Untung Rahardja, Qurotul Aini, Hani Dewi Ariessanti, Alfiah Khoirunisa year 2018 with the title "Effect of gamification on ILEARNING EDUCATION) in improving student motivation learning". This study discusses modern learning methods such as the gamification applied to an iLearning Education that is assessed to increase the motivation of students in implementing the learning process in the classroom [20].
8. The research was done by Untung Rahardja, Eka Purnama Harahap, Dwi Anjani in 2018 with the title "Utilization of Rinfogroup as a Media discussion and active student Assessment". This research discusses the utilization of Rinfogroup as a media discussion between lecturers and students by utilizing rinfo email in terms of online learning outside of lecture hours, as well as lecturers can explain the material and can monitor the active Student [21].
9. The research was conducted by Qurotul Aini, Untung Rahardja, Anoesyirwan Moeins, Ayu Martha Wardhani in 2018 under the heading "Application of Market Query Data (DMQ) in the YII Framework-based assessment system". This research discusses the utilization of Market Query Data so that when many users access a website does not experience slowness, because it only reads last update only [22].
10. Research conducted by Untung Rahardja, Qurotul Aini, Dian of Mustika Putri in 2018 with the title "Automated Email System Utilization (AEMS) as the notification of learning outcomes assessment". This study discusses the use of media notification lecturer as a reminder for the process of entering the student value so that the RPU and head of the department can monitor[23]

3. Finding

3.1. Problem

The last stage is, students need to come to campus to see their value in the magazine wall and should be queued, this process is really time consuming and costly for students.

3.2. Problem Solving

In order to address the problems described above, there is a need for development in the assessment and input system so that the process of the input value can be done online, so as to facilitate the performance of lecturers and students Easily obtain the value result information. PEN + is used in the means of input and delivery of information about the student's value. Here is the program listing :

```
$count= count($modelModelsname->getListKelasDosenIndependentStudy(SelisihStatus,$selisih,$tahunAjar));
if ($count > 0) {
?>

<div class="panel panel-inf0">
    <div class="panel heading"> <i class="fa fa-paw fa-paw"></i> List Kelas Independent Study</div>

    <div class="panel-body">

    <div class="data Table_wrapper">

    <table class="displayPen table table-striped table-bordered dt-responsive nowrap" width=100%"
cellspacing="0" id="">
        <thread>
            <tr>
                <th>No</th>
                <th>Kelas</th>
                <th>Mhs</th>
                <th>Start Input s/d Dateline</th>
                <th>Submit</th>
                <th>Status</th>
            <tr>
        </thead>
        <body>
            <?php
```

```
$no = 1 ;

        foreach ($modelModelsname->getListKelasDosenIndependentStudy($SelisihStatus,$Selisih,$tahunAjar) as
$data) {

        $tglujian = ($data[$Tanggal] NULL ?'_' :
Yii:"$app->Modelsname->converterwaktu($data[$tanggal]));
        $tglUjianStart = ($data[$start] == '_' ? '_';
Yii::$app->Modelsname->converterwaktu($data[$Start]))
        $batasAkhirInput = ($data[$End] == NULL ? " : 's/d
Yii::$app->Modelsname->converterwaktu($data)[$End]));
        $tglSubmit = ($data[$DateSubmit] == NULL ? '_' ;
Yii::$app->Modelsname->converterwaktu($data[$DateSubmit]));
        $statusSubmit = $data[$StatusSubmit];
```

Figure 3. Process of input value

The picture above is a listing program for lecturers to process the input verification of independent study assessment.

3.3 Research Implementation

1. Front End Pen + display

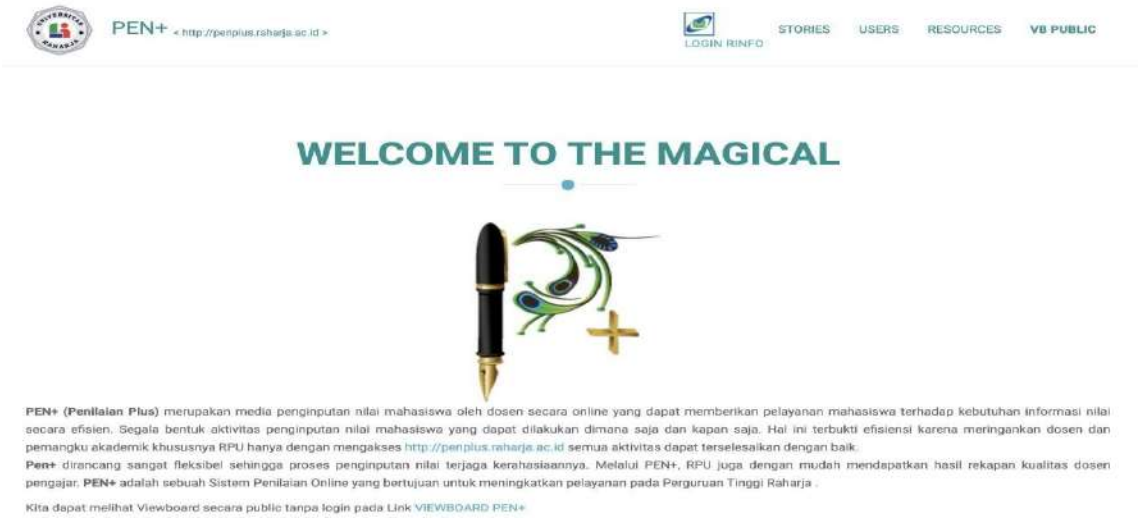

Figure 4. Main menu when lecturers access the pen + website http://penplus.raharja.ac.id/web/site/login

2. Independent Study Menu Display

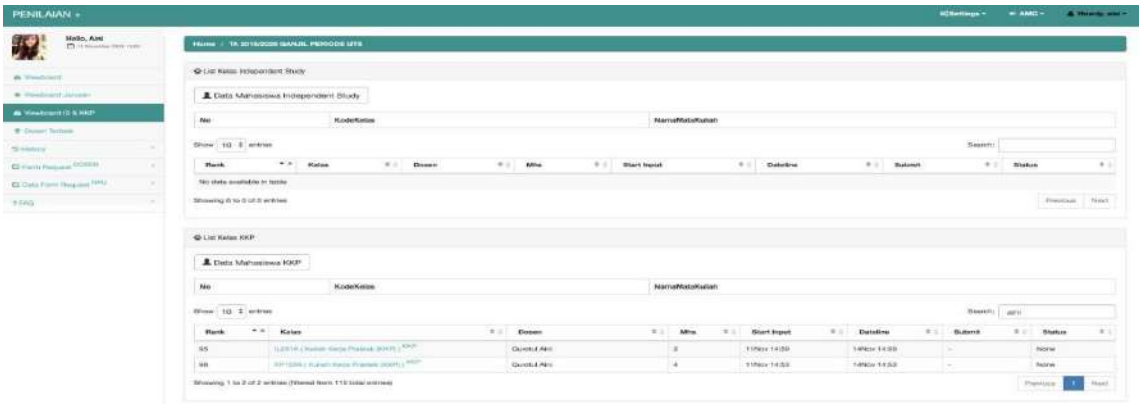

Figure 5. Independent Study Menu Display
in this view there is a list of classes Independent study that can be done by lecturers.

Figure 6. Independent Study class List View

3. Input penilaian IS

Figure 7. Display before input Grade

Figure 8. Display when input grade
In this view the value or value provided is only a grade

Figure 9. Display When Grade is Given

4. Independent Study Input Grade Results

Figure 10. Input Grade Independent Study final result

4. Conclusion

Based on what has been explained above, it can be concluded that the Independent study value input system in PEN + (valuation Plus) is an effective system in providing facilities for lecturers when making the input value process in the form of Independent Study Assessment becoming easier and more efficient.

References

[1] Rafika, A. S., Febriyanto, E., & Syafa'ah, F. Pengaruh Metode Pembelajaran Ilearning pada Kelas Independent Study terhadap Peningkatan Kualitas Pembelajaran dan Penilaian. Cyberpreneurship Innovative and Creative Exact and Social Science, 5(1), 1-14.

[2] Aini, Q., Rahardja, U., Moeins, A., & Apriani, D. M. (2018). Penerapan Gamifikasi pada Sistem Informasi Penilaian Ujian Mahasiswa Untuk Meningkatkan Kinerja Dosen. Jurnal Informatika Upgris, 4(1).

