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Investigating "organizational maturity" in order to provide "blockchain banking service" based on "FinTech" (through "the CMMI" in "Parsian Bank")

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Abstract

Purpose – The description of "blockchain banking", the determination of "the sub-processes" of "blockchain banking" as a "business process", and the assessment of "maturity level" in Parsian Bank.
Design/methodology/approach – Theoretical sources on "blockchain banking" were initially investigated. Then the "sub-processes" of "blockchain banking" as a "business process" were extracted by Parsian Bank's experts through the "Delphi method". Next, the "sequence" of the "sub-processes" was determined by means of the "AHP". Eventually, Parsian Bank's maturity levels for all the sub-processes as well as the overall maturity level were specified on the basis of the "CMMI" V1.3 in order for Business Process Management (BPM).
Findings – Blockchain banking' combines traditional banking with cryptocurrencies, which can be provided by merging "hybrid e-wallet" with "bank account" and "bank card" – all together as "crypto bank account". Plus, "hybrid e-wallet" is a form of mobile e-wallet on blockchain that supports both cryptocurrencies and traditional currencies in the same platform by which the purchase and sale of cryptocurrencies are possible. Besides, "Blockchain banking service" can also be offered within the framework of "open banking" aligned with "open innovation" through a FinTech (or a beta bank) in collaboration with a licensed bank via "open API", which is called "blockchain banking based on FinTech". At last, the eight sub-processes of "blockchain banking" were determined and Parsian Bank's "maturity level" was specified.
Originality/value – This is the very first practical guide to "blockchain banking service".

Keywords Neobank, Decentralized finance, Bitcoin, Hybrid E-wallet, Business process management, Parsian Bank

Paper type Case study

1. Introduction

1.1 Research objectives

This article aims at playing a role as a practical guide in order to expound and implement blockchain banking via the CMMI as business process management (BPM). In this regard, the main purpose of the research is that how is Parsian Bank's "organizational maturity" in order to provide blockchain banking service for customers through a newly established Financial

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Technology company (i.e. FinTech startup) as a business process (an organizational process)? In line with the research, firstly, the relevant sub-processes were identified and finally, so as to provide blockchain banking service based on FinTech, Parsian Bank's "organizational maturity" was investigated through the CMMI Version 1.3.

To summarize, two main questions along with a secondary one were perused:

(1) The main question 1: *What are the sub-processes for providing blockchain banking service based on FinTech as a business process?*

(2) The main question 2: *How is Parsian Bank's organizational maturity in order to provide blockchain banking service based on FinTech?*

(3) The secondary question: *What are Parsian Bank's weaknesses in order to provide blockchain banking service based on FinTech?*

1.2 Blockchain banking

(1) "Bitwala" FinTech, currently called "Nuri" (a FinTech in collaboration with a licensed bank)

"Crypto-bank" is a financial institution that involves in the typical array of money-related activities such as deposits, withdrawals, savings, lending, borrowing and investing in a broader range of instruments and markets. Whilst crypto bank also describes a standard bank completely, it integrates cryptocurrencies (decentralized finance or DeFi) into these financial functions (centralized finance). These kinds of crypto banks, like "Bitwala" (now called "Nuri"), are substantially the skeleton of what will sooner or later be a bridge between the separated fiat and crypto economies, which are already beginning to emerge (Kuznetsov, 2019).

"Bitwala" (presently called "Nuri") is perhaps the model that digital banks with crypto options of the future will follow (Say, 2020). The Berlin startup, "Bitwala" was awarded the third prize in the German Innovation Prize (Damm, 2017). For the first time, "Bitwala" merged fully licensed bank account with cryptocurrency and offered customers a safe and regulated entry into the blockchain economy (CORDIS, 2019). "Bitwala" has become a kind of bridge between traditional finance and crypto economy (Крейдун, 2021, p. 33).

"Bitwala" has brought Berlin's "Solarisbank" on board so that there are no problems with supervision. "Solarisbank" lends "Bitwala" its banking license and thus enables banking and crypto trading (Wischmeyer, 2018). "Solarisbank" has a German full banking license and will ensure that all bank accounts of the new offer meet the requirements and legal statutes. As a bridge between the cryptocurrency and fiat world, the Blockchain part of "solarisbank" will tackle challenges through offering banking service as APIs and other crypto-specific solutions (IT Finanzmagazin, 2018).

What is the major problem in the crypto community? Is it how to manage your cryptocurrencies through bank account? "Bitwala" takes the initiative to solve the problem. It provides debit card, being linked with traditional bank account that is connected to crypto debit card. Hence, you are initially required to convert Bitcoin to Euros – But with quick cash settlement via the e-wallet, you can live off your crypto investments (Du'Mmett, 2019).

What service does "Bitwala" (now called "Nuri") offer as blockchain banking?

"Bitwala" offers (1) bank account, (2) cryptocurrency e-wallet, as well as (3) bank card (Williams, 2021).

1. "*Bank account*"

"Bitwala" accounts have a German bank account linked to the e-wallet and debit card. The account operates as a regular bank account. The bank account provides the possibility of

payment (salary, wage, rent and personal transfers) and that of savings and that of international transfers using the "Single Euro Payments Area" (SEPA) and security up to one hundred thousand euros (Du'Mmett, 2019).

2. "*Cryptocurrency e-wallet*" (To be more exact, "*Hybrid e-wallet*")

"Bitwala" offers a crypto e-wallet, which supports Bitcoin as well as Euro. It operates as a regular crypto e-wallet, enabling customers to store, send and transfer their Bitcoins. In addition, it allows users to exchange crypto and fiat (Du'Mmett, 2019). "Bitwala" offers Bitcoin trading and ownership directly from a client's bank account, and charges a low 1% fee for any trades (Say, 2020). The e-wallet let the users have full control over their private keys and backup phrase. Users are able to apply QR code for transactions. It is accessible for Android and iOS system (Du'Mmett, 2019).

3. "*Debit card*"

To put the icing on the cake, "Bitwala" also provides a Mastercard debit card that is connected to the bank account. There is quick cash settlement owing to the unique integration of crypto and fiat into one platform. Once user sells Bitcoin, funds in Euros will be attainable on the bank account during an hour (Du'Mmett, 2019).

Incidentally, "Bitwala" is the very first blockchain banking service, offering integrated "tax reporting" to the users via its strategic partnership with "CryptoTax". The service is free for all the customers throughout the 31 countries of the EEA (European Economic Area). This tax reporting is as convenient as traditional financial institutions (Du'Mmett, 2019).

(1) "TokenPay" FinTech project (a FinTech looking for the acquisition of a bank)

TokenPay's platform is designed to integrate the advantages of an established banking institution into the pliability and future-forward potential of cryptocurrency. Therefore, the platform enables the exchange of major cryptocurrencies such as Bitcoin, Ethereum, et cetera by bridging the transition gap to fiat. The network also lets the users have access to crypto funds at merchant POS as well as ATMs worldwide. The costumers will be able to store their Bitcoin and other cryptocurrencies in a secure and insured e-wallet, just as customers are provided for via fiat accounts at a regular bank account. As a consequence, counterparty risk is obviously diminished to a great extend via a licensed and bonded banking institution. Hence, the acquisition of German "WEG Bank AG" makes "TokenPay" operate in a manner that will cater to the unique needs of cryptocurrency owners across the world (Capo *et al.*, 2017, p. 14).

In other words, the users can store cryptocurrencies in insured e-wallets, being fully supported by a bonded bank. The conversion to fiat in real-time is conducted by the bank's private closed-end exchange. The debit cards issued by the crypto-driven bank will be linked to e-wallet and virtual card. The private exchange provides seamless transactions and fluid conversions. The service appeals to merchants, since businesses can accept cryptocurrencies. The goal is the generation of a complete end-to-end solution for DeFi and banking (Capo *et al.*, 2017, p. 58).

(2) "WBB" (World Bit Bank) FinTech project: World's first legal cryptocurrency bank (a FinTech looking for the acquisition of a bank)

The objective is to provide a supplementary for incumbent banking service with electronic platforms and to merge cryptocurrencies and bank operations and to aid regular people make use of cryptocurrency in quotidian life (WBB, n.d., p. 16).

The project comprises (1) "WBB e-wallet" and (2) "WBB card". (1) The WBB e-wallet is a mobile app that integrates tokens into debit card. (2) The WBB debit card is the traditional

Visa and Mastercard debit card. The clients pay cryptocurrencies, such as Bitcoin, Ethereum (including the ERC20 standard), et cetera within a cup of coffee (WBB, n.d., p. 7). On that account, the WBB debit card is expected to back most cryptocurrencies, including Dash, Bitcoin, Ethereum (including the ERC20 standard) and others. It will enable WBB customers to store and exchange cryptocurrencies (WBB, n.d., p. 19). The result will be the opportunity to benefit from cryptocurrencies in the real world (WBB, n.d., p. 7).

