



Accessing Capital with Blockchain Technology

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Dedication

I dedicate this piece to my captain and guide, Jesus Christ, for giving me strength, courage, patience, wisdom, and love in every stage since I arrived in the United States. I give him all the glory for this work.

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I would like to extend sincere gratitude to all who supported me in the completion of this project and throughout my Rice career.

To Rice University, a unique university which, since I first stepped foot here, I received a call. It was a call for the challenge, a call for greatness, a call to conquer myself. When I breathed profoundly in front of the statue of Rice, I said I would evolve here, I will climb the mountain here, and I will start from somewhere here to learn. I knew I wanted to study here. I saw all the amazing and beautiful structures, and I knew I wanted to grow part of my life here...

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Executive Summary

Whether in times of prosperity or during a pandemic, acquiring capital is one of the most significant challenges that an entrepreneur can face. Traditional financial services do not always provide the necessary capital for a business to survive, much less thrive. This is especially pertinent to minorities with a significantly high rate of small business ownership yet a comparatively lower rate of banking history. However, new technology involving blockchain and cryptocurrencies provide many promising alternatives and novel applications. Blockchain-based technologies can serve as a bridge between two untapped markets: those who want to use their investments to do good in the world, and those with an entrepreneurial spirit who want to make their and their family's lives better but lack the necessary funds. With the assistance of blockchain, one could lend money to someone anywhere in the world and help decrease poverty and inequality, but also obtain financial returns. Initial Coin Offerings, crypto lending platforms, and other such applications create new methods of sharing wealth and promoting entrepreneurial advancement while creating additional wealth for the investor with financial returns. Blockchain is not limited only to raising capital, but also allows those same entrepreneurs to follow their goods along the supply chain, use smart contracts when conducting business deals, and less transaction times. First to be explored is how the emerging use of blockchain technology in financial services could transform small business lending and improve capital access for businesses excluded by conventional lending processes, as well as enhance business operations and create more growth opportunities. Then this information will shape the policy recommendations to be found at the end of the paper.

The Challenge with Accessing Financial Resources

What is the challenge?

Many entrepreneurs in this country struggle with obtaining the needed financial resources to succeed in their activities without the help of financial institutions and loan providers.

Entrepreneurs face many obstacles to securing capital to start, operate, and grow their small businesses. As forced shutdowns, limited capacities, and stricter regulations continue to place strain on businesses; business owners are seeking financial assistance at more significant rates; however, even during times of economic prosperity, acquiring capital for a business has been fraught with complications. Governmental loans provide some assistance, but these programs still have considerable room to improve. In 2019, a survey of 1,000 businesses found that only 51% of small businesses reported receiving their requested loan amount while 10% received no funding at all.¹

How did this problem come to be?

Difficulties for small business owners can begin as early as the application process. Loan applications take an average of 20 or more hours to complete, which can account for the high number of reported errors, such as the omission of necessary documents or providing the wrong classification code.² Nearly 47% of small business owners report that obtaining capital is hard and frustrating, and 37% report it as non-accessible.³

¹ “The Capital Report,” Square, accessed May 31, 2021, <https://squareup.com/us/en/capital/capital-report-2020>.

² Colin Krackowsky, “Applying Blockchain to the External Financing Needs of Small Business Owners” (blog), *Medium*, December 6, 2020, <https://medium.com/swlh/applying-blockchain-to-the-external-financing-needs-of-small-business-owners-6fb0e0423ff1>.

³ “The Capital Report.”

Applications that are complete and submitted do not guarantee that funds will be made available. Lack of history with the bank, low or nonexistent personal or business credit scores and insufficient cash or other collateral are common reasons for the denial of a loan application.⁴ These issues are disproportionately more difficult for minority groups even though immigrants represent 25% of business owners in the U.S. and up to 40% of business owners in states that have large immigrant populations.⁵ For example, 31% of African Americans, 28% of Asian Americans and Pacific Islanders, and 26% of Latino small business owners did not have a business banking relationship with a bank or credit union before the Covid-19 pandemic.⁶

What are the effects of the problem?