[3] Aryani, Diah, Qurotul Aini, and Fernanda Setyobudi Armansyah. "Perancangan Android Package Mobile Web pada Sistem Penilaian di Perguruan Tinggi." SISFOTENIKA 7.2 (2017): 155-166.

[4] Warsito, A. B., & Yusup, M. (2014). Kajian Yii Framework dalam Pengembangan Website Perguruan Tinggi. CCIT Journal, 7(3), 437-451.

[5] enderi, H., Zcull, H., & Putri, C. (2019). Utilization of Testimonials Menu as Submission Media Information on Buyer Satisfaction on the Website E-Commerce Raharja Internet Café. Aptisi Transactions On Technopreneurship (ATT), 1(1), 101-108. ATT

[6] Untung, R., Muhamad, Y., & Eva, R. Optimalisasi Key Performance Indicators (KPI) Melalui Pendekatan Balance Scorecard Upaya Mengimplementasikan Performance Management System (PMS) Pada Perguruan Tinggi. CCIT Journal ISSN, 6(2).

[7] Rahardja, U., Aini, Q., & Zuliana, S. R. (2016). Metode Learning Management System (LMS) iDu Untuk Mendukung Kegiatan Belajar Mengajar MIT Pada Perguruan Tinggi Raharja. Cyberpreneurship Innovative and Creative Exact and Social Science, 2(2), 156-172.

[8] Rahardja, U., Aini, Q., & Enay, N. (2017). Optimalisasi Dashboard pada Sistem Penilaian Sebagai Media Informasi di Perguruan Tinggi. Sisfotenika, 7(2), 167-176.

[9] Sunarya, P. A., Rahardja, U., Sunarya, L., & Hardini, M. (2020). The Role Of Blockchain As A Security Support For Student Profiles In Technology Education Systems. InfoTekJar: Jurnal Nasional Informatika dan Teknologi Jaringan, 4(2).

[10] Rahardja, U., Harahap, E. P., & Anjani, D. (2018). Pemanfaatan Rinfogroup Sebagai Media Diskusi Dan Penilaian Keaktifan Mahasiswa. Sisfotenika, 8(1), 81-92.

[11] Harjono, H., & Purwanto, L. A. (2015). Rancang Bangun Aplikasi Penilaian Kerja Praktek (KP) Berbasis Android Program Studi Teknik Informatika Universitas Muhammadiyah Purwokerto. JUITA: Jurnal Informatika, 3(4).

[12] Sunarya, P., Bernard, D., & Damanik, D. (2019). Viewboard Implementation Based on Javascript Charts As a Media for Submitting Sales Information on a Green E-Commerce Website Light Cafe. Aptisi Transactions On Technopreneurship (ATT), 1(1), 11-19.

[13] Handayani, I., Aini, Q., & Oktaviani, F. (2016). Penerapan Sistem Validasi Jurnal Di Pessta+ Sebagai Penilaian Artikel Ilmiah Dalam Mendukung Kegiatan Civitas Akademika. CSRID (Computer Science Research and Its Development Journal), 8(3), 177-190.

[14] Rahardja, U., Tejosuwito, N. J., & Armansyah, F. S. (2017). Perancangan Aplikasi Pen+ Berbasis Mobile untuk Memudahkan Kinerja Dosen pada Perguruan Tinggi. Technomedia Journal, 1(2), 50-60.

[15] Aini, Q., Rahardja, U., Moeins, A., & Apriani, D. M. (2018). Penerapan Gamifikasi pada Sistem Informasi Penilaian Ujian Mahasiswa Untuk Meningkatkan Kinerja Dosen. Jurnal Informatika Upgris, 4(1).

[16] Aryani, D., Aini, Q., & Armansyah, F. S. (2017). Perancangan Android Package Mobile Web pada Sistem Penilaian di Perguruan Tinggi. SISFOTENIKA, 7(2), 155-166.

[17] Moeins, A., Sudaryono, S., & Khoirunisa, A. (2018). Utilization of Management of Writing Scientific in the Learning Process in Higher Education. Aptisi Transactions On Management, 2(1), 1-8.

[18] Rahardja, U., Aini, Q., & Zebua, V. K. A. (2019). Penerapan Sistem Pengecekan Mahasiswa Layak KKP Berbasis YII Framework Pada Perguruan Tinggi. Jurnal Teknoinfo, 13(2), 96-99.

[19] Rahardja, U., Aini, Q., & Santoso, N. P. L. (2018). Pengintegrasian YII Framework Berbasis API pada Sistem Penilaian Absensi. SISFOTENIKA, 8(2), 140-152.

[20] Rahardja, U., Aini, Q., Ariessanti, H. D., & Khoirunisa, A. (2018). Pengaruh Gamifikasi pada iDu (iLearning Education) dalam Meningkatkan Motivasi Belajar Mahasiswa. Nusantara Journal of Computers and its Applications, 3(2).

[21] Rahardja, U., Harahap, E. P., & Anjani, D. (2018). Pemanfaatan Rinfogroup Sebagai Media Diskusi Dan Penilaian Keaktifan Mahasiswa. Sisfotenika, 8(1), 81-92.

[22] Aini, Q., Rahardja, U., Moeins, A., & Wardani, A. M. (2018). Penerapan Data Market Query (DMQ) pada Sistem Penilaian Berbasis Yii Framework. InfoTekJar: Jurnal Nasional Informatika dan Teknologi Jaringan, 3(1), 26-31.

[23] Rahardja, U., Aini, Q., & Putri, D. M. (2018). Pemanfaatan Automated Email System (AEMS) Sebagai Media Notifikasi Penilaian Hasil Belajar. SENSITEK, 1(1), 49-54.

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Creative Economy of College Student Gamification based on E-Commerce

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Abstract

The application of Blockchain technology in the context of providing security for transactions in the digital era 4.0 to prevent manipulation of transaction recording reports by irresponsible parties. By using research methods 10 (ten) literature reviews and methods of formulating problems, designing research, collecting data, processing & presenting data, analysis & research reports are expected to solve security problems in transactions. At present security in transactions is still very minimal, therefore a blockchain technology is needed to secure transactions where data can still be manipulated. Specifically, there are 2 (two) benefits of this research that use blockchain technology, (1) transactions become safer in the presence of encryption codes, (2) transactions become more transparent with blockchain. This research implements the encryption code into the payment system using AI Coin, where payment is now cashless, to make it more secure and transparent in transactions.

Keywords: *Blockchain, AI Coin, Encryption code*

1. Introduction

The era of the industrial revolution 4.0 made the Creative Economy one of the strategic choices to win global competition, marked by continued innovation and creativity in order to increase economic value added through the capitalization of creative ideas. The new economic model is characterized by economic activities based on ideas, ideas, and knowledge creativity as the main factors of production [1].

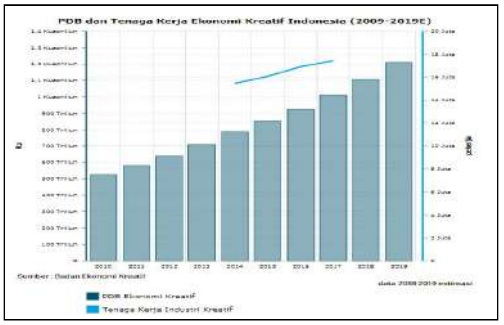

Figure 1. Growth chart of the Creative Economy

Growth of the creative economy has increased and has contributed 7.44% to the national economy. To develop a creative economy in the digital age requires business strategy and development to reach the global market. It is undeniable that digitalization supports the emergence of creative economic actors who are increasingly growing in the midst of global market currents. Utilization of technology in the trend of digitalization increasingly makes the creative economy better and can be competitive in the midst of global market currents [2].

But the problem currently encountered is the lack of knowledge and interest of students towards the digitalization of a creative economy, besides that in Indonesia there are still many agencies that have not been able to provide an-ecommerce container, website-based to accommodate student research products [3]. From this problem a digitalization in the creative economy of students based on e-commerce gamification was made which is expected to increase student interest in the creative economy so that it can produce research products from the results of creativity. and supported by gamification methods that are expected. to attract potential partners and can benefit many people, especially in the fields of education and technology [4].

2. Research Method

From the survey results of the Creative Economy Agency in collaboration with the Central Statistics Agency which contains information on the results of the Special Creative Economy Survey (SKEK) in 2016. The creative economy's GDP grew by 4.38 percent. The creative economy contributes 7.38 percent, which means the creative economy plays an important role in the growth of the national economy [5]. The government supports the development of the creative economy in Inpres No. 6 of 2009 concerning Creative Economy Development. Creative Economy is an economic form that emphasizes information and creativity (provision of knowledge) from human resources (HR) as the main production factor in economic activities. In implementing the creative economy model the community spends most of its time producing ideas that add value from the results of creativity rather than just doing routine and repetitive things [6].