World Bit Bank will offer the "Wibcoin" (WBBC) token based on Ethereum's blockchain, that is supposed to be a public cryptocurrency for daily digital service, including value maintenance, currency exchange and payments. "Wibcoin" (WBBC) will act as the unit of account of all transactions in the WBB ecosystem and will serve as the foundation for interaction with other digital service (WBB, n.d., p. 17).

(3) *Falcon Private Bank* (a licensed bank)

Zurich's Falcon private Bank is the first in the market to offer its clients the possibility to invest in cryptocurrencies through its "Blockchain Asset Management" service. The service also offers cryptocurrency holders the option to convert their virtual currencies into real money, fully complying with regulatory compliance rules (Sakho *et al.*, 2019, p. 2).

1.3 "Capability Maturity Model Integration" version 1.3 (CMMI V1.3)

The CMMI models are collections of best practices that help organizations to improve their processes. There are three "CMMIs version 1.3", consisting of (1) CMMI for development version 1.3 (CMMI-DEV V1.3), (2) CMMI for acquisition version 1.3 (CMMI-ACQ V1.3) and (3) CMMI for services version 1.3 (CMMI-SVC V1.3), which were released in 2010 (Team, 2010a; Team, 2010b; Team, 2010c).

Generally speaking, (1) If one does not know where to begin and which processes (or sub-processes) to opt for improvement, *the* "*staged representation*" is a good option. It provides a specific set of processes to improve at each stage, having been determined through more than a decade of research and experience with process improvement. There are "*five maturity levels*", that each one is a layer in the foundation for ongoing process improvement. They are designated by the numbers 1 through 5: *1. Initial 2. Managed 3. Defined 4. Quantitatively Managed 5. Optimizing*. (2) On the other hand, if one knows the processes that have to be improved in the organization and one understands the dependencies among the "*Process Areas*" (*PA*s) described in the CMMI, *the* "*continuous representation*" is a good option. The "*four capability levels*" are designated by the numbers 0 through 3, being as follows: *0. Incomplete 1. Performed 2. Managed 3. Defined* (Team, 2006, pp. 11-12; Team, 2010a; Team, 2010b; Team, 2010c).

Ultimately, all three CMMIs V1.3 for development, acquisition and services were integrated into the most up-to-date model, the CMMI version 2.0 in 2018 as a single model. However, you have to buy a license (Team, 2018).

Table 1 elucidates the maturity levels of the CMMI V1.3, which are utilized by this research.

1.4 Structure of the research

Having familiarized with "the introduction", in the following, we firstly delineate "the background" including "the research associated with providing cryptocurrency services via hybrid e-wallet" and "the research relating to the CMMI". Then, "the methodology" is precisely described. Next, "the essence of blockchain banking based on FinTech" and "the comprehensive model of the future banking" are meticulously elucidated. Later, we expound how the research was conducted step by step. Afterwards, the section named "the discussion" provides the final results of the research. In addition, the recommendations to implement

The CMMI V1.3 No.	Maturity Level	Description
1	Initial	Process is normally chaotic and ad hoc. The organization generally does not provide a stable environment to support process. Success in the organization relies on the heroics and competence of the people in the organization and not on the use of proven process Unpredictable and reactive: process is completed but often delayed and over budget
2	Managed	Process is planned and executed as per policy. Skilled people are employed, having appropriate resources to produce controlled outputs. Relevant stakeholders are engaged. Process is performed and managed in accordance with the documented plans Managed on the project level
3	Defined	Process is well-characterized and well-understood, and is described in procedures, methods, standards and tools. The purpose, inputs, entry criteria, activities, roles, measures, verification steps, outputs and exit criteria of a defined process are clearly stated. Process is managed more proactively Proactive, rather than reactive
4	Quantitatively Managed	Quantitative objectives are based on the needs of the organization, end users, customer and process implementers. Process performance and quality are understood in statistical terms. Statistics and other quantitative techniques are utilized Measured and controlled
5	Optimizing	The organization's process performance objectives and quality are established and continually revised. The organization constantly improves its processes based on a quantitative understanding of its performance needs and business objectives. The analysis of data identifies deficiencies or shortcomings in performance. These gaps are applied to advance organizational process improvement that generates measurable improvement in performance Stable and flexible

Table 1.
The maturity levels of the "CMMI" V1.3

Source(s): Authors' work based on Team (2010a), pp. 26-30; Team (2010b), pp. 28-32; Team (2010c), pp. 26-30

blockchain banking as per the CMMI V1.3 are finally presented in the last section named "the conclusion".

(1) *The bottom Line*: All in all, the research is outlined at a glance in "the model" below, being explained scrupulously in section 3.1 named "the essence of blockchain banking based on FinTech".

2. Background

2.1 Research associated with providing cryptocurrency financial services through "hybrid e-wallet" along with "card" based on FinTech

First of all, *Reinig* et al. *(2018)* warn established financial service providers against the payment transactions segment, which is expected to pose the greatest risk on them. This segment and banks' deposit business, which has already been threatened, would be even more at risk if companies and individuals became increasingly interested to transfer their current deposits into cryptocurrencies, which benefit from blockchain as a strong key resource. Furthermore, there are FinTechs, which base their business models on blockchain (or cryptocurrencies). Consequently, on the one hand, these FinTechs increase the spread of these currencies. On the other hand, they create new opportunities (e.g. "Bitwala", presently called "Nuri", uses Bitcoin as the base currency and supports the transfer to other currencies).

"Bitwala" FinTech, from the payment transaction segment, deserves special mention, as this FinTech primarily transfers bank branch to retail sector, which causes financial service providers could lose their direct contact with their customers. The cooperation with these FinTechs can therefore make sense in this context, as more and more financial transactions are expected to be made digitally.

Then *Voshmgir (2016)* points out some of the newer FinTech startups are taking completely different paths and it remains to be seen what will happen here in the next few years. The company, "Bitwala" which is active in Berlin offers Bitcoin-related financial services. It contains the better usability of Bitcoin and better interface with traditional financial service. It enables SEPA (Single Euro Payments Area) transfers with Bitcoin.

Additionally, *Dascano (2018)* states e-wallets can be shared and created with ease and security. As an example, "Bitwala", this payment service facilitates Bitcoin and allows the user to pay their EUR bills using the cryptocurrency.

To be more precise, *Preuss (2019)* explains the FinTech, "Bitwala", founded in 2015, offers "the bank account based on Bitcoin's blockchain", which can be used to process international transfers. For example, if you make a transfer of 300 cents via the "Bitwala" platform with a recipient account at a Chinese bank, you pay a transaction fee of 1.50 cents and the transfer is completed after six hours Since only a Bitcoin account is required for the "Bitwala" service, this international transfer service can also be used by people who do not even have a bank account.

To summarize Bitwala's business model, *Longman (2019)* mentions "Bitwala" is a company that combines traditional banking features with cryptocurrency banking ones, and recently released a "Bitcoin debit card" through Mastercard. Blockchain Banking, which allows consumers to instantly exchange cryptocurrencies into Euro, spend currencies (e.g. Euro) in stores and online and withdraw funds from any ATM worldwide.

By the way, *Solomon (2019)* introduces another FinTech, named "TenX", which allows customers to use Ether and other cryptocurrencies at retailers to pay for purchases around the world. Although most retailers do not directly support cryptocurrencies, yet, "TenX" created its own line of crypto debit cards and credit cards that link up with its proprietary crypto e-wallet. The "TenX" cards provide the bridge between cryptocurrencies and traditional payment. "TenX" records all payment transactions on blockchain, and has plans for a larger network that allow apps to communicate across multiple blockchains.

To be more specific, *Chuen and Linda (2018)* expound it is worth looking at the business model of smart cryptocurrency cards. The "TenX" wallet is the major game changer as it allows a user to spend their blockchain assets through the virtual or physical card in a myriad of POS (points of sale) online and offline. The virtual card is just the smartphone. And the "TenX" app is downloadable for free from app stores. The cryptocurrency is converted in real-time like fiat currency, and merchants just charge the user fiat currencies.

In addition, Castejón Teruel (2018) describes "Xapo" that offers a Bitcoin debit card, which is associated with a Bitcoin wallet too, enabling customers to spend Bitcoin easier than most other service. While there is a fee to acquire the card, it shows an intriguing form to bring Bitcoin into the real world. "Xapo" combines the convenience of a daily Bitcoin wallet with the security of a deep cold storage vault.

On the other hand, *Maksurov (2018)* reports it should be noted that VISA, at first favorably perceived indirect (through US dollar) pegging its card to cryptocurrency accounts, but began to gradually block this practice in order to try to kill the growing threat from the sides of cryptocurrencies which are still in their infancy. In particular, such service are like "TenX", "Wirex", "Bitwala", etc.