As a result, small businesses owners are eager to find other alternatives to source their capital. Only 18% of businesses with employees used loans from a financial institution as startup capital or initial acquisition capital in 2016,⁷ while 64% report having to use their own savings.⁸

Private investors provide several businesses with secure venture capital (VC), but this route can have a high cost since most of these entrepreneurs end up owning less than 20% of the business upon exit.⁹ The search and application process for VC funding deviates business owners from participating in their business itself. Dawn Dickson, who is a serial business owner, testified before

⁴ “Fostering Economic Resilience.”

⁵ Alli Romano, “Starting a Business as an Immigrant: What You Need to Know,” LendingTree, accessed June 13, 2021, <https://www.lendingtree.com/business/starting-a-business-as-an-immigrant/>.

⁶ “Small Businesses Struggling to Access Capital, Harming Their Financial Recovery,” Small Business Majority, accessed May 31, 2021, <https://smallbusinessmajority.org/our-research/access-capital/small-businesses-struggling-access-capital-harming-their-financial-recovery>.

⁷ Alicia Robb and Arnobio Morelix, “Startup Financing Trends by Race: How Access to Capital Impacts Profitability,” *SSRN Electronic Journal* (October 2016), <https://doi.org/10.2139/ssrn.2859893>.

⁸ “Startup Financing Trends by Race.”

⁹ *Building Blocks of Change: The Benefits of Blockchain Technology for Small Businesses, Before the Committee on Small Business*, 116th Congress (2020) (statement of Dawn Dickson, CEO of PopCom), 5, https://smallbusiness.house.gov/uploadedfiles/03-04-20_ms_dickson_testimony.pdf.

Congress that “spending 85% of [her] time acquiring debt and only 15% of [her] time acquiring customers was not fiscally viable.”¹⁰ She raised over \$1 million through a security token offering but was “blocked by regulatory hurdles and federal red tape that have impeded [her] plans.”¹¹

The COVID-19 pandemic caused a great economic impact and a substantial need for financial assistance for small businesses, meaning that the number of loans skyrocketed, most of which is attributed to the Paycheck Protection Program (PPP) of March 2020. The main reason for the PPP was to financially help small businesses affected by the pandemic,¹² but the program highlighted problems within the small business loan system. Some of these problems were: prioritization of existing customers, the non-acceptance of new applicants without a previous checking account, credit card, or a previous loan with that same institution.¹³

Table 1: Approval Summary of PPP Lending

<i>Approval Summary</i>		
Summary of all PPP-approved lending (as of May 31, 2021):		
Loans Approved	Total Net Dollars	Total Lenders
11,823,594	\$799,832,866,520	5,467

Source: https://www.sba.gov/sites/default/files/2021-06/PPP_Report_Public_210531-508.pdf

There were also considerable numbers of fraudulent cases. In Florida, for example, a business owner purchased a Lamborghini and stayed in high-end hotels with the capital he received from a

¹⁰ *Building Blocks of Change*, 5.

¹¹ *Building Blocks of Change*, 5.

¹² “PPP data,” U.S. Small Business Administration, accessed June 13, 2021, <https://www.sba.gov/funding-programs/loans/covid-19-relief-options/paycheck-protection-program/ppp-data>.

¹³ Joyce M Rosenberg and Ken Sweet, “Small-Business Loans Snarled in technical, bureaucratic problems,” *Arkansas Democrat Gazette*, April 12, 2020. <https://www.arkansasonline.com/news/2020/apr/12/small-business-loans-snarled-in-technic/>.

PPP loan of about \$4 million.¹⁴ Fast-food chains such as Shake Shack and Potbelly received approval for PPP loans, while many legitimate and deserving small businesses received no financial assistance.¹⁵ The Los Angeles Lakers, worth approximately \$3.7 billion, received a \$4.6 million loan.¹⁶ An estimated more than 15% of loans distributed as part of the PPP had at least one indication of potential fraud, totaling \$76 billion taken improperly.¹⁷

Subsequently, the significant economic strain of the pandemic and related shutdowns resulted in an additional 200,000 above historic levels of U.S. businesses permanently closing within the first year of the outbreak.¹⁸ Disruptive technologies have created new paths when solutions have been needed, as is the case with blockchain technology, which reflects that has the potential to front-facing essential issues that contribute to the access to the capital problem in the United States.