According to the Indonesian Internet Service Providers Association (APJII) and the Communication Studies Research Center at the University of Indonesia, stated that at the end of 2014, Indonesia already had 88,700,000 mobile internet users and this number would consistently increase to 112 million mobile internet users in 2017 with that the Government of Indonesia used it to encourage growth in the digitalization of the creative economy. The digitalization of the creative economy is not only leveling the field of competition, but also every business model of various sizes, industries, and regions. One form of digitalization in realizing a creative economy requires an e-commerce that can provide a forum that can accommodate the results of creativity students [7].

E-commerce is a form of buying and selling transactions carried out through the internet where the website is used as a container to carry out the process. E-commerce is a dynamic set between technology, applications and business processes that connect companies, consumers and certain communities through electronic transactions in the form of electronic goods, services and information trading [8]. As e-commerce that provides student research results and becomes a supporting container in the availability of an I-Learning learning system with new breakthroughs in the application of learning methods such as using iPad as its standard. Becomes a supporting container in the availability of an I-Learning learning system with new breakthroughs in the application of learning methods such as using iPad as its standard [9].

The benefits of e-commerce implementation are that it can be used online or can be accessed at any time and anywhere, and can be through a computer or even a smartphone. With e-commerce, it is expected that there will be no queues in trading activities. The application of gamification in ecommerce is useful for increasing buyer loyalty and providing a motivated effect in conducting transactions by utilizing elements in gamification. Gamification can be used as an online marketing concept involving gamification elements that engage, brand loyalty and brand awareness and to improve the competitiveness among buyers [10].

3. Results and Analysis

The methods used in this research are methods of problem identification, data collection, data analyst, system design and implementation, and evaluation. The purpose of the method is to solve the problem that occurs [11].

3.1 5 Stages of system research

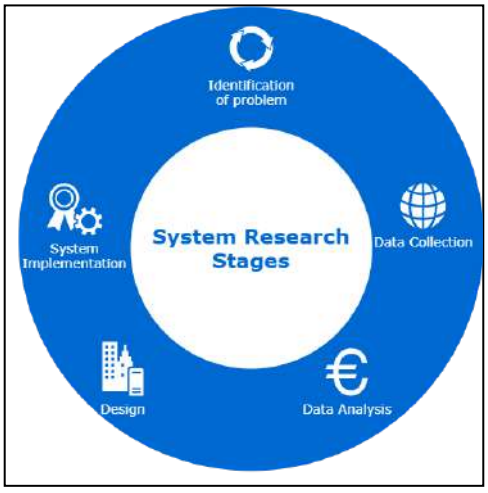

Figure 2. System Research Stages

From (Figure 1), the research method used can be described, First, the Problem Identification method, namely by identifying the problems that occur in the creative economy development of students and the development of scientific publications which are then formulated into a question that will be solved. Second is the data collection method which consists of observations, namely direct observation of an e-commerce that applies the gamification method [12]. Third is the Data Analysis, namely analyzing the data that has been collected and used as a strategy in making a better system. The fourth is Design, namely making system design from data that has been generated previously. Finally System Implementation which consists of designing a prototype system to meet the needs of system users [13].

3.2 Systems Development Methodology

In the process of developing this research system using the agile method. Where the Agile Method is a software system development methodology that is similar to short-term system development that requires rapid adaptation to changes in any form [14]. In practice the method Agile Software Development there are 4 things to consider: interactions and personnel are more important than processes and tools, software that functions is more important than complete documentation, collaboration with clients is more important than contract negotiations, and responsiveness to change is more important than following the plan [15].

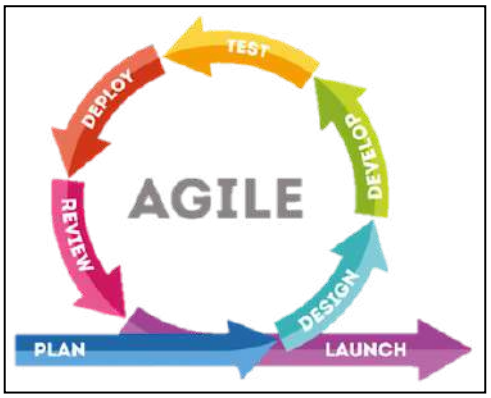

Figure 3. Agile Method

Steps in developing the system using the agile method consists of planning the schematic of the activity plan and the system development schedule and the target which is then made in the form of a system interface design and then carried out the stages of system development tailored to the agreed custom request [16]. After completing the system development, it is tested to use a system that has been developed in stages. The test results are then distributed to users and then a review or discussion is obtained until the final stage of the system is launched [17].

3.3 Methods gamification in the System

Steps in developing the system using the agile method consists of planning the schematic of the activity plan and the system development schedule and the target which is then made in the form of a system interface design and then carried out the stages of system development tailored to the agreed custom request. After completing the system development, it is tested to use a system that has been developed in stages [18].

The test results are then distributed to users and then a review or discussion is obtained until the final stage of the system is launched gamification is the use of techniques designed like a game, in order to motivate / pull someone related to their use,gamification works with technology function more interesting, encouraging users to engage in desired behaviors such as missions, collect points to earn vouchers, rewards and so on [19].

Then embedded in a website-based e-commerce as a form of buying and selling transactions by utilizing internet technology that connects companies, consumers and the public and transfers funds and exchanges electronic data, management systems and data collection automatically [20]. In applying this method of e-commerce gamification, the Level technique is applied from various techniques including Badges"or"title", Levels, Progress bars, Leaderboards, Virtual Currency, Gifting, awarding, redeeming, trading, where each user gets a level or the ranking of the products purchased, of course, each level has its own features that make users interested in upgrading each level [21].

4. Editorial Policy

The submitting author is responsible for obtaining an agreement of all coautors and any consent required from sponsors before submitting a paper. It is the obligation of the authors to cite relevant prior work [22].

5. Results and Discussion

In this study the authors used "Simple Random Sampling" in determining the trust survey of the website. The authors used the Slovin formula as follows :

$$n = \frac{N}{(1 + Ne^2)}$$
$$n = \frac{1565}{(1+15.65)}$$
$$n = \frac{1565}{16.65}$$

n = 93,99% (rounded up to 94 Responden

From the population sampling formula of the total population (N = 1565 respondents) produces a minimum sample of 94 respondents who remember this method [23].

.After getting the survey results from the Slovin formula, then testing is done with the reliability test with Cronbach alpha as follows :

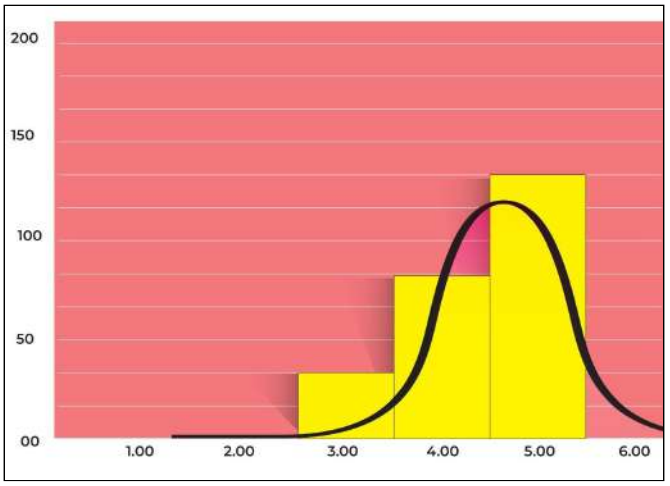

Figure 4. Histogram Cronbach Alpha

Based on the (figure 3), Histogram chart has the mean 4.58, with deviation 0,63 of 210 responden. The case process can be described in the following table.

Table 1. Case Data

	N	%
Cases Valid Except Total	210 0 210	100,0 0 100,0

Table 2. Reliability Statistic

Cronbach's Alpha	N of Item
0.925	25

This research proves that Pandawan has provided a rhyming service to its users so that it can increase transaction satisfaction. With the results of the calculation of 210 respondents, the reliability test output x is known that Cronbach's Alpha is 0.925 > 0.6. Then the research instrument is declared reliable [24]. Pandawan is an innovation of an e-commerce platform that provides online journal publisher services as a substitute for a conventionally managed publisher [25].

