

Reinventing Electronic Know Your Customer Solutions Using Blockchain: A Business Model Approach

Fitra Akbar, Gunawan Wang

Information System Management Department, BINUS Graduate Program – Master of Information System Management, Bina Nusantara University, Jakarta, 11480, Indonesia

fitra.komma@gmail.com

Abstract. This paper proposes an innovative blockchain-based framework to address challenges related to security, privacy, and redundancy in existing eKYC solutions. A detailed business model canvas is developed and validated through focus group discussions with banking experts. The key components of the model include the value proposition of cost-effectiveness, security, and convenience, along with eKYC integration, data storage protocols, and revenue strategies. This research represents a pioneering effort to harness blockchain technology to streamline and enhance the eKYC process for multiple stakeholders. The standardized and interoperable architecture can facilitate transparency, trust, and efficiency in the digital identity verification process.

Keywords: eKYC, Blockchain Technology, Business Model Canvas, Technopreneur

1. Introduction

The Know Your Customer (KYC) process is essential for companies to know or get to know their customers. Usually, this KYC process is used by banks, but now it is also widely used by financial technology companies (startups). In practice, the various KYC requirements across industries create different onboarding procedures, identification requirements, and authentication methods. This process is problematic for banks because it is cost-intensive, time-consuming, and inconvenient for customers (Schlatt et al., 2021). Thus, there have been attempts at improvement, mainly involving digitization. One of the solutions provided is to use Electronic Know Your Customer (eKYC). This solution makes it easier for bank users to complete the KYC process, providing several advantages compared to the traditional KYC process (TAKARAGI et al., 2022). Using this eKYC process will eliminate the process where customers provide physical documents; the process is faster and less likely for errors to occur.

However, although eKYC has been widely used to avoid repetitive work, it is still not ideal because the information retrieved from the eKYC process is also the subject of many criminal threats, and such systems must be adequately secured to avoid any denial-of-service attacks (George et al., 2019a). This consideration led to the use of blockchain as a technology, significantly improving user experience and data protection while accelerating customer onboarding and reducing KYC and compliance-related costs for financial institutions (Schlatt et al., 2021).

Recent research (Patil & Sangeetha, 2022) offers a solution to the eKYC process using blockchain technology, which can help banks verify the correctness of customer data. This solution makes the eKYC process time shorter and less redundancy by avoiding the execution of the same task again and again by different banks. Moreover, it saves operational costs for financial institutions.

While research on the problem and approaches to eKYC using blockchain have recently emerged, they have not covered topics such as how eKYC uses blockchain technology from the business side. Is this solution worthy of being a new business idea in the hope of providing value to users. We also need a general explanation of how the eKYC process based on blockchain technology works.

We are creating an approach using a business model to illustrate how eKYC based on blockchain technology can be used as a business idea. We develop and evaluate this business idea by combining theoretical knowledge and practitioner perspectives through semi-structured interviews. We also provide a general overview of how the eKYC process based on blockchain technology works to provide readiness in implementing eKYC based on blockchain technology.

This research will be structured as follows: In section 2, we will explain the literature review used in this research. In Section 3, the methodology used will be explained. Section 4 will explain the business model, the evaluation from expert interviews, and the process. Section 5 summarizes our results, identifies limitations, and outlines further research.

2. Literature Review

2.1. Business Model Canvas

In short, a business model is an organization's logic to support itself financially (Tim Clark, Alexander Osterwalder, Yves Pigneur - Business Model You A One-Page Method For Reinventing Your Career- John Wiley & Sons (2012), n.d.). Osterwalder created a one-page document for a business plan model, which is nothing new and is already widely used by entrepreneurs who want to start a business. What is different is that this document only contains one page. Usually, this document is generally used as a business direction to anticipate market changes, which could be caused by many factors such as demographics, global competition, and environmental issues.