Blockchain technology

What is Blockchain?

In the book 25 trends, in new technologies for the future. Blockchain has been referred to as one of the main focuses of technology since its inception in 2009¹⁹ blockchain has evolved to influence every global industry sector.

¹⁴ Jaclyn Peiser, “A Florida man received millions in coronavirus aid. He used it to buy a lamborghini, prosecutors say,” *Washington Post*, July 28, 2021, <https://www.washingtonpost.com/nation/2020/07/28/florida-ppp-coronavirus-lamborghini/>.

¹⁵ Jim Zarroli, “Even The Los Angeles Lakers Got A PPP Small Business Loan,” *NPR*, April 27, 2020, <https://www.npr.org/sections/coronavirus-live-updates/2020/04/27/846024717/even-the-la-lakers-got-a-ppp-small-business-loan>.

¹⁶ Zarroli, “Los Angeles Lakers.”

¹⁷ Griffin, John M. and Kruger, Samuel and Mahajan, Prateek, Did FinTech Lenders Facilitate PPP Fraud? (December 6, 2021). Available at SSRN: <https://ssrn.com/abstract=3906395> or <http://dx.doi.org/10.2139/ssrn.3906395>

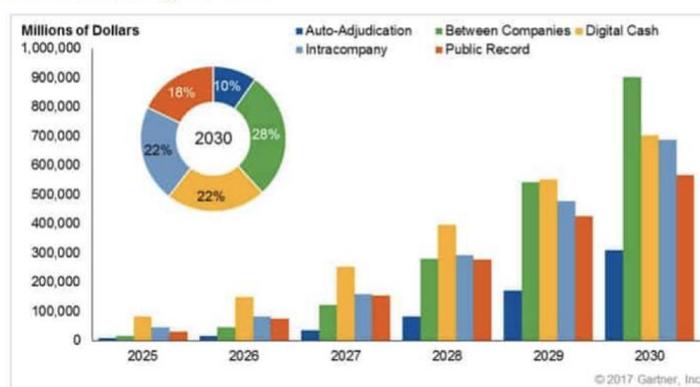
¹⁸ <https://www.federalreserve.gov/econres/feds/files/2020089r1pap.pdf> page 4

¹⁹ Bernard Marr, *Tech Trends in Practice: The 25 Technologies That Are Driving the 4th Industrial Revolution* (Chichester: John Wiley & Sons Ltd, 2020), 70.

Blockchain is a database of transactions or, in lay terms, a digital ledger. The applications of blockchain are expected to add \$176 billion in business value by 2025 and \$3.1 trillion by 2030, with additions to the economy such as digital currencies.²⁰ Its promise stems from its security, public accessibility, and immutability.

Figure 1: Business Value added by blockchain

Business value-add of Blockchain - \$176 billion by 2025, \$3.1 trillion by 2030



Gartner

Source: <https://media.consensys.net/gartner-blockchain-will-deliver-3-1-trillion-dollars-in-value-by-2030-d32b79c4c560>

Each transaction made through blockchain creates a new digital “block” that saves the information of the transaction. Each block also has a hash, or digital fingerprint, and the hash of the previous block.²¹ This creates a sort of chain that makes modifying the information on the blocks extremely difficult. Any change to the block will invalidate that block’s hash, which will affect all the