The implementation of the Open Journal System (OJS) of the PKP (Public Knowledge Project) as a basis is able to provide convenience, speed, and integrity in managing journals [26]. In the initial appearance of Pandawan there are 5 main menus namely About, My Account, Success Stories, Checkout and also Cart. Pandawan's website can be accessed via https://pandawan.id/ In the About menu there is a brief description of Pandawan, Vision, Mission and Purpose. And in the My Account menu there is a FAQ facility that can help website visitors know the ways needed in Pandawan such as, How to conduct transactions, how to fill in the registration form, payment methods available and so on [27][28].

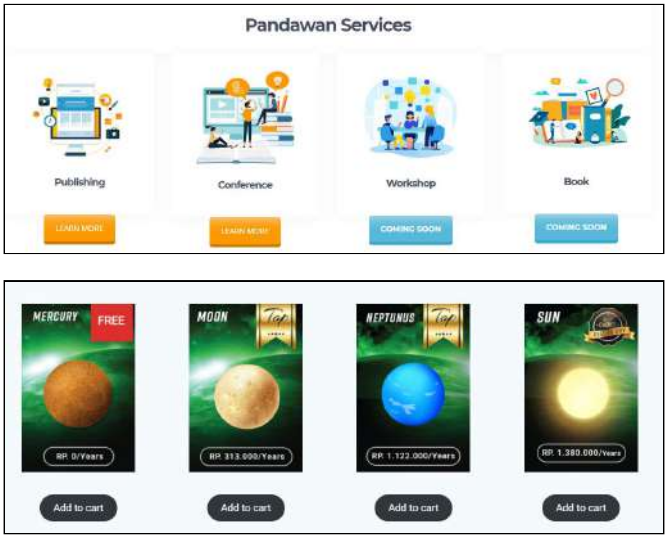

Figure 6. Packages provided by Pandawan

The picture above explained that the Pandawan publisher service has 4 excellent packages, ranging from the free to various ones with specifications that have their respective features [29][30].

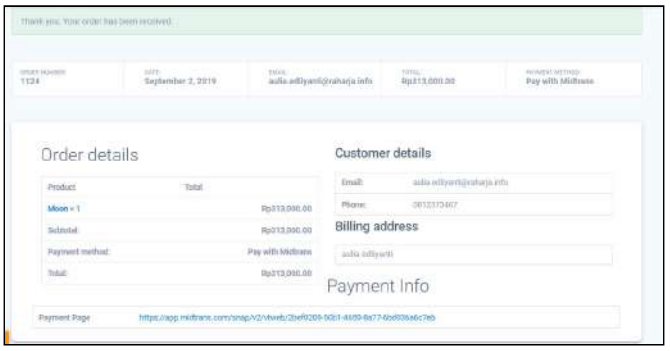

Figure 7. Display of Pandawan checkout results

From the picture above it is explained that the final process of the transaction at Pandawan will be as shown above. Where divided into 2 (two), namely Order Details and Customer details [31][32].

4. Conclusion

This paper describes the research of an e-commerce platform that provides journal publisher services with the gamification method to support the world of creative economy that can make a major contribution to improving the national economy. There are still very few specialized e-commerce platforms that provide online-based journal management services at competitive prices. Into a new transformation that was originally conventional to digitization. In the author's view, the gamification-based e-commerce platform makes it easier for educational institutions who have difficulty publishing journals [33][34].

In the discussion of this study, the authors have not been able to determine the most appropriate gamification element used in an e-commerce platform that provides journal publisher services and the ability to compete in the world of creative economy globally. Apart from these shortcomings the application of gamification can be used as more value to market the platform into the global market with the concept of including game elements in a non-games platform. The author cannot claim that gamification is the most appropriate way, but can be used as a reference in further research [35].

The application of gamification in e-commerce today is not stopped only for research needs. But on the contrary, the next step that can be done is to make adjustments and evaluations about which elements of gamification are most suitable to be applied in e-commerce websites in terms of the needs of its users which are expected to increase user loyalty in transactions [36][37].

5. Appendix

Appendixes, if needed, appear before the acknowledgment.

6. Acknowledgement

The preferred spelling of the word "acknowledgment" in American English is without an "e" after the "g." Use the singular heading even if you have many acknowledgments. Avoid expressions such as "One of us (SBA) would like to thank ..." Instead, write "FA Author thanks ..." Sponsor and financial support acknowledgments are placed in the unnumbered footnotes on the first page.

References

[1] Gouvea, R., & Vora, G. (2018). Creative industries and economic growth: stability of creative products exports earnings. Creative Industries Journal, 11(1), 22–53. https://doi.org/10.1080/17510694.2017.1416529

[2] Rahardja, U., Aini, Q., Graha, Y. I., & Tangkaw, M. R. (2019). Gamification Framework Design of Management Education and Development in Industrial Revolution 4.0. Journal of Physics: Conference Series, 1364(1), 0–13. https://doi.org/10.1088/1742-6596/1364/1/012035

[3] Dunska, M., & Marcinkevica, A. (2017). Situation and development opportunities of creative industries companies in Latvia. European Research Studies Journal, 20(3), 96–114. https://doi.org/10.35808/ersj/698

[4] Rahadi, D. R. (2017). Analisis Sektor Usaha Kecil & Menengah Menjadi Model Kewirausahaan Sosial Berbasis Ekonomi Kreatif. Jurnal Manajemen Dan Bisnis Indonesia, 4(2), 159–173.

[5] Prawira, M., Sukmana, H. T., Amrizal, V., & Rahardja, U. (2019). A Prototype of Android-Based Emergency Management Application. In 2019 7th International Conference on Cyber and IT Service Management, CITSM 2019. Institute of Electrical and Electronics Engineers Inc. https://doi.org/10.1109/CITSM47753.2019.8965337

[6] Syauqi, A. T. (2016). Startup sebagai Digitalisasi Ekonomi dan Dampaknya bagi Ekonomi Kreatif di Indonesia. Department of Electrical Engineering and Information Technology, 1–4. https://doi.org/UniversitasGadjahMada

[7] Hariguna, T., Rahardja, U., Aini, Q., & Nurfaizah. (2019). Effect of social media activities to determinants public participation intention of e-government. Procedia Computer Science, 161, 233–241. https://doi.org/10.1016/j.procs.2019.11.119

[8] 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

[9] Hamsani, M., & Khairiyansyah, M. (2018). The Opportunity of SMEs Development by Triple Helix ABG Method in Supporting Creative Economy in Pangkalpinang City. Integrated Journal of Business and Economics, 2(1), 76. https://doi.org/10.33019/ijbe.v2i1.60

[10] Hidayat, A. R. R. T., & Asmara, A. Y. (2017). Creative industry in supporting economy growth in Indonesia: Perspective of regional innovation system. In IOP Conference Series: Earth and Environmental Science (Vol. 70). Institute of Physics Publishing. https://doi.org/10.1088/1755-1315/70/1/012031

[11] Aini, Q., Rahardja, U., & Hariguna, T. (2019). The antecedent of perceived value to determine student continuance intention and student participation in the adoption of ilearning. Procedia Computer Science, 161, 242–249. https://doi.org/10.1016/j.procs.2019.11.120

[12] Khasanah, F. N., Rofiah, S., & Setiyadi, D. (2019). Metode User Centered Design Dalam Merancang Tampilan Antarmuka Ecommerce Penjualan Pupuk Berbasis Website Menggunakan Aplikasi Balsamiq Mockups. JAST : Jurnal Aplikasi Sains Dan Teknologi, 3(2), 14. https://doi.org/10.33366/jast.v3i2.1443

[13] Rahardja, U., Aini, Q., Yusup, M., & Edliyanti, A. (2020).Application of Blockchain Technology as a Security Media for E-Commerce Transaction Processes. . Computer Engineering, Science and System Journal, 5(1), 28–32. https://doi.org/10.24114/CESS.V5I1.14893

[14] Rahardja, U., Hariguna, T., & Aini, Q. (2019). Understanding the impact of determinants in game learning acceptance: An empirical study. International Journal of Education and Practice, 7(3), 136–145. https://doi.org/10.18488/journal.61.2019.73.136.145

[15] McNair, C., & Pearl, M. (2018). Worldwide Retail and Ecommerce Sales: eMarketer's Updated Forecast and New Mcommerce Estimates for 2016—2021 - eMarketer. eMarketer (pp. 4–11). Retrieved from https://www.emarketer.com/Report/Worldwide-Retail-Ecommerce-Sales-eMarketers-Updated-Forecast-New-Mcommerce-Estimates-20162021/2002182