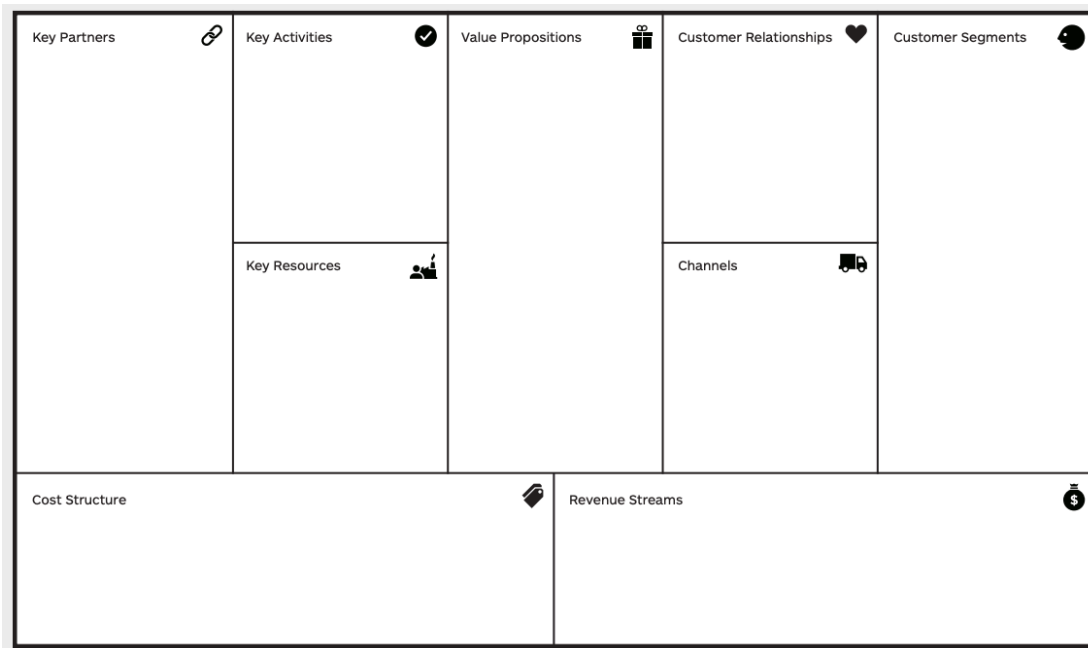


Fig. 1: Business Model Canvas

2.2. Know Your Customer

The Know Your Customer (KYC) process has been in place since 2008 after the economic recession, with the primary aim being to prevent banks from being used as a place for money laundering and other crimes. This process can be different depending on each country's policies. However, some repeating core activities of the KYC process can be identified. In the initial process, the customer uploads the identity document that has been provided, then schedules a direct meeting with the bank or makes a video call with the relevant party. After that, the bank will check various aspects related to the use of financial products or services, such as the monthly income amount or transaction history.

This process will continue to be repeated by the bank for each customer, and they also need to do the same thing when they want to proceed with another bank. This hurts customer orientation and satisfaction. Quoting (Parra Moyano & Ross, 2017), the survey results showed that around 89% of customers stated that customers did not have a good experience with the KYC process. Apart from that, banks must pay significant costs to carry out KYC. Quoting from (Parra Moyano & Ross, 2017), the figure issued by banks in America is around USD 500 million per year per bank.

2.3. Electronic Know Your Customer (eKYC)

The Electronic Know Your Customer process, commonly called eKYC, is a more comprehensive, more detailed KYC process to detect potential risks that the regular KYC process cannot detect. It replaces the physical KYC process (Adi Permana, 2023). The benefits of eKYC technology are increasing the effectiveness, efficiency, and ease of the consumer recognition process with a process that is now fully digital and reduces the level of human error with accuracy and precision. This process also requires lower costs and is faster than conventional processes. The following is a general overview of how eKYC works, quoted from (Adi Permana, 2023):

- Automatic data collection with an OCR system (technology that can change image formats into text that applications can read).
- Capture biometric data with selfie photos.
- Liveness detection.
- Biometric verification.
- Matching with government databases via API.

This entire process occurs digitally in a very short time. Usually, it will take under five seconds, so organizations using this technology can acquire more users quickly. Even though the eKYC process can be said to be good, there are still shortcomings, such as the security of the data stored. User data is stored centrally, making it vulnerable to attacks (George et al., 2019a). An example of eKYC implementation in India's Aadhaar system is that they are trying to change the process to use eKYC, with the output of faster onboarding times and fewer losses from fraud and corruption (Zetzsche et al., 2018). However, several data breaches have raised questions regarding the privacy and security of the system (Zetzsche et al., 2018). The following is a comparison between the Know Your Customer (KYC) and Electronic Know Your Customer (eKYC) processes (idfy.com, 2023):