In the end, to reach a conclusion, *Capo* et al. *(2017)* ask if the cryptocurrencies world can meet the fiat. There are Bitcoin debit cards, such as "Bitwala", "Xapo", "Wirex" and more. However this is only half the way. There are still crucial banking barriers that hamper the

exchange of cryptocurrencies to fiat. So, why not reverse the route, and have the banking world meet the crypto world half way? In summary, this is TokenPay's central premise. The aim is to build the world's first bank that verily understands and embraces cryptocurrencies. This bank will enable clients to exchange cryptocurrencies to fiat so as to purchase hard assets. It all begins with a banking partnership. That is why the acquisition of a bank was the first necessary measure to take by TokenPay.

(1) *The outcome:* To begin with, *Reinig* et al. *(2018)* give financial institutions a serious warning against the payment transactions segment, which is due to pose the greatest risk on them by blockchain FinTechs. Thus *Reinig* et al. *(2018)* recommend the cooperation between banks and FinTechs. In this respect, *Voshmgir (2016)* declares some of the new FinTechs are taking completely different paths. And *Dascano (2018)* expresses e-wallets can be created with ease and security. "Bitwala", this payment service facilitates Bitcoin. *Preuss (2019)* also explicates "Bitwala" offers "the bank account based on Bitcoin's blockchain". Furthermore, *Longman (2019)* expounds "Bitwala" is a company that combines centralized finance with decentralized finance (DeFi). Besides, *Solomon (2019)* describes "TenX", which allows customers to use Ether and other cryptocurrencies at retailers to pay for purchases around the world. In addition, *Chuen and Linda (2018)* explain the "TenX" e-wallet enables users to spend their blockchain assets through the virtual or physical card in many points of acceptance (POS) online and offline. Additionally, *Maksurov (2018)* states VISA, at first favorably perceived indirect (through US dollar) pegging its card to cryptocurrency accounts such as "TenX", "Wirex", "Bitwala", etc. Over and above that, to conclude, *Capo* et al. *(2017)* announce there are Bitcoin debit cards, like "Bitwala", "Xapo", "Wirex" and more. Yet, TokenPay's purpose is to build the world's first bank that indeed caters to the needs of cryptocurrency holders.

2.2 Research relating to the CMMI

To make use of the CMMIs V1.3, *the CMMI product team [Team] (2010a)* on the technical report the "CMMI for Development (CMMI-DEV) Version 1.3" states that the CMMI is a maturity model of process improvement for the development of service and products. It consists of best practices, which address development and maintenance activities, covering the product lifecycle from conception through delivery and maintenance. Plus, *the CMMI product team [Team] (2010b)* on another technical report the "CMMI for Acquisition (CMMI-ACQ) Version 1.3" also expresses this model offers a comprehensive integrated array of instructions for acquiring services and products. Moreover, *the CMMI product team [Team] (2010c)* on the third technical report declares this model named the "CMMI for Services" (CMMI-SVC) Version 1.3 presents a comprehensive integrated set of guidelines for providing superior services. Over and above that, the three CMMIs V1.3 were incorporated into the "CMMI Version 2.0" in 2018.

To assess the CMMIs, *Goldenson and Gibson (2003)* demonstrate the benefits and impact of CMMI and declare the results provide credible quantitative evidence that CMMI-based process improvement can bring forth higher quality products and better project performance. Their process improvement efforts contain both large and small organizational units. The organizations do business in various industries and fields, including banking, finance, information technology, aerospace and automotive engineering, training and simulation. They apply the CMMI model practices to software development, systems engineering and systems integration. They classify the outcomes into the four main categories of benefits: cost, quality, customer satisfaction and schedule. Related cost-benefit matters and evidence as to return on investment (ROI) constitutes the fifth performance category.

It is noteworthy to mention that *Siviy* et al. *(2005)* examine the "relationships between the CMMI and Six Sigma". And they point out that organizations, endeavoring to improve their processes often find themselves juggling many approaches to achieve that improvement. *Siviy at al. (2005)* focuses on the joint use of two popular improvement initiatives: The CMMI and Six Sigma. They present a brief summary of each initiative and then outlines the connections between frameworks commonly used in Six Sigma and the CMMI "*Process Areas*" (PAs).

Moreover, *Yoo* et al. *(2006)* introduce "a unified model for the implementation of both ISO 9001:2000 and the CMMI for ISO-certified organizations". They state that the CMMI is a model for process improvement and ISO is a standard for quality management systems. If ISO-certified organizations desire to improve their processes unceasingly, the CMMI would be a wise choice, as it supplies exhaustive practices for process improvement than the ISO standards. However, there are two issues that have to be resolved when the CMMI is implemented by ISO-certified organizations. For instance, on account of the discrepancies in the structure, language and details of the two sets of documents, it is hard to implement the CMMI for ISO-certified organizations in a simple, straightforward fashion. In consequence, *Yoo* et al. *(2006)* present their unified model for ISO 9001:2000 and the CMMI that resolves these impediments.

Furthermore, *Dayan and Evans (2006)* point out although the CMMI and "Knowledge Management" (KM) take distinct approaches to achieve competitive advantage, they appear to be supportive as well as dependent on one another. Because of the hypothesis that it is feasible to measure and relate between the quality of the product and the quality of the process in mature organizations; the CMMI, having well-defined stages, deals with the ways organizations need to pursue in order for the maintenance of well-mapped processes. By the way, "KM" is a rather young discipline promising to maximize innovation and competitive advantage to organizations that practice knowledge capture, documentation, retrieval and reuse, creation, transfer and share to its knowledge assets in a measurable way, integrated in its operational and business processes.

Take it into consideration that *Glazer* et al. *(2008)* explain that "the CMMI and Agile can be utilized together well". In actual fact, the CMMI best practices and the methods of Agile development are ofttimes regarded to be at odds. But *Glazer* et al. *(2008)* clarify why the discord need not exist. They propose that the simultaneous application of the CMMI and Agile brings about the synergy, which has the potential to significantly ameliorate business performance.

Eventually, *Wang* et al. *(2016)* introduce their BCMM (Blockchain Capability Maturity Model). They adapt the five stages (stage 1 to stage 5) of maturity from the CMM: (1) initial, which is the chaotic and ad hoc status of a new service; (2) repeatable, wherein some experiences are borrowed from similar products; (3) defined, which is the stage at which a service is standard and documented; (4) managed stage, which comprises the standard metrics proposed for qualitative evaluation; and (5) optimizing, which means that the service is continuously optimized and improved.

(1) *The result: The CMMI product team [Team] (2010a, b, c)* presents the instructions on the three CMMIs Version 1.3 to be utilized by various organizations so as to improve their business processes. Take in into account, *Goldenson and Gibson (2003)* had previously indicated the CMMI (older versions) can give rise to better project performance and higher quality products on the basis of credible quantitative evidence. Above all, there is more to the CMMI than meets the eyes, as *Siviy* et al. *(2005)* explicate the joint use of the CMMI and Six Sigma as two popular improvement initiatives can be made. Besides, *Yoo* et al. *(2006)* offer a unified model for the implementation of both ISO 9001:2000 and the CMMI for ISO-certified

organizations. Furthermore, *Dayan and Evans (2006)* remark despite the fact that "Knowledge Management" and the CMMI take different approaches to the attainment of the competitive advantage, they look to be supporting as well as hinged on each other. Into the bargain, *Glazer* et al. *(2008)* elucidate the CMMI and Agile can effectively be applied together. On top of that, *Wang* et al. *(2016)* introduce the BCMM.

3. Methodology

To conduct the research, theoretical sources on money, cryptocurrencies, banking, blockchain banking, startup, FinTech, digital wallet (e-wallet), business process management, organizational maturity and CMMI were perused. This is mixed research (qualitative and quantitative). In fact, this research contains (1) the extraction of the sub-processes of blockchain banking service and their sequence and (2) the designation of a number 1 through 5 to every single sub-process according to the CMMI V1.3 (1. Initial 2. Managed 3. Defined 4. Quantitatively Managed 5. Optimizing). To put it in a nutshell, on the one hand, owing to the fact that the sub-processes relating to blockchain banking have been determined, it is qualitative (exploratory) research. And on the other hand, due to specifying the organizational maturity levels (i.e. the numbers have been assigned to the sub-processes as the levels of organizational maturity), it is quantitative research as well.

The models as displayed on Figure 1 (FinTech D. B. I., 2016, p. 11) and Figure 5 (Schich, 2019, p. 101) used by "Bitwala" FinTech (currently called "Nuri") in collaboration with German "Solarisbank" for the provision of blockchain banking were applied in this study. Plus, Figure 2 outlines the essence of blockchain banking. Furthermore, in order to evaluate Parsian Bank's organizational maturity, Carnegie Mellon University's "Capability Maturity Model Integration" (CMMI) version 1.3 was employed.