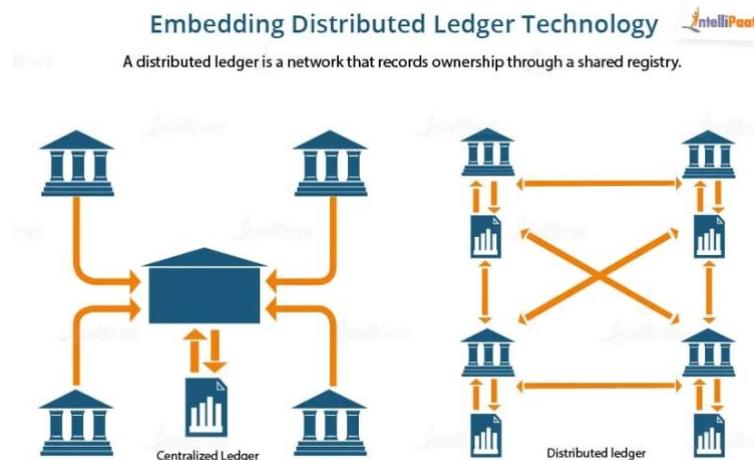
²⁰Gartner. “Gartner Predicts 90% of Current Enterprise Blockchain Platform Implementations Will Require Replacement by 2021.” Accessed April 9, 2022. <https://www.gartner.com/en/newsroom/press-releases/2019-07-03-gartner-predicts-90--of-current-enterprise-blockchain>.

²¹ Abhimanyu Bhargava, “What Is Blockchain? Simply Explained by a 15-Year-Old” (blog), *Medium*, June 20, 2021, <https://medium.com/swlh/what-is-blockchain-simply-explained-by-a-15-year-old-941489219704>.

subsequent blocks of the chain. The ability to view the blockchain can be available to all or restricted to participants of an organization, depending on the implementation model.

Blockchain is most often decentralized and visible to all. Anyone can interact with the public blockchain. However, other blockchain implementation models have also been created. Depending on the company's needs, one can also use a partially decentralized blockchain or a fully private blockchain that would be centralized within the organization.²² A larger organization that may like to coordinate various branches with a shared ledger could choose a partially decentralized model accessible to only those within their organization. A smaller organization may opt for a fully private blockchain.

Figure 2: Distributed Ledger Technology



Source: <https://intellipaot.com/blog/tutorial/blockchain-tutorial/blockchain-vs-database/>

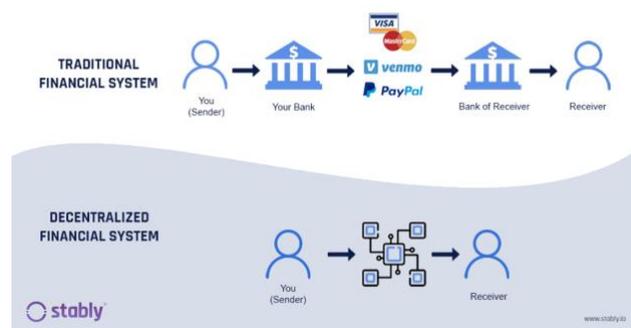
²² Alan Wunsche, *Business Licensing: Governance for Government Blockchains*, Blockchain Research Institute, 2018, <https://www.blockchainresearchinstitute.org/project/business-licensing-governance-for-government-blockchains/>.

Uses of Blockchain

The most common uses of Blockchain now are cryptocurrency transactions. These transactions are made on cryptocurrency platforms that rely on a technology called decentralized finance (DeFi) and on software applications called dApps, or decentralized applications.

The cryptocurrency transactions are run by dApps using Defi, meaning that most of the transactions are made without any traditional intermediaries, such as banks or brokers. If a man in El Salvador uses a credit card to buy a drink in a gas station, the credit card company (*e.g.*, Mastercard or Visa) facilitates the transfer of money from the man to the gas station. With DeFi, the man could pay for the drink without an intermediary, using cryptocurrency on a so-called “peer to peer” or “person to person” internet platform.

Figure 3: Traditional vs. Decentralized Financial Systems



Source: <https://medium.com/stably-blog/decentralized-finance-vs-traditional-finance-what-you-need-to-know-3b57aed7a0c2>

In the digital age of this kind of transactions, Ethereum is a leader in a DIY (Do It Yourself) platform and network that allows people to create and run dApps²³. Ethereum uses a coin called

²³ “DeFi explained: The guide to decentralized finance,” Forekast, accessed August 10, 2021, <https://forkast.news/explainer-decentralized-finance-defi-guide/>.