Table. 1: Comparison KYC and eKYC

Criteria	KYC	eKYC
Process	It was done manually by collecting user information. The information collected is based on the needs of the KYC process.	It was done digitally, using a digital verification process and an online platform.
Duration and Efficiency	The duration is longer because it requires a manual process, usually one day to a week, depending on the relevant agency.	Short duration and more efficient. They were usually completed in real time or within minutes.
Cost	High operational costs for setting up resources and data processing.	Low operational costs, agencies can save costs because the process is digital and automated.
Accuracy	There is potential for human error to occur when carrying out the KYC process.	By using technology, the level of accuracy is high, and errors are minor.
Accessibility	Limited to regions or areas, cannot be done for areas that must be done remotely.	It can be accessed anywhere and anytime, depending on the internet connection.

2.4. Blockchain

A blockchain is a collection of blocks that can store data and be distributed, transparent, and safe (Bodkhe, 2020). When new data is added to the partnership, the blockchain chain will get bigger, and each block can interact with other unions. Any change in the alliance of the blockchain chain will disrupt the entire blockchain, allowing each user to validate and verify the integrity of the stored data.

Using blockchain in the eKYC process has several advantages. One of the biggest advantages is that it helps users who have registered in a system to avoid repeating the process when they want to register in another system (George et al., 2019a). This is because when information is stored in the chain, it can be accessed by certain parties as long as they have the authority to view it. Another advantage is that blockchain implements a peer-to-peer network, which is safer than a centralized system that is more vulnerable to cyber-attacks. Moreover, every information entity stored in the blockchain can be ensured that it cannot be modified and will be transparent (George et al., 2019a).

3. Method

In IS research, there needs to be a major contribution that must answer relevant business needs that will be useful for individuals, organizations or the technology used in an environment. As previously mentioned, improvements to the eKYC process represent business needs. The framework here is based on efforts aimed at creating new business ideas related to the eKYC process using blockchain technology and getting feedback from practitioners already involved in this field. This research process has four sequential processes (see Figure 2).

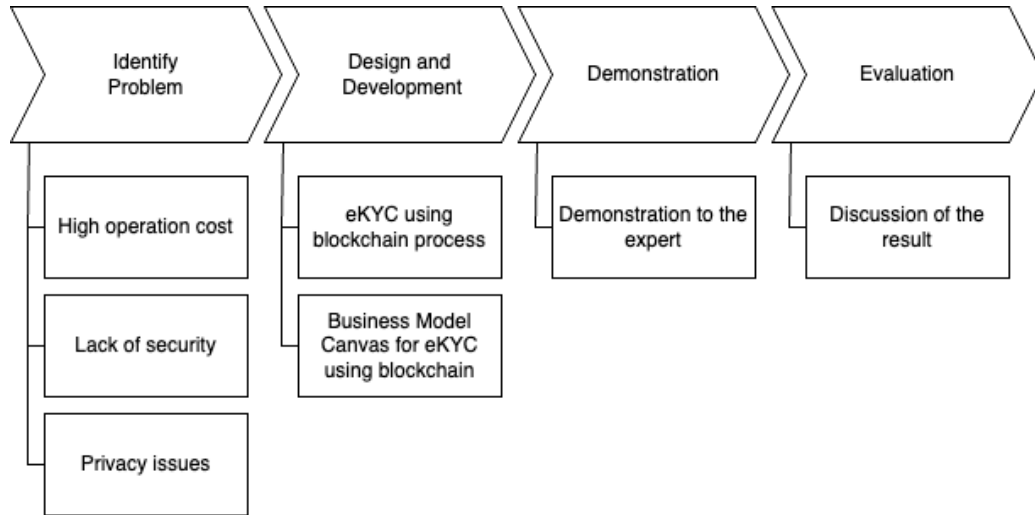


Fig. 2: Methodology

The process begins with identifying problems that have relevance. Based on the examination carried out, the obstacles faced by eKYC are high operational costs and lack of security and privacy issues.