The statistical population of the research was Parsian Bank's fourteen experts who were opted from a "non-probabilistic sampling" method using the "snowball sampling technique". The research data were collected through three questionnaires by the "Delphi technique" and

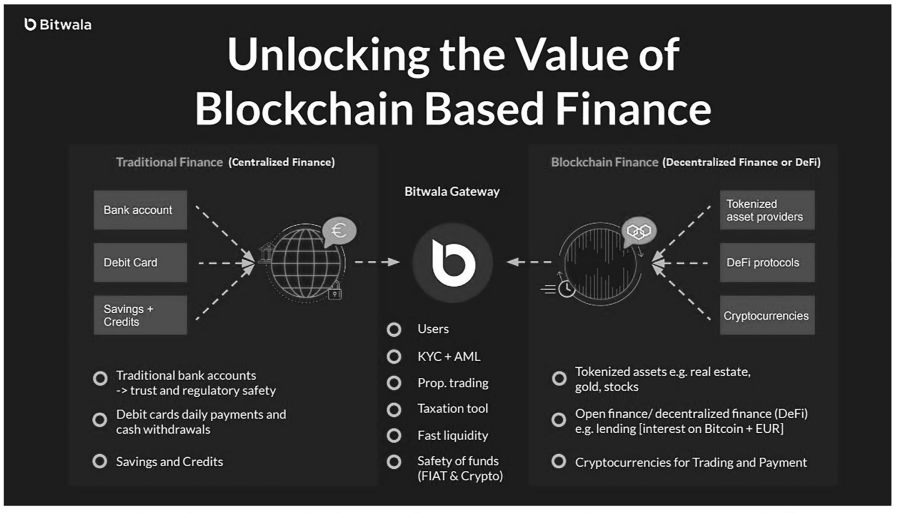
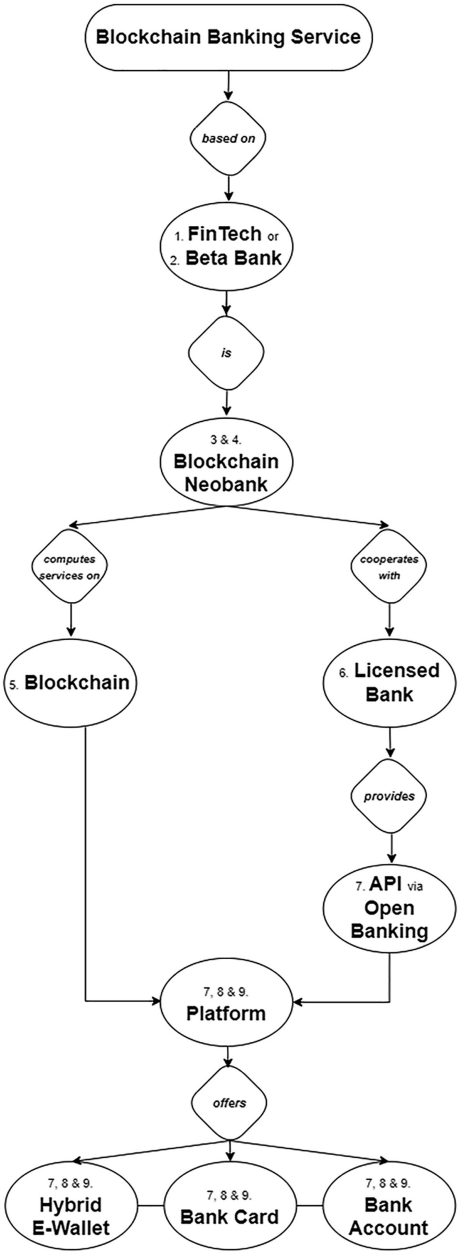


Figure 1.
The conceptual model: "blockchain banking"

Source(s): Adapted from PwC (PricewaterhouseCoopers); FinTech, D. B. I. (2016), p.11



Source(s): Authors' work

Figure 2.
The essence of blockchain banking based on FinTech or beta bank (i.e. blockchain neobank)

"analytic hierarchy process" (AHP) in 2021 January, February and March. The validity of the questionnaires was confirmed by the "content method" through Parsian Bank's experts' opinions. For the reliability of the questionnaires, "Cronbach's alpha coefficient" was applied.

In the first round of the Delphi questionnaire, blockchain banking sub-processes based on FinTech were identified by the specialists. The second round of the Delphi questionnaire, in addition to reaching a consensus on the sub-processes, their sequence was determined using the "AHP". Parsian Bank's organizational maturity to implement the sub-processes was determined through the third-round questionnaire. In this study, "descriptive statistics" were used to analyze the data. Moreover, the "AHP" and "Friedman test" were employed.

3.1 Essence of blockchain banking based on FinTech

To comprehend and decipher the nature of "blockchain banking service" based on FinTech or beta bank (i.e. "blockchain neobank") as shown on Figure 2, it is indispensable to study as follows:

Note: The numbers from 1 to 9 as stated below respectively correspond to the numbers on Figure 2.

1. *FinTech:* The term "FinTech" is a contraction of "financial technology" (Puschmann, 2017, p. 70). FinTech is a novel financial industry which applies technology to better financial activities (Schueffel, 2016, p. 45). FinTech start-ups are newly-established businesses that provide financial service based on FinTech (Gimpel *et al.*, 2018, p. 247). "FinTech" is defined as the ecosystem of (perhaps initially) small technology-based startup firms that either provide financial service to the marketplace or primarily serve the financial service industry (Deloitte, 2020, p. 2). What FinTech covers is outlined on Figure 3 (CB Insights, 2020, p. 7).

2. *Beta bank:* Obstacles, that a bank encounters, are immense. Therefore, it cannot overcome them on its own. Instead, it is required to re-launch and set up an independent organization outside, called "beta bank", which is a business that is fully designed to manage an ever-changing world, and is aware that quick reaction is a competitive advantage, while design and experience makes it prominent and distinguished. A "beta bank" is different from its parent bank and has a different structure and separate leadership with independent decision-making. Not only in services does a beta bank provide but also in the way it works and interacts with the world, it experiments new ways. A "beta bank" is a fully-digital business. It also offers a small number of distinctive products (Haycock and Richmond, 2015).

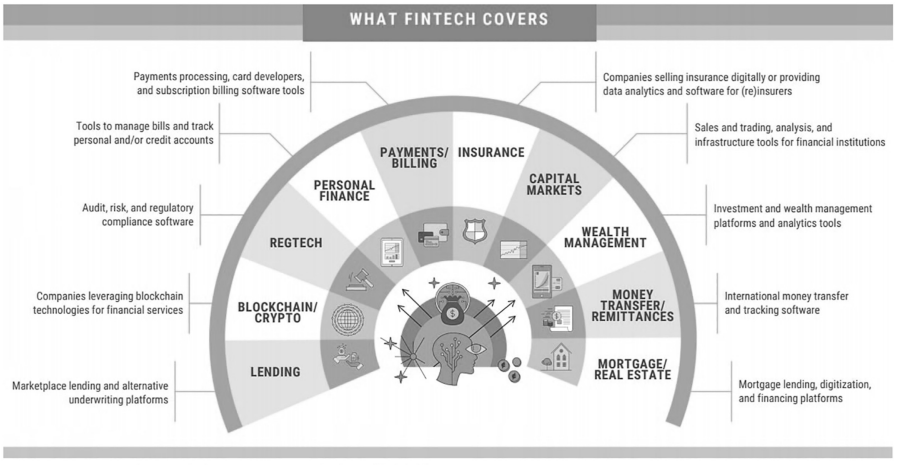


Figure 3.
The FinTech businesses categories

Source(s): Adapted from CB Insights (2020), p.7

3. *Taxonomy of FinTech businesses*:

"Cluster A" and "cluster Q" as indicated on Figure 4 relate to "cryptocurrency" (i.e. "blockchain") and "banking" based business models respectively (Eickhoff *et al.*, 2017, pp. 12-13), which are interrelated with blockchain banking.

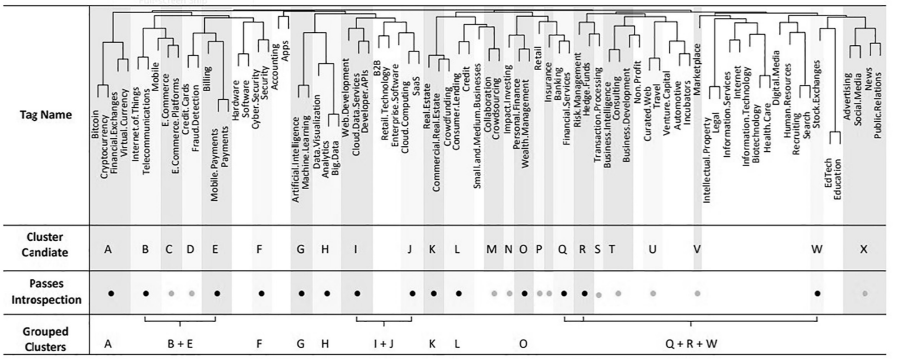
4. *Main models of FinTechs:* In accordance with Figure 3 and Figure 4, FinTechs are divided into categories that the two below are concerned with blockchain banking.