[16] Hussein, A. S., Rosita, N. H., & Ayuni, R. F. (2019). Knowledge management orientation behaviour and innovation: A lesson from Indonesia creative economy sector. International Journal of Sociotechnology and Knowledge Development, 11(1), 17–28. https://doi.org/10.4018/IJSKD.2019010102

[17] Sudaryono, Rahardja, U., Aini, Q., Isma Graha, Y., & Lutfiani, N. (2019). Validity of Test Instruments. Journal of Physics: Conference Series, 1364(1). https://doi.org/10.1088/1742-6596/1364/1/012050

[18] Setiadi, B. R., & Suparmin, Mr. (2017). Providing Space for Creative Industry Sub-Sectors to Meet the Labor Market For Vocational School Graduates. Atlantis Press. https://doi.org/10.2991/ictvt-17.2017.53

[19] Sudaryono, Rahardja, U., & Masaeni. (2020). Decision Support System for Ranking of Students in Learning Management System (LMS) Activities using Analytical Hierarchy Process (AHP) Method. Journal of Physics: Conference Series, 1477(2). https://doi.org/10.1088/1742-6596/1477/2/022022

[20] Yang, Y., Asaad, Y., & Dwivedi, Y. (2017). Examining the impact of gamification on intention of engagement and brand attitude in the marketing context. Computers in Human Behavior, 73, 459–469. https://doi.org/10.1016/j.chb.2017.03.066

[21] Kardianawati, A., Haryanto, H., & Rosyidah, U. (2016). Application of the Appreciative Gamification Concept in Msme E-Marketplace.Techno. Com, 15(4), 343–351. Retrieved from http://publikasi.dinus.ac.id/index.php/technoc/article/view/1274

[22] Handayani, I., Rahardja, U., Febriyanto, E., Yulius, H., & Aini, Q. (2019). Longer Time Frame Concept for Foreign Exchange Trading Indicator using Matrix Correlation Technique. Proceedings of 2019 4th International Conference on Informatics and Computing, ICIC 2019. https://doi.org/10.1109/ICIC47613.2019.8985709
[23] Aini, Q., Hariguna, T., Putra, P. O. H., & Rahardja, U. (2019). Understanding how gamification influences behaviour in education. International Journal of Advanced Trends in Computer Science and Engineering, 8(1.5 Special Issue), 269–274. https://doi.org/10.30534/ijatcse/2019/4781.52019
[24] Huotari, K., & Hamari, J. (2017). A definition for gamification: anchoring gamification in the service marketing literature. Electronic Markets, 27(1), 21–31. https://doi.org/10.1007/s12525-015-0212-z
[25] Rozy, N. F., Ramadhiansya, R., Sunarya, P. A., & Rahardja, U. (2019). Performance Comparison Routing Protocol AODV, DSDV, and AOMDV with Video Streaming in Manet. 2019 7th International Conference on Cyber and IT Service Management, CITSM 2019. https://doi.org/10.1109/CITSM47753.2019.8965386
[26] Dietrich, T., Mulcahy, R., & Knox, K. (2018). Gaming attribute preferences in social marketing programmes: Meaning matters more than rewards. Journal of Social Marketing, 8(3), 280–296. https://doi.org/10.1108/JSOCM-06-2017-0038
[27] Dikert, K., Paasivaara, M., & Lassenius, C. (2016). Challenges and success factors for large-scale agile transformations: A systematic literature review. Journal of Systems and Software, 119, 87–108. https://doi.org/10.1016/j.jss.2016.06.013
[28] Sunarya, P. A., Rahardja, U., & Immaniar, D. D. (2016). Development Assessment Module Portfolio E-Imei Students With Learning To Improve The Quality Of Concentration Case Study Mavib. 13(8), 3597–3606.
[29] Curcio, K., Navarro, T., Malucelli, A., & Reinehr, S. (2018). Requirements engineering: A systematic mapping study in agile software development. Journal of Systems and Software, 139, 32–50. https://doi.org/10.1016/j.jss.2018.01.036
[30] Shim, W., & Lee, S. W. (2019). An agile approach for managing requirements change to improve learning and adaptability. Journal of Industrial Information Integration, 14, 16–23. https://doi.org/10.1016/j.jii.2018.07.005
[31] Dingsøyr, T., Moe, N. B., Fægri, T. E., & Seim, E. A. (2018). Exploring software development at the very large-scale: a revelatory case study and research agenda for agile method adaptation. Empirical Software Engineering, 23(1), 490–520. https://doi.org/10.1007/s10664-017-9524-2
[32] Ghezzi, A., & Cavallo, A. (2020). Agile Business Model Innovation in Digital Entrepreneurship: Lean Startup Approaches. Journal of Business Research, 110, 519–537. https://doi.org/10.1016/j.jbusres.2018.06.013
[33] Sudaryono, Lutfiani, N., Suseno, & Aini, Q. (2019). Empirical Study of Research Performance Leading to Education 4.0 using the iLearning Method. International Journal of Advanced Trends in Computer Science and Engineering, 8(1.5), 264–268. https://doi.org/10.30534/ijatcse/2019/4681.52019
[34] Korobov, Y. (2020). Impact of digitalization on consumer behaviour and marketing activity in financial markets. SHS Web of Conferences, 73, 01013. https://doi.org/10.1051/shsconf/20207301013
[35] Aini, Q., Rahardja, U., Handayani, I., Hardini, M., & Ali, A. (2019). Utilization of google spreadsheets as activity information media at the official site alphabet incubator. Proceedings of the International Conference on Industrial Engineering and Operations Management, 7, 1330–1341.
[36] Rahardja, U., Hariguna, T., & Baihaqi, W. M. (2019). Opinion mining on e-commerce data using sentiment analysis and k-medoid clustering. Proceedings - 2019 12th International Conference on Ubi-Media Computing, Ubi-Media 2019, 168–170. https://doi.org/10.1109/Ubi-Media.2019.00040
[37] Rahardja, U., Moeins, A., & Lutfiani, N. (2017). Leadership, competency, working motivation and performance of high private education lecturer with institution accreditation B: Area kopertis IV Banten province. Man in India, 97(24), 179–192.

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Smart Contracts to Support the Advancement of Blockchain Technology in the Security Integrity

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Abstract

The development of technology today is used as a benchmark in the advancement of the industrial world where the development of technology has influenced various aspects in the life of today's society. Smart contracts as one form of blockchain technology that resembles a conventional contract can be used to bind agreements between one party and another. One difference between a smart contract and a conventional contract is the smart contract that is stored in the blockchain. With the presence of smart contracts on the blockchain has become one of the most sought-after technologies, because the number of users is high enough for each transaction within the company. In this case various features of smart contracts applications in various worlds, ranging from financial services, life sciences, energy resources and media voting. Smart contracts still pose a lot of challenges that overwhelm the interaction of some Parties, such as users, developers, and organizations built on smart contracts. Smart contracts are essentially a very effective source of problem solvers, where smart contracts on the blockchain make it easy to maintain data security, and save costs and time. In addition, in the absence of third parties strongly minimizes the fraud that is often done by irresponsible parties, this prevents conflicts between parties. Prone to cases of loss of a document is generated because there is no secure storage media. The advent of smart contracts on the blockchain is expected to be a solution to tackle most of the world's commercial and bureaucratic systems.

Keywords*: Blockchain Technology, Smart contracts, Documents.*

1. Introduction

The rapid development of technology, making the demands of life increasingly increasing[1]. Technology plays an important role in encouraging social change, modernization and globalization. As a product of human material culture, technology contributes to the Industrial Revolution [2]. The utilization of technology in the era of digital revolution has made technology a major necessity, science and technology that develops so rapidly making technology in this era used in various fields of science [3]. The world is currently heading for the era of digitalisation and automation. This is the key to the business competition strategy, in the world of business, there is technology capable of presenting a variety of conveniences to perform various transactions and contracts. Currently, in the business belief can be realized by the existence of a contract, namely, a paper sheet that lays out the terms or conditions of the cooperation agreement between Parties [4]. By the time one of the parties violates the agreement, the path taken is the legal path. But of course the cost is not cheap and it takes a lot of time. So, taking the legal path is not profitable for the harmed Party.