Based on theory and previous research references, we design and develop eKYC based on blockchain technology using a business model canvas approach in the subsequent process. After the business model has been designed, it will be evaluated by interviewing experts. The main source was the interview process with several experts from various companies operating in the field or having KYC processes in their operational business processes. The interviews were semi-structured so we could react flexibly to the interviewees' answers and ask appropriate follow-up questions. Apart from taking experts from various industries, the interviews were conducted at various levels to prevent bias. A detailed overview of the interviewees appears in the Table below:

Table. 2: Expert Interview

Expertise	ID	Role	Background	Type
KYC	A	Operation Manager	Fintech Startup	Offline Interview
KYC	B	Sales Executive	Fintech Startup	Offline Interview
KYC	C	Senior Developer	e-commerce Startup	Offline Interview
Business	D	Head of Risk and fraud	e-commerce Startup	Offline Interview
KYC	E	Sales Executive	Banking	Offline Interview
Business	F	Project Manager	Banking	Offline Interview

The interview consists of three sections: In the opening, the respondent stated their function and discussed their areas of responsibility. Second, focusing on the eKYC process to understand their understanding of the term and its implications. This section also compared the authors' and respondents' understanding to clarify differences. The last section about the business model to get value offers and creation from the new business model was created.

4. Result and Discussion

The eKYC application offered to this business will be integrated with client applications that have worked together so that clients can customize to suit their needs, and users will be more familiar with the application's appearance. For a more precise explanation, here is an overview of the eKYC process based on blockchain technology:

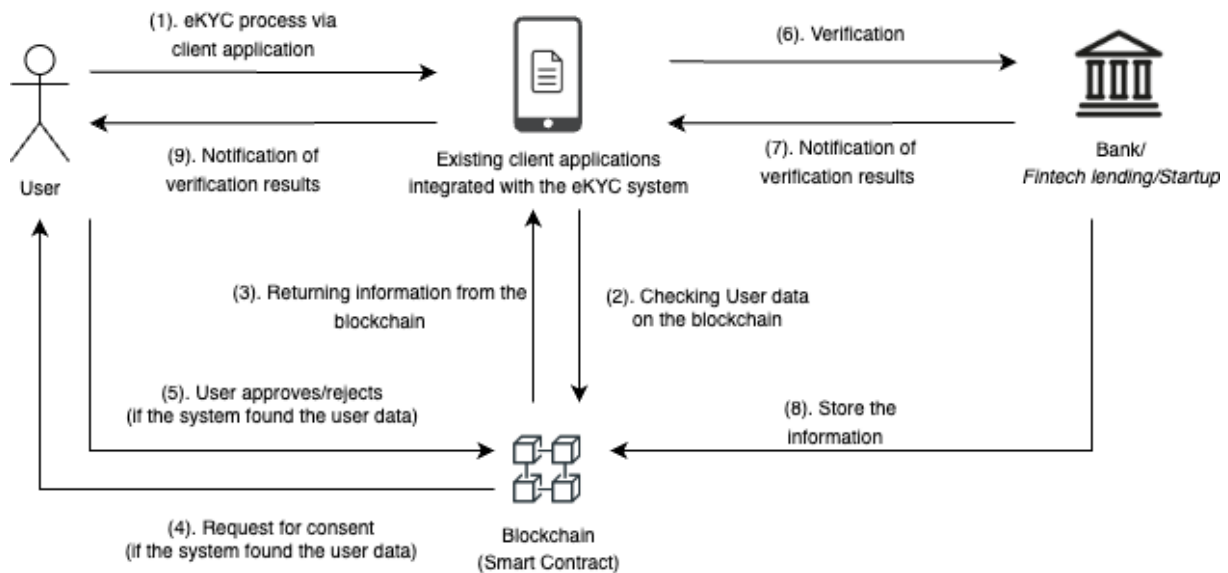


Fig. 3: eKYC with Blockchain Proposed Solution

Below is the explanation of the process above:

No.	Process	Description
1.	eKYC process via client application	Users application who want to use financial or banking products access the application and start the initial eKYC process. The assumption is that the application is a client who has become a partner with the company.
2.	Checking user data on the blockchain	Before the user continues the process, they must enter their ID number (passport number or others, depending on the country) to check whether the ID has been stored on the blockchain.
3.	Returning information from the blockchain	The results of this check will be returned to the application, whether the data user has been saved or not. If user information has never been stored on the blockchain, the user will be directed to another page to enter the data for the eKYC process.
4.	Request for consent (if the system found the user data)	Suppose the user has already carried out eKYC in another application, and the data has been stored on the blockchain. In that case, the system will ask for the user's consent to be given access so that the information can be forwarded to the bank/financial