(1) Blockchain FinTech (FinTech in the field of cryptocurrencies)

Cryptocurrencies are enabled by and function on top of a technology named blockchain. A number of FinTech firms are already utilizing cryptocurrencies and blockchain technology in the service they are providing for consumers; and a range of major financial institutions are experimenting with blockchain (Bates, 2017, p. 16). a blockchain is made up of one "data layer", one "network layer", one "consensus layer", one "incentive layer", one "contract layer" and one "*application layer*". For the reason, the last layer includes various practical use cases and diverse application scenarios of blockchain (Li *et al.*, 2021a, b, pp. 3-4). For instance, "*tokenization*" refers to the creation of assets digital representations, which indicates value that can be simply generated and shared online. Accordingly, value transfers by means of the internet in the form of "*tokens*" are viable by an underlying "distributed ledger technology" (or blockchain), thus creating the so-called "*Internet of Value*". From a wider perspective, the "*token economy*" pertains to the system of incentives based on cryptocurrencies that reinforce and build desirable behaviors in the blockchain ecosystem (Treiblmaier, 2023, p. 6).

(2) Neobank or Digital Bank (FinTech in the field of banking)

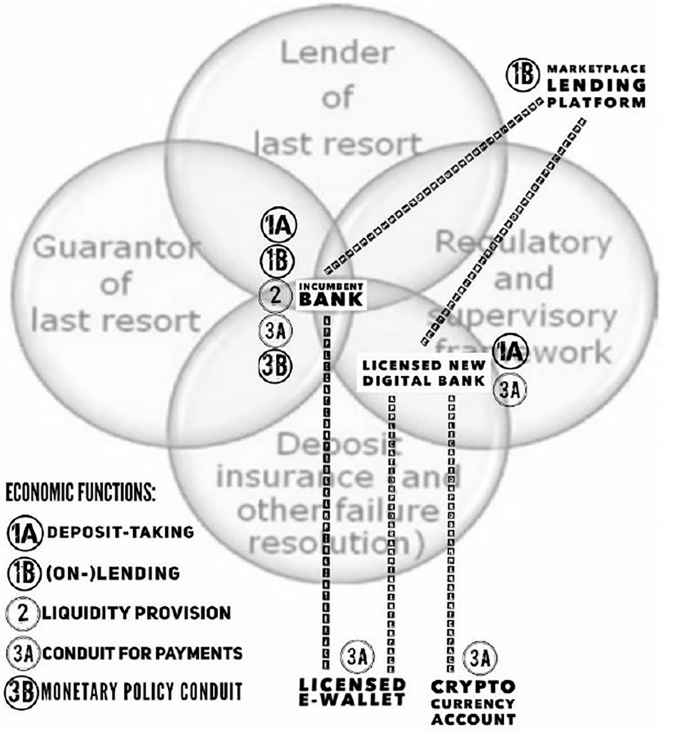
Startups offering banking services through mobile or online service that can be entirely managed via the app. Not necessarily having "banking license" (EY, 2020, p. 55). Apart from the digital-first approach, neobanks differ from traditional banks in multiple ways. Their main strengths lie within four areas, including (1) agility and low-cost structure, (2) transparency, (3) customer experience and (4) innovative features and tools (Geschke and Fritschi, 2019, pp. 20-21). Neobanks can be defined as a type of institution, offering financial



Coding of clusters. To technological and entrepreneurial categories. Colored columns only serve to emphasize the clusters. Red dots indicate clusters that do not contain companies in line with the FinTech definition used here

Source(s): Adapted from Eickhoff *et al.* (2017), p.12

Figure 4.
The FinTech taxonomy



The FSN, incumbent banks and Fintech, and cryptocurrency initiatives: Linkages and economic functions

Source(s): Adapted from Schich (2019), p.101

Figure 5.
"Licensed new digital banks" (Neobanks) offer "licensed e-wallet" and "cryptocurrency account"

services and products fully online without any physical branch by using technological innovations and financial technology. By the way, neobanks can structure their business activities under three basic models: (1) "front-end focus neobank model", (2) "full-stack neobank model", or (3) "hybrid model" (Temelkov, 2022, p. 2). Neobanks can also be categorized into three models: 1. "*Over-the-top neobanks*" which are digital-only platforms that don't have their own banking licenses. These platforms offer either a stand-alone product or a bouquet of financial products in partnerships with financial institutions/banks and FinTechs. 2. "*Licensed neobanks*" (e.g. "*challenger banks*") which have obtained a fully operational banking license, enabling them to provide services and products on their own, but at a cost quite lower than traditional banks. 3. "*Traditional banks*" *digital initiatives*' (e.g. "*beta banks*") which are stand-alone, mobile-only banks created by incumbent banks; they leverage new-age technology to deliver services and products in a customer-friendly manner. These fully-digital banks apply different technology platforms compared to their parent banks (MEDICI, 2020, p. 9).

5. *Types of blockchain-based services computing:* There are five categories (Li *et al.*, 2021a, b, p. 7) that the two below are interrelated with blockchain banking.

(1) Services Creation based on Blockchain

All of the blockchain-based services creation models mainly generate a service via the transaction stored on blockchain. Then each vendor can be traced through transaction records (Li *et al.*, 2021a, b, p. 8).

(2) Services Composition Based on Blockchain

Blockchain-based services composition approaches generally support automatic composition according to the runtime "quality of service" (QoS). Smart contracts record the state of services and take down all the compositions in the transaction. Services composition thereby is more reliable and can rapidly respond (Li *et al.*, 2021a, b, p. 8).

Blockchain is a "distributed digital ledger" (DLT) that stores any kind of data such as cryptocurrency transactions, DeFi smart contracts, NFT ownership, et cetera in a decentralized manner (Rodeck and Curry, 2022, p. 2). Blockchain technology can provide a new revolution especially in banking with better payment clearing mechanisms and upgraded credit information and management systems, which would lead to a more efficient banking system (Garg *et al.*, 2021, p. 3).

6. *Taxonomy of the cooperation between banks and FinTechs:* Bank-FinTech cooperation patterns are categorized into six clusters (Drasch *et al.*, 2018, p. 14) that the two clusters below are concerned with blockchain banking based on FinTech.

(1) Investment in FinTechs to form an alliance and access the FinTech's ecosystem

This cluster possesses the largest group of the cooperation cases, encompassing the collaborations in which chiefly branch-centered banks make investments in FinTechs so as to have access to FinTech-oriented ecosystems (Drasch *et al.*, 2018, p. 15).

(2) Early-stage collaboration to access technology

Well-established banks make cooperation with early-stage FinTechs, which concentrate on early-stage innovations. The ecosystem is fundamentally confined to the FinTech that is in charge of the innovation. The bank is in the pursuit of accessing the innovation technology (Drasch *et al.*, 2018, p. 15).

7. *Open banking:* The use of "*Application Programming Interfaces*" (*APIs*) is the approach that is becoming more popular in banking industry's "*digital transformation*", linking banks' own structures to innovative digital services and products, which is developed by third-party developers (e.g. FinTechs). Whence, A plethora of banks has reached to the decision that they had better take advantage of such initiatives (APIs) independently, so that they can allow third parties (For instance, FinTechs) to develop and implement applications which run on top of their own infrastructure and connect to their own client base. To exemplify, according to Figure 5, "licensed new digital banks" (to be more precise, neobanks or FinTechs in the field of banking such as "Wirex" and "Tenx") provide (1) "licensed e-wallet", along with (2) "cryptocurrency account" as a crypto initiative (Schich, 2019, p. 101).

8. *Business model taxonomy of "blockchain FinTechs":* "Blockchain FinTechs" are categorized into seven clusters (Beinke *et al.*, 2018, p. 5) that the two below are associated with blockchain banking.

(1) "Card" Provider

Companies in this cluster offer solutions for everyday payment transactions. They are especially characterized by the offer of cards with which private customers can handle daily

money transactions in cryptocurrencies. The respective cryptocurrencies are transferred to a special "e-wallet" address, and via an app, customers can choose with which cryptocurrency they intend to pay (Beinke *et al.*, 2018, p. 5).

(2) "E-Wallet" Provider

The most significant difference between the companies in this cluster and those in cluster 1 (trading platforms or cryptocurrency exchanges) is that no professional trading options (e.g. margin trading) are available here; the purchase and sale of cryptocurrencies is only possible. Besides, customers access the private key to their e-wallets, which is not the case with companies in cryptocurrency exchanges. The focus is on private individuals purchasing cryptocurrencies in exchange for fiat money. Usually only an e-wallet function is offered, while the revenue stream is based on transaction fees. E-wallet providers particularly engross people, intending to buy and sell a variety of cryptocurrencies by means of a simply designed app (Beinke *et al.*, 2018, p. 5).

9. *Types of electronic wallets:* Digital wallets fall into different categories (Chea, 2020) that the following is related to blockchain banking.