Until the Smart Contract technology on this blockchain is present, Smart Contract is to apply software code executed in the Blockchain network, which aims to facilitate contracts or agreements between the parties and other Enables credible transaction performance without third parties[5]. Thus, this contract is stored in a public database and cannot be changed. By using Smart contracts, parties are able to exchange money, property, stocks or anything transparently, without conflict and without intermediaries [6]. Smart contracts are almost the same as conventional contracts i.e. document binding agreements between one party and the other, which distinguishes between Smart contracts and conventional contracts, that is[7]. a Smart Contract in the form of code that is stored in the blockchain, with the Smart contracts the parties do not need to rely on brokers, lawyers, or other intermediaries to confirm the matter, this Hall because of the absence of third parties in the Smart Contract system on the

blockchain [8]. Smart contracts also promise low transaction fees compared to conventional systems requiring trusted third parties to enforce and execute the terms of the agreement.

Figure 1. Three things in your Smart contract.

The blockchain system comes with transforming a centralistic approach to decentralization. The advantage of blockchain technology put into Smart contracts is flexibility. Developers can store virtually any type of data in the blockchain, and can have various transaction options that can be selected during the implementation of smart contracts. To run the contract, the user can only send the transaction to the contract address. This transaction will then be executed by each consensus node in the network to achieve a consensus on its output. Because Smart contracts are transparent in the blockchain, it will be distributed in the network [9]. It is going to be a lot of people to see and validate the contracts that have been made.

Smart contracts are very supported in various fields such as banking, governance, health and especially for education, the perpetrators who use the Smart Contract system on the Blockchain greatly facilitate various jobs in the bookkeeping system, Data storage, and also safeguards in data [10]. Smart contracts can be utilized for the field of education for the validation of academic credits and the issuance of academic degrees [11]. The actual digitization of this system can make safer and lower bureaucracy in terms of document validation, saving labor storage, due to the numerous counterfeiting and loss of important documents. It is very important that The process of the Smart Contract becomes more transparent and can be a reference to all parties involved. The increasingly sophisticated and growing technology has become a convenience for the community, technological opportunities must be well utilized by society [12]. Smart contracts on the Blockchain can make the world a better place with free from commissions, smart contracts as a solution that will quickly automate most of the commercial and bureaucratic systems in the world.

2. Research Method

2.1 Smart Contract Implementation Concept

The main concept behind Smart contracts uses programs to manage contractual provisions, using cryptography to ensure fraud protection, transparency, and anti-interference[13]. This digital contract automatically guarantees legality. Smart contracts should be regarded as software programs that may assume contractual properties when the parties involved decide to do so. They are a tool to enforce legality.

Having said that, a legally binding Smart contract must always meet the three elements of a conventional contract. First, a party should start an offer. Secondly, associates must agree to the terms offered. Third, the parties bargain for mutual promises and obligations. Simply put, as in conventional bidding, Smart contracts must transfer some type of value at this time or in the future. For example, one of the laws is the Uniform Electronic signature Act and Electronic Signatures in the global and National Commerce Act. This provision already acknowledges, permits, and validates the use of electronic signatures and electronic records. This involves those who use the blockchain.

Figure 2. Benefits of implementing Smart contracts.

An open-source blockchain, Ethereum executes Smart contracts. Very secure, its blockchain database, stores smart Contract transactions, including the source code. Developers use Solidity to write Ethereum smart contracts. This high-level programming language helps developers write Smart contracts that run on the Ethereum Virtual Machine (EMV) [14]. In the Ethereum database, Smart contracts exist as bytecodes. This code forms the core of Ethereum's disruptive power and innovative potential.

The Ethereum blockchain is a massive computer network that allows code to run in a decentralized, distributed way. This Blockchain does not charge. This costs for each instruction executed on the network. This Blockchain executes the generation of Smart contracts. An EMV implements an executable program on each of the Ethereum network nodes. Each system node runs the program in a synchronized way to ensure that the execution cannot be tampered with [15]. The system serves as a control to prevent exceeding network computing capacity. With the Ethereum configuration, each developer can code a simple program that can be run in a decentralized, distributed network. The network replicates its code and database storage. This process secures and tweaks the program code. The network assigns a unique address or ID as a reference to the upload code. The ID or address can trigger the contract execution at any time.

2.1 Literature Review

Blockchain technology has both decentralized consensus and algorithmic authentication and execution. The research conducted by Lin William Cong analysed the way in which decentralization increased consensus effectiveness, and the classic features of the industry organization reshaping blockchain and competition landscapes. Smart contracts can reduce information asymmetry and provide higher social welfare and consumer surplus through increased entry and competition, but blockchains can also encourage collusion due to the distribution of information not Can be reduced, especially in the consensus generation [17].

Smart contracts focus on the form of technical contracts by setting aside the social context in which contracts operate, and the complex ways in which people use them. The research explanation described by KAREN E. C. LEVY, explains the 3 categories of contract practice in which people engage to illustrate how the contract actually works [18]. Smart Contract Technology ignores the fact that people use contracts as social resources to manage their relationships. Therefore, suggesting that attention to the social and relational context of contractors is an important consideration for discussion, development, and dissemination of smart contracts.

Smart contracts can find a broad spectrum of potential application scenarios in the digital economy and the intelligent industry, including financial services, management, healthcare, and the Internet of Things, among others, and have also been integrated into the platform Mainstream blockchain-based development, such as Ethereum and Hyperledger. The research presented by Shuai Wang presents a systematic and comprehensive overview of blockchain-enabled Smart contracts, aiming to stimulate further research into this growing area of research [19]. Research conducted by S R Mani Sekhar, analyzes various use cases of Smart contracts in different domains and comes with models that can be used in the future. Furthermore, different case studies associated with five different domains are discussed with the help of use case diagrams [20].

Finally, solutions for natural disaster management have been proposed by integrating Smart contracts, digital identity, policy and blockchain technology, which can be used effectively. Blockchain Data is rarely used for process miners. The research conducted by Christopher KLINKMU ¨ller This, proposed a framework. The Framework consists of three main parts: a manifest that specifies how the data is recorded, the Extractor for the retrieving data (structured according to the XES Standard), and a generator that generates Logging code to support the developer's Smart contract, Proposes an easy way to encode Logging data in a compact form, to achieve a relatively low cost and high throughput to log-Ging on the chain. Proposals are evaluated with logs created from the generated Logging code, as well as with existing blockchain applications that do not utilize the proposed Code Generator [21].

A blockchain theory of programmatic risk chosen by the user is proposed by Melanie Swan. Black Swan Smart Contracts instantiate S-a distribution event curve so that the risk may be more efficiently managed by selecting low intermediate high risk as a standard Smart contract parameter [22]. The potential of the Black Swan Smart contracts application includes insurance as a digital service, eBay for Money, market information, and autonomous risk management as a Smart Network property.

The research conducted by Munindar P, builds decentralized applications that naturally accommodate and exploit blockchain technology. This approach avoids the shortcomings of Smart contracts that arise from their regular way of organizing computing, which restricts their prospects for practical decentralized applications. This new way of thinking allows building a flexible government, by structuring an organizational structure, verifying truth without hindering autonomy and foundation for Trust [23].

3. Listing Program

According to the discussion above this method, using the programming language solidity to verify proof of work on the Smart Contract. Solidity is a statically typed programming language designed specifically for writing Smart contracts that can run on Ethereum virtual machines[24]. It is very similar to JavaScript to make it easier to learn for Web developers.

Constructor functions are only called once when a contract is created. This sets a prerequisite for Smart contracts, such as setting the number of initial tokens, etc. Every time someone sends Ethers to your Smart contracts with no additional information and without calling a certain method in the Smart contract, this method will be called. You can return funds to the sender, using the default method or distributing it as you wish.

This function is used to make transfers and collect items. Smart contracts do not need to send new transactions immediately when you press the ether into it. It can work as a database. You may see some functions have optional keywords that can be paid after the name. If you add these keywords, Smart contracts will be able to operate with Ethers. You can attach ether to a Smart Contract, send a transfer with Ethers or withdraw ethers[25]. By default, the contract does not receive money. The keywords to be paid must be added after each function that should be able to operate with money.

The second action is to save the owner. Some methods or functions may be banned for everyone except the owner. Solidity provides a nice and intelligent way to select methods that have limited permissions-we can use modifiers. TIP: Payable keyword allows delivery of these Smart contracts

Ethers[26]. If you don't add these keywords to the constructor or fallback function, you won't be able to send money to your Smart contract. However, there is a way to hack it. Two functions that work in the same way, as simple if statements that might throw an error and stop executing the code of SMART contracts[27]. The Require and Assert method does the same thing, but when you use the Assert and the condition is fulfilled, the Smart Contract will not execute, but the transaction will consume gas, that is, take some money shipper. Functions require restoring gas if Smart contracts cannot be executed.