		company for processing. If the user refuses to provide access, the data will not be passed on to the relevant parties, and it will be deemed that the user has not continued the eKYC process.
5.	User approves/rejects (if the system found the user data)	Suppose the user permits the information to be used by related parties. In that case, the information will be forwarded, and the user no longer needs to enter information such as address, cellphone number, or other information usually required for the KYC process.
6.	Verification	The relevant company verifies the information received. The duration of verification depends on the need for the KYC process itself. For example, for new user registration, the process can be done in real-time; for the loan process, it depends on whether further verification is needed. And if not, the results can also be known in real-time.
7,9	Notification of verification results	After the verification process is complete, users will be notified whether they have passed the verification process or not, and they will be notified via the application. Depending on the client company's procedures, notifications can be obtained in real-time or quickly.
8.	Store the information	All user information that is successfully verified will be stored on the blockchain, and everyone cannot access this information. Companies can only see news about users who have carried out eKYC at their company and cannot see information about other users who have never done activities on their application/product.

Based on the business process description, the following is an overview of the business model canvas, complete with explanations of each element.

Business Model Canvas				
Key Partners • Government • Cloud company • Payment Gateway	Key Activities • Integration eKYC with clients application • eKYC through client application • Store user information on blockchain using smart contract Key Resources • Employee • Legality • Place of business • Application • Investment	Value Propositions • Offers a faster, more secure eKYC process at a lower cost • A solution for customers who no longer need to enter repeated information when they want to do KYC at any other banking/financial institution • A solution for company that don't need to pay a lot for the KYC process • Guaranteed security of customer data because it will be stored on the blockchain	Customer Relationships • SOP for handling complaints from customers • Customer Care • Account executive for each client • Webpage for documentation and guideline Channels • Website • Direct sales • Content marketing • Free trials	Customer Segments • Financial companies do not want to be burdened with KYC operational costs • Bank companies do not want to be burdened with KYC operational costs • Startup who needed eKYC application and want to reduce the operational cost for KYC process
Cost Structure • Employee Salary • Operational cost • Marketing Cost • Maintenance application cost		Revenue Streams • The application's price is charged based on the number of users using the eKYC application • Customization for each client who want to enhance the application		

Fig. 4: eKYC with Blockchain Technology Business Model Canvas

a. Customer Segment

Financial companies do not want to be burdened with KYC operational costs, and bank companies do not want to be burdened with KYC operational costs. Also, startups who need an eKYC system and want to save time and money for KYC functional things. Expert A confirmed that the targeted potential customer segmentation is not limited to banks or financial startups alone but can be leveraged on other companies that require a KYC process.

b. Value Propositions

1. Offers a faster, more secure eKYC process at a lower cost, and the time can also be reduced (*BLOCK CHAIN ENABLED E-KYC SYSTEM*, 2019)
2. A solution for customers who no longer need to enter information repeatedly when they want to do KYC at any other banking/financial company. This can happen because data stored on the blockchain cannot be modified, especially by irresponsible parties (George et al., 2019b).
3. Guaranteed security of customer data because it will be stored on the blockchain. This is an advantage of decentralized peer-to-peer networks compared to centralized infrastructure (George et al., 2019b).

c. Channels

1. Website. One marketing strategy that can be done is to build a website to showcase the eKYC solution along with the benefits obtained and testimonials from clients who have used it. Expert B also mentioned that a website must exist, especially in today's digital world, where all goods are exhibited online, adding to the business's credibility.
2. Direct Sales. The sales team will approach prospective clients. This team consists of people who understand the products being sold and their benefits and help answer problems related to the KYC process from potential clients. Expert B said leads for sales could be obtained from the website, and then this will help salespeople follow up in the hope that these leads can be converted into new customers.
3. Content Marketing. Using the Internet and social media as marketing can increase company

opportunities because of low costs, brand awareness, and sales (Dwivedi et al., 2021).

In this case, what needs to be done is to prepare content that explains and sells this blockchain-based eKYC product using blog or video media.