(1) Hybrid E-Wallet

It is a form of mobile digital wallet that supports both cryptocurrencies and fiat currencies in "the same platform". "Wirex" is a prime example of "FinTech" service, which is akin to the combination of Bitcoin e-wallet with banking account. "Wirex" account can hold both digital and cash currencies. Hence, it is an attractive product (or service) as it offers choices and alternatives to purchasers. And it can be appealing, since each option has its own benefit that one can benefit (Chea, 2020, p. 935).

(2) *The upshot:* Having scrutinized the above-mentioned, the essence of "blockchain banking" based on FinTech is revealed. All things considered, "blockchain banking" combines traditional banking services ("centralized finance") with cryptocurrency ones ("DeFi"), which is to merge "hybrid e-wallet" on "Distributed Ledger Technology" (DLT, e.g. "blockchain") with "bank account" and "bank card" by dint of a platform, that can also be provided by a "FinTech" (or a "beta bank"; to be more exact, a "blockchain neobank") in collaboration with a "licensed bank" in line with "open innovation", as well as in the framework of "open banking" through the "open Application Programming Interface" (i.e. "open API") that in such a manner, it is called "blockchain banking based on FinTech".

3.1.1 Comprehensive model of the future banking, from the customers' point of view: an upgraded version of "blockchain banking". The "four groups" of "*blockchain neobanks*" (as displayed in Table 2), which are FinTechs in the field of "banking" and "blockchain" ("cryptocurrencies"), are examined as follows:

No.	Blockchain neobank	Banking license	Account and card	E-Wallet
1	*TenX and Wirex*	No	User Account and Card	Hybrid E-Wallet
2	*Nexo*	No	User Account and Card	Hybrid E-Wallet
3	*Xapo*	Yes	Bank Account and Bank Card	Hybrid E-Wallet
4	*Bitwala (now "Nuri")*	Yes	Bank Account and Bank Card	Hybrid E-Wallet

Table 2.
Blockchain neobanks

Source(s): Authors' work

(1) "*Blockchain neobank*", a FinTech in the field of "banking" and "blockchain": e.g. "*TenX*" FinTech and "*Wirex*" FinTech, the providers of "hybrid e-wallet" in addition to "card"

"TenX" FinTech makes it easy to store, spend and buy cryptocurrencies. "TenX" crypto wallet, linked to its crypto card, allows users to spend and buy multiple cryptocurrencies in the real world by converting cryptocurrencies to cash each time users pay. To recap, "TenX" crypto wallet stores Bitcoin, Ethereum and Litecoin in one unique crypto card that enables clients to pay for real-time transactions all around the world. Customers can make use of the "TenX" Blockchain e-wallet to manage their digital assets (Google Play, 2020a).

"Wirex" FinTech is a regulated financial institution (FI) and is an "EMI" (E-Money Institution), which has been licensed by the UK "FCA" (Financial Conduct Authority) (Wirex, 2016, p. 4). "Wirex" offers the multi-currency account, holding digital and traditional currencies. In short, it is a mobile app that combines multi-currency bank accounts (11 traditional currencies) with electronic wallets (nine cryptocurrencies), supporting multiple in/out funding options (SEPA, SWIFT, ACH, Faster Payments, credit/debit cards and crypto transfers). Wirex's exchange engine is able to convert in real-time (immediately) any combination of 11 traditional currencies and nine cryptocurrencies at the best rates on the market (Wirex, 2016, p. 15). "Wirex" visa card enables customers to convert and spend cryptocurrencies straightaway in quotidian life (Wirex, 2020). As per this FinTech, Wirex current account is coming (Wirex, n.d.).

Such FinTechs might later apply for banking license (Forbes, 2020).

Note: There are FinTechs like "Wirex" and "TenX", which offer hybrid financial services through "user account" (not "bank account"). These FinTechs integrate (1) "hybrid e-wallet" with (2) "card" (not "bank card"). The financial services of these FinTechs are provided independently from licensed banks. Additionally, the options for converting cryptocurrencies into fiat and vice versa are not limited to Bitcoin and Ethereum into Euros. They actually offer a wide range of cryptocurrency and currency exchanges to one another in real-time. The DeFi services, such as (1) storing, sending and receiving cryptocurrencies through "hybrid e-wallet" connected to "card" and (2) "private exchange" via "hybrid e-wallet", are offered to customers.

(2) "Blockchain neobank", a FinTech in the field of "banking" and "blockchain": e.g. "*Nexo*" FinTech, the provider of "hybrid e-wallet" in addition to "card", offering "instant crypto-backed loans"

"*Nexo*" FinTech's customers are entitled to buy, sell and convert all supported crypto and fiat assets and users can swap directly from the Nexo "e-wallet" app (Google Play, 2021a). "Nexo" also delivers instant cryptocurrency-backed loans, thus resolving a crucial inefficiency for the cryptocurrency world. The innovative business model of "Nexo" brings to the crypto community the best of both worlds - retaining 100% ownership of their digital assets while having immediate access to cash. The instant cryptocurrency-backed loans are an automatic, flexible and cost-efficient way of obtaining liquidity that is secured by the value of clients' digital assets. The whole process is completed in just a few simple clicks. Transparency is guaranteed by the use of blockchain technology, smart contracts and algorithmic processes executed by Nexo's blockchain oracle (Nexo, 2018, p. 5). Once clients set up their Nexo accounts, they will transfer crypto assets to their "Nexo Wallets". The Nexo Oracle automatically updates the funds, which are instantly available to the clients through their "Nexo credit card" (Nexo, 2018, p. 39).

Note: "Nexo" FinTech provides the DeFi services through "user account" (not "bank account") by integrating (1) "hybrid e-wallet" with (2) "card" (not "bank card"). It also offers instant crypto-backed loans (Nexo, n.d.).

Such FinTechs might later apply for acquiring banking license (Forbes, 2020).

(3) Former "*blockchain neobank*", a FinTech in the field of "banking" and "blockchain" turned into a licensed bank by acquiring banking license: e.g. "*Xapo*" FinTech turned into "Xapo bank", the provider of "hybrid e-wallet" in addition to "bank account" and "bank card"

"*Xapo*" FinTech provides a Bitcoin e-wallet, which is linked with a Bitcoin debit card too, allowing clients to spend Bitcoin easier. "Xapo" is a digital wallet that allows clients to send, receive, store and spend any traditional currencies and Bitcoin easily and safely. To be more precise, it allows users to send, receive and exchange up to 150 traditional currencies and Bitcoin (Google Play, 2021b). In 2004, "Xapo" firstly launched its Bitcoin storage solution. Then, in 2018, it gained the "Distributed Ledger Technology" (DLT) permission, authorizing it to make use of the DLT for the storage or transmission of crypto value and manage digital assets for its customers. Afterwards, in 2020, It obtained (1) the banking license and (2) Mastercard and Visa memberships. Subsequently, "Xapo" relaunched as a bank, becoming a financial institution to offer access to both BTC and USD (Xapo, n.d.).

Note: The options for converting cryptocurrencies into fiat and vice versa by this specific former FinTech (i.e. Xapo) and now turned into a licensed bank are now restricted to Bitcoin. However, beside (1) the DeFi services such as storing, sending and receiving Bitcoin through hybrid e-wallet linked to card and (2) private exchange via hybrid e-wallet, (3) bank accounts are offered to customers as well.

(4) "*Blockchain neobank*", a FinTech in the field of "banking" and "blockchain" in partnership with a licensed bank: e.g. "*Bitwala*" FinTech (currently called "*Nuri*"), the provider of "hybrid e-wallet" in addition to "bank account" and "bank card" in collaboration with "Solarisbank"

The epitome of this category is the German FinTech, "*Bitwala*", which in cooperation with German licensed "*Solarisbank*" offers "blockchain banking service", that is to provide (1) centralized finance, along with (2) decentralized finance (DeFi) integrally on a platform to customers. "Bitwala" provides (a) hybrid e-wallet (that supports Bitcoin and Ethereum), together with (b) bank account and (c) bank card (Bitwala, n.d.; Google Play, 2020b). The FinTech projects such as "*TokenPay*" and "*World Bit Bank*" (*WBB*) are also within this category, which are intent on acquiring banks (Please, refer to "the introduction").

Note: The difference between the business model of "Bitwala" and that of "TenX" and "Wirex" is that, on the one hand, "hybrid e-wallet" in Bitwala is integrally linked with "bank account". On the other hand, unlike "Wirex", Bitwala's options for the exchange of cryptocurrencies for fiat and vice versa are currently confined to converting Bitcoin and Ethereum into Euro and exchanges are not made instantly by Bitwala, implying it is not yet possible to convert them in real-time.