Solidity supports multiple global variables that store information about the current transaction. They are MSG, block, and TX. The MSG object is one of the most important and useful because there we can find information about the sender, funds, or data sent to the contract. As other objects or classes in other programming languages, Smart contracts also have constructors. The contractor's name is the same as the contract name, and does not accept arguments. However, if you add payable keywords, it will accept Ethers that you can send as creators. Otherwise, the Smart Contract cannot be made with Ethers[28].

A modifier is a type of special function that can be invoked between or after other functions. Inside the modifier, use the underline function that specifies where the other method code should be laid out. In this code, it has two modifiers, namely:

```
modifier isOwner() {
  require(msg.sender == owner);
  _;
}

modifier canWithdraw() {
  require(salaryAmount[msg.sender] > 0);
  _;
}
```

A good piece of code is divided into a single responsibility component. It may have noticed that the Smart Contract, from a programmer's point of view, is very similar to classes in other languages. We can create new objects, instances of other Smart contracts[29]. The simplest use example is to create 2 Smart contracts (classes) next to each other and only create a new object inside the second one.

In this example, ContractB will create an instance of ContractA in the Public variable. ContractA is responsible for only one hall, namely: Counting add function calls. We can call this function from within ContractB. But this solution will not allow us to change the behavior of Smart contracts when

something goes wrong or when we want to change the calculations[30]. So, let's change the code in a way that will accept the instance change from Contract A.

At this point, we need to assume that the Smart Contract is similar to the same interface as Smart contract A has been deployed to the blockchain and has its own address. In this case, we will be able to pass this address to the setContract function which will create a new instance [31]. Please note the small difference that we don't use the new operator before we create a ContractA object. It is not necessary when we create an instance of the address.

4. Result and Discussion

By implementing smart contacts in everyday life, it can make phenomenal changes as it offers several advantages over conventional contracts. Smart contacts are more convenient and faster which makes it acceptable for people to streamline workflows [32]. Eliminating intermediaries makes Smart contracts, even more interesting to apply in our lives. The use of Smart contracts tends to be prepared with technological advances. From the discussion above, there are results and 8 benefits offered by Smart contracts[33].

As stated earlier, Smart contracts are full of the terms and conditions in absolute detail which are also examined by the parties involved in the agreement. This eliminates the possibility of disputes and issues at a later stage as the terms and conditions are thoroughly examined and put into place only when all participants agree to it. The nature of this smart contract enables the parties involved to ensure transparency during the transaction. In addition, the precision needed in the detailing contracts keeps all the information open with everyone who eventually solves something related to the problem of miscommunication[34].

Therefore, with the help of Smart contracts, the efficiency lost in communication gaps can be reversed. In order to continue with the process involving documentation, it usually takes more than at least a few days. Delays in this process are due to many intermediaries and unnecessary steps along the way. On the other hand, smart contracts are run through the Internet as they are nothing but a piece of software code. Therefore, the speed of completing the transaction through the smart code is too fast. Smart contracts can save hours or even days compared to any conventional business process. Additionally, the delay time due to manual involvement is also eliminated.

Smart contracts are encoded in explicitly detailed form. It requires to hold all of the terms and conditions in it before it is finally punished for work[35]. Any condition left behind from a contract can result in an error at execution, therefore while creating a Smart contract, all conditions are laid out in a detailed form. Because of this, Smart contracts become a comprehensive agreement that, when executed automatically, almost everything is done. In the case of a conventional contract, there is a possible fault as the person responsible for making the contract may lose one condition or another. Additionally, there is no way to even trace until the error is created.

Therefore, smart contracts are a better alternative when it comes to achieving accuracy and accuracy. Smart contracts with the automatic coding feature are the safest choice when it comes to encrypted data technology at this time. Because they conform to the highest safety standards, the level of protection involved therein allows them to be safe to use for critical processes. Moreover, because Smart contracts are so accurate and secure, their efficiency levels are too high which results in more value in transactions.

Smart contracts are accurate and precise for the minutest level of agreement[36]. All transaction details are kept on the contract and any person between the parties involved can access them at any given time. In addition, these transactions are stored on the blockchain in the form of future records. It is very helpful in terms of disputes regarding future contractual provisions. First and foremost, because Smart

contracts only involve the parties that are part of the agreement, the need for intermediaries is eliminated and the money involved in that is also stored. All lawyers, witnesses, and intermediaries have no role when Smart contracts are used. In addition, as stated earlier, Smart contracts also save money as paper-based documents are not involved in any process [37].

Other unique features of this contract may be their ability to significantly reduce litigation and court requirements. Executing the Smart Contract allows the parties to perform and bind by the conditions and rules written therein. Because smart contracts are computer code documents, the use of paper in the whole process is removed [38]. On the one hand, this saves costs while on the other, it's useful for companies globally because it helps to save a little bit of their paper use in terms of contracts and promotes contributions to the community. In 8 these benefits ensure that the use of Smart contracts is necessary for various aspects of the field, in addition to the absence of third parties, Smart contracts can make life more modern in the development of information technology [39].

5. Conclusion

During the course of study, all kinds of superior performance certificates, transcript scores, diplomas, etc. will be an important reference for recognizing new schools or new works. As schools make various awards or diplomas, only the school name and students are input. Because of the lack of effective anti-Forge mechanisms, events that cause the graduation certificate to be forged often get noticed[40]. In order to troubleshoot a certificate forgery, a digital certificate system based on blockchain technology will be proposed. By properties that cannot be modified from blockchain, digital certificates with anti-counterfeiting and can be made. The digital certificate issuance procedure in this system is as follows. First, generate an electronic file from a paper certificate that accompanies other related data into the database, while it calculates the electronic file for its hash value. Finally, save the hash value to the block in the system chain[41].

From this research it can be concluded, with potential Smart contracts can not be limited. Smart contracts can be used in any field, buyers and users can track anything for their security level. While for third parties such as lawyers, government agencies etc, it is only necessary to put the coin into the contract and the loss of the third role. Smart contracts save money by eliminating the need for intermediaries. When using the Smart Contract, all we need to do is check the code before execution, everything after it will be done by electronic means[42]. Smart contracts provide an opportunity to make routine transactions and processes more efficient and automated.

The basis of Smart contracts are interfaces, business rules, and data. With emerging technologies, smart contracts will also need to be updated to eliminate compatibility issues with the operating system and perform properly routed functions. Although smart contracts are still in the development phase, that may face attacks of certain vulnerabilities. In order to make Smart contracts part of everyday life, both, CyberSecurity practices as well as a platform to make Smart contracts need to be updated from time to time[43].

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References

[1] Aini, Q., Dhaniarti, I., & Khoirunisa, A. (2019). Effects of iLearning Media on Student Learning Motivation. Aptisi Transactions On Management, 3(1), 1-12. Chicago.

[2] .Rahardja, U., Aini, Q., Graha, Y. I., & Khoirunisa, A. (2019, May). Implementation of Gamification into Management of Education for Motivating Learners. In Proceeding Interuniversity Forum for Strengthening Academic Competency (Vol. 1, No. 1, pp. 209-209).

[3] Aini, Q., Alwiyah, A., & Putri, D. M. (2019). Effectiveness of Installment Payment Management Using Recurring Scheduling to Cashier Performance. Aptisi Transactions On Management, 3(1), 13-21.Chicago

[4] Mezquita, Y., Valdeolmillos, D., González-Briones, A., Prieto, J., & Corchado, J. M. (2019, July). Legal Aspects and Emerging Risks in the Use of Smart Contracts Based on Blockchain. In International Conference on Knowledge Management in Organizations (pp. 525-535). Springer, Cham.

[5] Patel, K., & Das, M. L. (2020, January). Transcript Management Using Blockchain Enabled Smart Contracts. In International Conference on Distributed Computing and Internet Technology (pp. 392-407). Springer, Cham.

[6] Shao, W., Wang, Z., Wang, X., Qiu, K., Jia, C., & Jiang, C. (2020). LSC: Online auto-update smart contracts for fortifying blockchain-based log systems. Information Sciences, 512, 506-517.