4. Free Trials. Offer a free trial for a certain period (1 – 2 months), so prospective clients can use the solutions offered and get the experience of using them. During this time, the client will not be charged any fees. If the free trial has finished, the client can decide to continue using the application and must pay according to the fees charged or not continue using the application. Expert B emphasized this by saying this is common, especially for businesses that rely on the Business to Business (B2B) business model to make potential clients believe in the product they will buy.
- d. Customer Relationships
 1. Standard Operating Procedure. This SOP will guide the customer support team and others, such as the engineering team, to answer questions or handle operational problems. This SOP will be a document that is easily accessible to everyone and will continue to be updated regularly. This SOP will also be made as a website so that clients can see or find out if they are experiencing operational difficulties. This was confirmed by Expert D, who said that SOPs are important as a medium for risk prevention. Apart from that, Expert A said that with the SOP, operations would run smoothly and not depend on certain individuals."
 2. Customer Support. The main task of the Customer Support team is to capture all questions or problems from clients, answer if the questions asked are contained in the SOP or continue questions to the relevant team who can help resolve related issues, to the Engineering team or other teams and ensure clients get answers to their questions. Expert A said that customer support is the main team responsible for customer complaints, and the first PIC is also tasked with responding to all customer needs. From a customer perspective, Expert F said the customer support team must be on standby 24/7 and ready to help solve any problems.
 3. Account Executive. Each company that has become a client will have one contact (Account Executive) whose task is to handle all requests or help clients if they experience payment problems or if clients ask for additional features or customization of existing systems. So that collaborative relationships with clients are maintained well. From a business perspective, Expert B said having a company representative for each client who has used the product is important because it will create better relationships between organizations and immediately capture product-related needs from users. An Account Executive can help translate these needs into requirements for development. Continuation of the product.
 4. Dedicated webpage for documentation regarding the application. Creating a dedicated webpage to document the application. This will make it easier for clients or potential clients to know the application better. The webpage should include frequently asked questions (FAQs), an explanation of how the application works, sandbox demos, and a comprehensive list of APIs or libraries used. This will provide clients or potential clients with all the necessary information.
- e. Revenue Streams

The income stream from the business comes from the subscription model, which is charged to clients by providing a basic price if no transaction and additional fees depending on how many users successfully carry out eKYC transactions. This business income is also obtained from customizing the eKYC system according to client needs. The fees charged will be separate from the monthly subscription fee. Experts B and E agree with this idea because using a subscription model will benefit customers, and they no longer need to pay large costs for the KYC process (both from the system and operational costs).
- f. Key Resources

Resources are usually categorized into four assets, namely physical, intellectual, human, and

financial. Those included in the physical category include Place of business. Intellectual includes legality and the eKYC application. Human includes the company's employees, and financial is the investment costs required to run the company.

g. Key Activities

Activities designed for new business needs have been discussed together with the Experts (A, C and F):

1. Integration of eKYC with client's application. The eKYC application will be embedded into client applications to adjust the interface and some of the required information to the client's needs. Clients can also customize the application to suit their needs. Apart from that, every information carried out in the application will later be stored on the blockchain and in the client system for use if needed. When there is customer data that has been stored on the blockchain, and the same customer wants to carry out KYC in a different application, for example, the customer no longer needs to carry out the eKYC process because the data has already been stored on the blockchain; the user only needs to provide access permission so that the data can be shared with the related company.
2. eKYC through client application. The process starts when the user accesses the application to carry out the verification process, such as entering ID, full name, place and date of birth, email address, residence address, cell phone number, and taking a picture of themselves.
3. Store user information on blockchain using smart contract. User information will be stored on the blockchain using smart contracts.

h. Cost Structure

1. Employee Salary
2. Marketing Cost
3. Maintenance application cost
4. IT Cost

4. Key Partners

According to Expert D, several key partners who will help the sustainability of this new business include:

1. Government. Support from government institutions, especially those involved in finance and business legality, is urgently needed.
2. Cloud company. Companies need cloud services to store various information, including blockchain, which will use cloud hosting services.
3. Payment gateway. Payments made by clients will use the payment gateway service.

5. Conclusion and Future Research

This paper proposes a promising business model for blockchain-integrated eKYC solutions to tackle challenges like centralization risks, fragmented processes, repetitiveness, and unsatisfactory customer experiences. The proposed model uniquely emphasizes consent-based data sharing across banking institutions to enable streamlining while prioritizing privacy. Through expert validation, this research develops an industry-applicable framework focusing on the technical and operational aspects. The customizable and interoperable design provides scope for evolution to incorporate emerging technological and regulatory advancements. While limitations exist regarding scalability and adoption barriers, this work represents a major advancement by harnessing blockchain's advantages to reshape eKYC systems. The model can foster standardization, security, and transparency and catalyze innovation in digital identity infrastructure, though additional research is warranted.