(1) *The gist*: when all is said and done, it can be inferred that the most comprehensive model of banking, from the customers' viewpoint would be a combination of (1) the business model of "Wirex", (2) that of "Nexo", (3) that of "Xapo" and (3) that of "Bitwala" (currently "Nuri"), which integrates (1) "hybrid e-wallet" on "Distributed Ledger Technology" (DLT, e.g. "blockchain") with (2) "bank account" and (3) "bank card", all together on a platform that can also be provided through the partnership of a "licensed bank" with a "FinTech" or a "beta bank" (i.e. "*blockchain neobank*") within the framework of "open banking" in line with "open innovation; which beside traditional banking services, it offers a wider array of DeFi services such as storing, sending and receiving cryptocurrencies and tokens and "private exchange" through "hybrid e-wallet" (linked to "bank card") in real-time and instant crypto-backed loans

and more. Ultimately, this development can be called the "*upgraded version of blockchain banking service*" based on FinTech.

3.2 Conducting the research

3.2.1 Step 1: the extraction of the sub-processes. As per the conceptual models (Figure 1 and Figure 5; being outlined on Figure 2), the "sub-processes" for implementing "blockchain banking" as the "business process" by a FinTech (i.e. blockchain neobank) with the support of a licensed bank (that is, Parsian Bank) within the framework of open banking, which is the integration of "hybrid e-wallet" on blockchain with "bank account" and "bank card" through a platform, were initially identified via the researchers and proposed to Parsian Bank's experts, which are as follows:

(1) "The establishment of a FinTech" in order to provide blockchain banking

(2) "The mutual collaboration between the FinTech and Parsian Bank" in order to provide blockchain banking

(3) "Launching a hybrid platform" by the FinTech with the support of Parsian Bank
(The hybrid platform integrates hybrid e-wallet with bank account and bank card for offering Internet banking and mobile banking services.)

(4) "The connection to public blockchains" by the FinTech with the support of Parsian Bank
(e.g. Bitcoin's blockchain and Ethereum's blockchain in order to transfer cryptocurrencies and apply smart contracts on Ethereum's platform for decentralized financial projects, i.e. DeFi)

(5) "The connection to a private blockchain" by the FinTech with the support of Parsian Bank
(e.g. Kuknos Foundation's Iranian DLT (Kuknos Foundation, 2018), Neo's asset digitization platform (Neo, 2018), et cetera for tokenization directly by its own and indirectly by the cooperation with tokenization providers)

(6) "Launching hybrid e-wallet on blockchain" by the FinTech with the support of Parsian Bank
(The hybrid e-wallet is connected to bank account and bank card on the hybrid platform and supports fiat monies and crypto-assets, such as tokens and cryptocurrencies and exchanges them via subtracting a fee.)

(7) "Opening bank account via open API" by the FinTech with the support of Parsian Bank
(The bank account is connected to the hybrid e-wallet on the hybrid platform.)

(8) "The issuance of bank card" by the FinTech with the support of Parsian Bank
(The bank card is connected to the hybrid e-wallet on the hybrid platform.)

(9) "The Know Your Customer (KYC) in accordance with the Anti-Money Laundering (AML) policy" by the FinTech with the support of Parsian Bank (KYC and AML)

(10) "The taxation tool" by the FinTech with the support of Parsian Bank
(Income taxes on crypto-assets are calculated in order to be submitted to tax administrations.)

3.2.2 Step 2: the first-round questionnaire. Then the significance of all the above-mentioned sub-processes was surveyed by Parsian Bank's experts applying the Delphi technique in the

form of a semi-open first-round questionnaire. Having used descriptive statistics (such as frequency distribution tables, frequency percentage and mean, median, variance, etc.), the last sub-process (the taxation tool by FinTech) only scored less than the allowable limit on the Likert scale. On this account, this sub-process must have been removed, but in order to ensure that the experts' opinions were stable, in the second-round, by adding a little more explanation as to this sub-process, the importance of this sub-process together with other sub-processes were surveyed again.

3.2.3 Step 3: the second-round questionnaire. The two objectives were intended in the second-round questionnaire: (1) the consensus achievement on blockchain banking sub-processes using the Delphi technique, and (2) the sequence determination of blockchain banking sub-processes applying the AHP. Hence, the second-round questionnaire was designed to collect data in two different parts respectively.

In the second round, the last sub-process (the taxation tool by the FinTech with the support of Parsian Bank) and the first sub-process (the establishment of a FinTech to provide blockchain banking), in terms of descriptive statistics according to the Likert scale obtained the lowest scores, which were less than the allowable limit. (1) With respect to the elimination of last sub-process, it should be noted that "Bitwala" as the first blockchain banking service also offers the taxation tool through the outsourcing and strategic partnership with another FinTech called "CryptoTax". And (2) as regards the removal of first sub-process, it should be considered that since an independent pre-established FinTech cooperating more or less doesn't already exist at all, the true presumption is that the experts intend blockchain banking service to be provided with more control and supervision". To be more accurate, they mean Parsian Bank must cooperate with an in-house FinTech (e.g. a beta bank). By the way, the Cronbach's alpha of second-round questionnaire is 0.734, denoting its reliability is acceptable. In the end, by omitting these two sub-processes, the other ones were prioritized by the AHP through the experts' opinions. Please, refer to the section entitled "the discussion" to find the final outcomes.

3.2.4 Step 4: the third-round questionnaire. In the third-round questionnaire, the experts determined the current maturity levels relating to all the sub-processes. In point of fact, every single expert was expected to designate a number from 1 to 5 to every single sub-process in accordance with the CMMI V1.3 ((1) Initial (2) Managed (3) Defined (4) Quantitatively Managed (5) Optimizing) based on his/her evaluation of the current status of every single sub-process in Parsian Bank. Please, refer to the section entitled "the discussion" to find the final results.

4. Discussion

The final results of the research are as follows:

(1) *Main question 1: What are the sub-processes for providing blockchain banking service based on FinTech as the business process?*

The sub-processes and their sequence are as below:

(1) "Launching a hybrid platform" in order to provide blockchain banking
(The hybrid platform integrates hybrid e-wallet with bank account and bank card for offering Internet banking and mobile banking services.)

(2) "The Know Your Customer (KYC) in accordance with the Anti-Money Laundering (AML) policy" in order to provide blockchain banking (KYC and AML)

(3) "Launching hybrid e-wallet on blockchain" in order to provide blockchain banking
(The hybrid e-wallet is connected to bank account and bank card on the hybrid

platform and supports fiat monies and crypto-assets, such as tokens and cryptocurrencies and exchanges them via subtracting a fee.)

(4) "The mutual collaboration between the FinTech and Parsian Bank" in order to provide blockchain banking

(5) "The connection to public blockchains" in order to provide blockchain banking
(e.g. Bitcoin's blockchain and Ethereum's blockchain in order to transfer cryptocurrencies and apply smart contracts on Ethereum's platform for decentralized financial projects, i.e. DeFi)

(6) "Opening bank account via open API" in order to provide blockchain banking
(The bank account is connected to the hybrid e-wallet on the hybrid platform.)

(7) "The connection to a private blockchain" in order to provide blockchain banking
(e.g. Kuknos Foundation's Iranian DLT, Neo's asset digitization platform, et cetera for tokenization directly by its own and indirectly by the cooperation with tokenization providers)

(8) "The issuance of bank card" in order to provide blockchain banking
(The bank card is connected to the hybrid e-wallet on the hybrid platform.)

Firstly, what is self-evident from the above-mentioned sequence is that the mutual collaboration between the FinTech (independent, in-house, beta bank, or any kind of blockchain neobanks) and Parsian Bank can merely be implemented after (1) launching the hybrid platform, (2) the KYC according to the AML policy and (3) launching the hybrid e-wallet by Parsian Bank on its own. It indicates that these sub-processes are regarded as the key and strategic ones in the eyes of Parsian Bank's experts and must be undertaken by the bank itself, and the mutual collaboration between the FinTech (or blockchain neobank of any kind) and Parsian Bank for the rest of sub-processes are only possible. It is noteworthy that the experts assessed Parsian Bank's maturity levels for the first three sub-processes (as presented in next page) as the "maturity level two" or "managed" and evaluated Parsian Bank's maturity levels for the rest of sub-processes as the "maturity level one" or "initial". Therefore, owing to this fact, benefiting from the mutual cooperation with the FinTech (or the beta bank) does make sense for these sub-processes (i.e. from forth sub-process onwards).

Secondly, even though (1) the researchers' initial proposal as per the conceptual model (Bitwala's) was to offer blockchain banking service based on an entirely independent FinTech (i.e. an independent "blockchain neobank") with the support of Parsian Bank, signifying all the sub-processes should be provided by an independent FinTech with the support of Parsian Bank through "open API" in the framework of "open banking" and in line with "open innovation". (2) Yet, given the experts' opinions on providing blockchain banking service with more organizational control and supervision (without the need to establish an independent FinTech for blockchain banking, as reflected on omitting the sub-process of the establishment of the FinTech); the provision of blockchain banking service via "*beta banking*" (preferably fully digital) is proposed. It denotes that a beta bank had better be substituted for the FinTech. The first three sub-processes are required to be performed by Parsian Bank on its own and the other ones ought to be executed by the beta bank with the support and supervision of Parsian Bank. Or (3) the first three sub-processes must be performed by Parsian Bank itself and the other ones should be executed in partnership with an independent FinTech. Lastly, blockchain banking service is offered by the FinTech with the support of Parsian Bank.