[7] Mezquita, Y., Valdeolmillos, D., González-Briones, A., Prieto, J., & Corchado, J. M. (2019, July). Legal Aspects and Emerging Risks in the Use of Smart Contracts Based on Blockchain. In International Conference on Knowledge Management in Organizations (pp. 525-535). Springer, Cham.
[8] Sultana, T., Almogren, A., Akbar, M., Zuair, M., Ullah, I., & Javaid, N. (2020). Data Sharing System Integrating Access Control Mechanism using Blockchain-Based Smart Contracts for IoT Devices. Applied Sciences, 10(2), 488.
[9] Shao, W., Wang, Z., Wang, X., Qiu, K., Jia, C., & Jiang, C. (2020). LSC: Online auto-update smart contracts for fortifying blockchain-based log systems. Information Sciences, 512, 506-517.
[10] Zupan, N., Kasinathan, P., Cuellar, J., & Sauer, M. (2020). Secure Smart Contract Generation Based on Petri Nets. In Blockchain Technology for Industry 4.0 (pp. 73-98). Springer, Singapore. Chicago
[11] Lin, J., Pipattanasomporn, M., & Rahman, S. (2019). Comparative Analysis of Blockchain-based Smart Contracts for Solar Electricity Exchanges. In 2019 IEEE Power & Energy Society Innovative Smart Grid Technologies Conference.
[12] Meneghetti, A., Parise, T., Sala, M., & Taufer, D. (2019). A survey on efficient parallelization of blockchain-based smart contracts. arXiv preprint arXiv:1904.00731.
[13] Anantha, H. R., Kulkarni, K. P., CHATURVEDI, A., Banerjee, D., & Ramakrishna, P. (2019). U.S. Patent Application No. 15/796,204.
[14] Wang, S., Huang, C., Li, J., Yuan, Y., & Wang, F. Y. (2019). Decentralized Construction of Knowledge Graphs for Deep Recommender Systems Based on Blockchain-Powered Smart Contracts. IEEE Access, 7, 136951-136961.
[15] Bhattacharya, D., Canul, M., Knight, S., Azhar, M. Q., & Malkan, R. (2019, February). Programming Smart Contracts in Ethereum Blockchain using Solidity. In Proceedings of the 50th ACM Technical Symposium on Computer Science Education (pp. 1236-1236). ACM.
[16] Tariq, F., & Colomo-Palacios, R. (2019, July). Use of Blockchain Smart Contracts in Software Engineering: A Systematic Mapping. In International Conference on Computational Science and Its Applications (pp. 327-337). Springer, Cham.
[17] Cong, L. W., & He, Z. (2019). Blockchain disruption and smart contracts. The Review of Financial Studies, 32(5), 1754-1797.
[18] Levy, K. E. (2017). Book-smart, not street-smart: blockchain-based smart contracts and the social workings of law. Engaging Science, Technology, and Society, 3, 1-15.
[19] Wang, S., Ouyang, L., Yuan, Y., Ni, X., Han, X., & Wang, F. Y. (2019). Blockchain-Enabled Smart Contracts: Architecture, Applications, and Future Trends. IEEE Transactions on Systems, Man, and Cybernetics: Systems.
[20] Chicago
[21] Sekhar, S. M., Siddesh, G. M., Kalra, S., & Anand, S. (2019). A Study of Use Cases for Smart Contracts Using Blockchain Technology. International Journal of Information Systems and Social Change (IJISSC), 10(2), 15-34.
[22] Klinkmüller, C., Ponomarev, A., Tran, A. B., Weber, I., & van der Aalst, W. (2019, September). Mining blockchain processes: Extracting process mining data from blockchain applications. In International Conference on Business Process Management (pp. 71-86). Springer, Cham.
[23] Swan, M. (2019). Blockchain Theory of Programmable Risk: Black Swan Smart Contracts. Blockchain Economics: Implications Of Distributed Ledgers-Markets, Communications Networks, And Algorithmic Reality, 1, 171.
[24] Singh, M. P., & Chopra, A. K. (2019). Computational governance and violable contracts for blockchain applications. IEEE Computer.
[25] Gatteschi, V., Lamberti, F., & Demartini, C. (2020). Blockchain Technology Use Cases. In Advanced Applications of Blockchain Technology (pp. 91-114). Springer, Singapore.
[26] Rahardja, U., Nurhaeni, T., Khoirunisa, A., & I'zzaty, R. D. (2019, December). LTAI BERBASIS TEKNOLOGI BLOCKCHAIN UNTUK MENINGKATKAN ALEXA RANK. In SENSITIf: Seminar Nasional Sistem Informasi dan Teknologi Informasi (pp. 373-380).
[27] Sato, N., Tateishi, T., & Amano, S. (2020). U.S. Patent Application No. 16/048,322.
[28] Zichichi, M., Ferretti, S., & D'Angelo, G. (2020, January). A distributed ledger based infrastructure for smart transportation system and social good. In 2020 IEEE 17th Annual Consumer Communications & Networking Conference (CCNC) (pp. 1-6). IEEE.
[29] Mandrykin, M., O'Shannessy, J., Payne, J., & Shchepetkov, I. (2020). Formal specification of a security framework for smart contracts. arXiv preprint arXiv:2001.04314.
[30] Ye, J., Ma, M., Peng, T., & Xue, Y. (2020). A Software Analysis Based Vulnerability Detection System For Smart Contracts. In Integrating Research and Practice in Software Engineering (pp. 69-81). Springer, Cham.
[31] Mandloi, J., & Bansal, P. An Empirical Review on Blockchain Smart Contracts: Application and Challenges in Implementation.
[32] Khairunnisa, R., & AL, A. M. (2020). PENGEMBANGAN DESAIN METERAI ELEKTRONIK MENDUKUNG DIGITALISASI BEA METERAI DI INDONESIA. Jurnal Komputer dan Informatika, 15(1), 288-296.

[33] SHELAR, M. K. K. (2020). USE OF BLOCKCHAIN FOR SMART CONTRCT BETWEEN TWO UNTRUSTED PARTIES WITHOUT INVLOVING A THIRD PARTY.
[34] Khatoon, A. (2020). A Blockchain-Based Smart Contract System for Healthcare Management. Electronics, 9(1), 94.
[35] Rahardja, U., Hidayanto, A. N., Hariguna, T., & Aini, Q. (2019, November). Design Framework on Tertiary Education System in Indonesia Using Blockchain Technology. In 2019 7th International Conference on Cyber and IT Service Management (CITSM) (Vol. 7, pp. 1-4). IEEE.
[36] Zheng, Z., Xie, S., Dai, H. N., Chen, W., Chen, X., Weng, J., & Imran, M. (2020). An overview on smart contracts: Challenges, advances and platforms. Future Generation Computer Systems, 105, 475-491.
[37] Zheng, Z., Xie, S., Dai, H. N., Chen, W., Chen, X., Weng, J., & Imran, M. (2020). An overview on smart contracts: Challenges, advances and platforms. Future Generation Computer Systems, 105, 475-491.
[38] Bamasag, O., Munshi, A., Alharbi, H., Aldairi, O., Altowerky, H., Alshomrani, R., & Alharbi, A. (2020). Blockchain and Smart Contract in Future Transactions—Case Studies. In Decentralised Internet of Things (pp. 169-198). Springer, Cham.
[39] Gupta, R., Tanwar, S., Al-Turjman, F., Italiya, P., Nauman, A., & Kim, S. W. (2020). Smart contract privacy protection using AI in cyber-physical systems: tools, techniques and challenges. IEEE Access, 8, 24746-24772.
[40] Mahankali, S., & Chaudhary, S. (2020). Blockchain in Education: A Comprehensive Approach–Utility, Use Cases, and Implementation in a University. In Blockchain Technology Applications in Education (pp. 267-293). IGI Global.
[41] Yusup, M., Aini, Q., Apriani, D., & Nursaputri, P. (2019, December). PEMANFAATAN TEKNOLOGI BLOCKCHAIN PADA PROGRAM SERTIFIKASI DOSEN. In SENSITIf: Seminar Nasional Sistem Informasi dan Teknologi Informasi (pp. 365-371).
[42] Patel, K., & Das, M. L. (2020, January). Transcript Management Using Blockchain Enabled Smart Contracts. In International Conference on Distributed Computing and Internet Technology (pp. 392-407). Springer, Cham.
[43] Cheng, J. C., Lee, N. Y., Chi, C., & Chen, Y. H. (2018, April). Blockchain and smart contract for digital certificate. In 2018 IEEE international conference on applied system invention (ICASI) (pp. 1046-1051). IEEE.
[44] Rahardja, U., Aini, Q., Yusup, M., & Edliyanti, A. Penerapan Teknologi Blockchain Sebagai Media Pengamanan Proses Transaksi E-Commerce. Computer Engineering, Science and System Journal, 5(1), 28-32.

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