Moreover, future research can analyze how this business model is implemented globally, considering variations in the regulatory framework, cultural differences, and geopolitical factors. Apart from that, identify what factors the company may face and what strategies to overcome these. Another thing that could be used as further research is further investigation to see how the new business model is scalable when implemented, especially focusing on the number of users and transactions and how to handle an increase in volume from the blockchain side without reducing efficiency.

References

Adi Permana. (2023, May 22). *Mengenal Sistem e-KYC: Manfaat dan Keuntungannya di Era Digital*. <https://www.itb.ac.id/berita/mengenal-sistem-e-kyc-manfaat-dan-keuntungannya-di-era-digital/58560>

BLOCK CHAIN ENABLED E-KYC SYSTEM. (2019). <https://doi.org/10.26562/IRJCS.2019.APCS10081>

Bodkhe, U. (2020). Blockchain for Industry 4.0: A comprehensive review. *IEEE Access*, 8, 79764–79800. <https://doi.org/10.1109/ACCESS.2020.2988579>

Dwivedi, Y. K., Ismagilova, E., Hughes, D. L., Carlson, J., Filieri, R., Jacobson, J., Jain, V., Karjaluoto, H., Kefi, H., Krishen, A. S., Kumar, V., Rahman, M. M., Raman, R., Rauschnabel, P. A., Rowley, J., Salo, J., Tran, G. A., & Wang, Y. (2021). Setting the future of digital and social media marketing research: Perspectives and research propositions. *International Journal of Information Management*, 59. <https://doi.org/10.1016/j.ijinfomgt.2020.102168>

George, D., Wani, A., & Bhatia, A. (2019a). A Blockchain based Solution to Know Your Customer (KYC) Dilemma. In *2019 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)*.

George, D., Wani, A., & Bhatia, A. (2019b). A Blockchain based Solution to Know Your Customer (KYC) Dilemma. In *2019 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)*.

idfy.com. (2023, October 16). *Difference between KYC and eKYC – A Comprehensive Guide*. <https://www.idfy.com/blog/a-comprehensive-difference-between-kyc-and-ekyc/>

Parra Moyano, J., & Ross, O. (2017). KYC Optimization Using Distributed Ledger Technology. *Business and Information Systems Engineering*, 59(6), 411–423. <https://doi.org/10.1007/s12599-017-0504-2>

Patil, P., & Sangeetha, M. (2022). Blockchain-based Decentralized KYC Verification Framework for Banks. *Procedia Computer Science*, 215, 529–536. <https://doi.org/10.1016/j.procs.2022.12.055>

Schlatt, V., Sedlmeir, J., Feulner, S., & Urbach, N. (2021). Designing a Framework for Digital KYC Processes Built on Blockchain-Based Self-Sovereign Identity. *Information and Management*. <https://doi.org/10.1016/j.im.2021.103553>

TAKARAGI, K., KUBOTA, T., UMEZAWA, K., & ... (2022). Secure Revocation Features in eKYC-Privacy Protection in Central Bank Digital Currency. *IEICE Transactions on ...*. https://www.jstage.jst.go.jp/article/transfun/advpub/0/advpub_2022CIP0008/_article/-char/ja/

Tim Clark, Alexander Osterwalder, Yves Pigneur - Business Model You A One-Page Method For Reinventing Your Career-John Wiley & Sons (2012). (n.d.).

Zetsche, D., Arner, D. W., & Buckley, R. (2018). *Digital ID and AML/CDD/KYC utilities for financial inclusion, integrity and competition*. <https://www.researchgate.net/publication/328092073>

Appendix A

Table. A: List of the questions asked in the interviews

Part 1
1. What is your position and what are your functions in the organization? 2. Since when are you active in this role? 3. What specific tasks and areas of responsibility does your position encompass?
Part 2
4. How familiar are you with the eKYC? What is your understanding of it? 5. Is eKYC already relevant for your organization? If not, in which timeframe do you see eKYC as relevant to you? 6. Which challenges do you see for yourself regarding eKYC? 7. Which trends or developments do you think will have a substantial influence on the adoption of eKYC in financial industry?
Part 3
8. What would you say were the most critical steps, elements, and concepts that best describe this eKYC process of a business model (proposed)? 9. In which of the following areas of the business model (proposed) do you expect will bring a change, and can you describe those changes? 10. How did you know it was the right solution? Did you employ any methodology, model, approach, or tool to support and enable this?