(2) *Main question 2: How is Parsian Bank's organizational maturity in order to provide blockchain banking service based on FinTech?*

As shown in Table 3, at the time of conducting the research in 2021, the overall maturity level of blockchain banking based on FinTech or beta bank (i.e. blockchain neobank) in Parsian Bank as a "business process" is "initial" or the "maturity level one" according to the experts.

Above all, it ought to be taken into account that in view of the fact that blockchain banking service is not currently provided by Parsian Bank, hereupon, the maturity level is "initial" as per the CMMI V1.3, which is approved by the experts as well. Additionally, the validity of the questionnaire was confirmed by the "content method" through Parsian Bank's experts' opinions. And the Cronbach's alpha as reliability coefficient is 0.837, which is "good".

The results as demonstrated in Table 3 must be interpreted on the basis of the CMMI V1.3 as summarized in Table 4 whose extended version is Table 1.

(3) *Secondary question: What are Parsian Bank's weaknesses in order to provide blockchain banking service based on FinTech?*

Since the maturity level of "blockchain banking based on FinTech (beta bank, or blockchain neobank of any kind)" in Parsian Bank is at present (in 2021 January, February and March)

Sub-process	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	Overall score
Expert 01	2	3	2	1	1	2	2	2	*1.8*
Expert 02	1	1	1	1	1	1	1	1	*1*
Expert 03	4	1	4	1	4	4	1	4	*2.8*
Expert 04	1	2	1	1	1	1	2	1	*1.2*
Expert 05	2	3	3	1	1	2	1	1	*1.7*
Expert 06	1	1	1	1	1	1	1	1	*1*
Expert 07	1	1	1	1	1	1	1	1	*1*
Expert 08	2	3	3	1	1	2	1	1	*1.7*
Expert 09	4	1	4	1	4	4	1	4	*2.9*
Expert 10	2	3	2	1	1	2	2	2	*1.6*
Expert 11	2	3	1	3	1	2	2	2	*2*
Expert 12	1	1	1	1	1	1	1	1	*1*
Expert 13	2	2	2	1	1	2	2	2	*1.7*
Expert 14	3	4	3	3	1	2	4	2	*2.7*
Overall score	*2*	*2.071*	*2.071*	*1.286*	*1.429*	*1.929*	*1.571*	*1.786*	*1.768*
Maturity level	*Managed*	*Managed*	*Managed*	*Initial*	*Initial*	*Initial*	*Initial*	*Initial*	*Initial*
Cronbach's alpha	*0.762*	*0.871*	*0.785*	*0.849*	*0.82*	*0.779*	*0.853*	*0.786*	*0.837*

Table 3.
The maturity levels of the sub-processes relating to blockchain banking in Parsian Bank according to 14 experts in 2021

Source(s): Authors' work

No.	Maturity level	Description
1	Initial	If the sub-process is chaotic, temporary and not fixed
2	Managed	If the sub-process is being performed and managed in accordance with the specified documented plans
3	Defined	If the sub-process is being executed on the standards, methods, procedures and tools described in detail
4	Quantitatively Managed	If the quantitative targets are set for the sub-process. Moreover, the performance and quality of the sub-process are being statistically analyzed
5	Optimizing	If the performance and quality of the sub-process are being constantly monitored for a measurable improvement

Table 4.
The maturity levels of the CMMI V1.3

Source(s): Authors' work based on Team (2010a), pp. 26-30; Team (2010b), pp. 28-32; Team (2010c), pp. 26-30

"initial" or the "maturity level one", so in order to manage all the eight specified sub-processes, all of them are required to be managed from the most basic "*Process Area*" (*PA*) at the "maturity level two" or "managed" on the basis of the CMMI V1.3 in accordance with the detailed explanation presented in the next section under the title "the conclusion". Because there is no "*Process Area*" (*PA*) at the "maturity level one" or "Initial" (Team, 2010a, pp. 33-34; Team, 2010b, pp. 35-36; Team, 2010c, pp. 33-34).

5. Conclusion

The guidelines to implement "blockchain banking" are as follows:

First and foremost, "blockchain banking" was aptly described as a "business process". Thus, its "eight sub-processes" were suggested to be executed through a "FinTech" startup or a "beta bank" (i.e. a "blockchain neobank") in collaboration with a "licensed bank" or even via a licensed bank itself.

Next, using any "organizational maturity model" in order for business process management (BPM), the sub-processes can be implemented and improved. In this regard, the "CMMI" V.1.3 was proposed. If organization is in two minds whether to choose (1) "the *continuous representation*" or (2) "the *staged representation*". The staged representation is a good option, if organization does not know where to begin and which processes to opt for improvement. Because it gives a specific set of processes to improve at each stage (Team, 2006, p. 11).

Therefore, there are the eight sub-processes that need to be upgraded from the most basic "*Process Area*" (*PA*), which is at the maturity level two (managed) to the maturity level five (optimizing), as time goes by (Team, 2010a, pp. 33-34; Team, 2010b, pp. 35-36; Team, 2010c, pp. 33-34). It goes without saying that if blockchain banking has not yet been provided by the financial organization (a licensed bank, FinTech, beta bank, or blockchain neobank of any kind), the financial organization's current maturity level is "initial" (the maturity level one).

By and large, it is frequently encouraged that organization, wishing to move from maturity level 1 to maturity level 2 establish a "process group" (i.e. sub-processes). Despite the fact that a "process group" (sub-processes) is not an obligatory characteristic of a maturity level 2 organization, it can truly be a beneficial part of the organization's approach to obtaining maturity level 2. It is ofttimes described as establishing a maturity level 1 "process group" to bootstrap the maturity level 1 organization to maturity level 2 (Team, 2010a, pp. 29-30).

Bear in mind, a manager ought to be appointed to implement and improve blockchain banking process. (1) If the licensed bank intends to manage the business process through outsourcing (by a FinTech or beta bank), it must apply the "CMMI for acquisition version 1.3" (CMMI-ACQ V1.3) under the supervision of the licensed bank's manager. (2) If the FinTech or beta bank intends to manage the sub-processes, regardless of the licensed bank, they must employ the "CMMI for development Version 1.3" (CMMI-DEV V1.3) under the supervision of the Fintech or beta bank's managers. (3) Even if the licensed bank insists on providing blockchain banking directly and without any intermediaries, the "CMMI for development Version 1.3" (CMMI-DEV V1.3) is required to be utilized under the supervision of the licensed bank's manager. For the record, in any case, the "CMMI for services Version 1.3" (CMMI-SVC V1.3) does not apply to blockchain banking service. For the reason that the CMMI-SVC practices and goals are basically pertained to any organization in the field of "service delivery", including enterprises in sectors like transportation, health care, finance, IT and defense. Early users of the CMMI-SVC entail organizations that deliver service as varied as maintenance, lawn care, book shelving, training, refugee service, human resources, logistics, research, consulting, auditing, independent verification and validation, health care, IT service and financial management (Team, 2010c, p. 8).

After all, Maturity Levels *Should Not Be Skipped* at all. Each maturity level lays a fundamental foundation, so that organization can effectively implement processes at the next level (Team, 2005, p. 42). However, the maturity levels are measured by the achievement of "the *Specific Goals*" and "the *Generic Goals*" associated with each predefined set of "*Process Areas*" (Team, 2010a, pp. 26-27).

Last but not least, it is emphasized that one should not be "idealistic" in providing blockchain banking. It signifies that one had better not seek to provide the cutting edge of blockchain banking from the outset, offering a wide variety of DeFi services to customers. Rather, one ought to stick to "*lean startup thinking*" (i.e. "*lean thinking*"), which is to enter the stage of manufacturing the product (or the stage of offering the service) as soon as possible that has the least possibility of development and growth (Norris, 2015, p. 54). As a matter of fact, a "*minimum viable product*" (*MVP*) refers to the simplest version of the product (or the service) in terms of features, that could satisfy customer needs, built with the goal of soliciting feedback, which enables quick and iterative product development (Jing, 2018, p. 7). A "minimum viable product" (MVP) in terms of blockchain banking is the integration of a simple "hybrid e-wallet" on blockchain (Distributed Ledger Technology), "bank account" and "bank card" through a single platform (Bitwala, n.d.). Needless to say, the specified sub-processes meet this important point. In short, a simple "hybrid e-wallet", in the most conservative scenario, can be a digital wallet, supporting a fiat currency and a few cryptocurrencies, which incorporates into bank account and bank card. Obviously, more comprehensive versions of DeFi services can later be offered through the provision of much more diverse and innovative services. In this respect, it is feasible to cooperate with "*stock markets*" so as to give birth to dramatic innovations, which lead to "*digital transformation*" as such.

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