Ether. Some useful dApps created with Ethereum are Gitcoin Grants, a crowdfunding app for Ethereum community projects; Maker Dao, which works with decentralized stablecoin, community governance, and collateral loans²⁴; and Compound, which allows users to lend tokens to earn interest with the ability to withdraw at any time.²⁵

Another important aspect of Blockchain is smart contracts or a digital code that carries out the processes of agreements made between parties, which is the serviceable application of blockchain. Once the criteria for the transaction are met, the code will carry out the steps of the transaction with no human intervention.²⁶ Nick Szabo, a computer scientist and cryptographer who first coined the term smart contract, presented a simplified, real-life example of a vending machine as a primitive ancestor to smart contracts: money is inserted into the machine, satisfying the terms of the “contract,” and the machine then automatically dispenses change and product fairly. As of now, smart contracts fulfill only basic functions: moving funds for payment after a triggering event and imposing financial penalties if objective conditions are not met. However, given that blockchain use is becoming more mainstream, the capabilities of smart contracts are sure to improve. A smart contract code may soon be able to process more complex tasks, including determining subjective criteria such as the quality of the product or service involved.

Smart contracts can be more secure than regular programs, given that the source code is fully open-source and immutable, therefore visible to all. Unlike executing a function in a web server which is hidden in the backend of the platform, users wanting to execute a function in a smart

²⁴“MakerDAO | An Unbiased Global Financial System.” Accessed April 9, 2022. <https://makerdao.com/en/>(<https://makerdao.com/en/>).

²⁵ “Decentralized Applications (Dapps),” Ethereum.org, accessed November 16, 202, <https://ethereum.org/en/dapps/>.

²⁶ Alex Lipton and Stuart Levi, “An Introduction to Smart Contracts and Their Potential and Inherent Limitations,” *The Harvard Law School Forum on Corporate Governance* (blog), May 26, 2018, <https://corpgov.law.harvard.edu/2018/05/26/an-introduction-to-smart-contracts-and-their-potential-and-inherent-limitations/>.

contract can see exactly what will happen in the code.²⁷ However, like any coded software, security concerns can arise from hackers. Creating a secure code is key, from the writing testing of the codes to the insuring of the funds. Ethereum has published security guidelines to aid in the process.²⁸ Smart contracts and Cryptocurrencies are the genesis of blockchain technology's potential. Entrepreneurs and small businesses can take advantage of blockchain for multiple services to expand and enhance their financial operations.

Applications of Blockchain

How Can Blockchain Help?

Blockchain holds the promise of greatly improving business operations and economic processes. All transactions could be swiftly processed without intermediaries, thereby reducing costs and being protected through encryption with increased traceability.

The U.S. Small Business Administration (SBA) could seek to implement blockchain technology to expedite the application and loan process. Lenders use information including credit scores, banking history, and high-quality collateral to determine the risk of a loan. If a business lacks even one component, the likelihood of loan approval is significantly reduced. Small companies using blockchain would have all transactions visible, meaning SBA lenders could use this information to decide creditworthiness without a lengthy application process.

Organizations have already seen this valuable opportunity, such as the National Policy Network of Women of Color in Blockchain. The group presented a proposal to the SBA for a federally backed

²⁷ <https://research.checkpoint.com/2022/scammers-are-creating-new-fraudulent-crypto-tokens-and-misconfiguring-smart-contracts-to-steal-funds/>

²⁸ ethereum.org. "Smart Contract Security Guidelines." Accessed April 9, 2022. <https://ethereum.org>.

loan that uses blockchain technology.²⁹ Their goal in doing so is to provide a loan program asserting that would not perpetuate the obstacles faced by minority business owners, such as lack of credit and banking history.

Additionally, the SBA would benefit from increased transparency in a time where trust in government is among the lowest it has been throughout the last century.³⁰ The decentralized, publicly accessible ledger on blockchain would show disbursement of funds and other SBA transactions, providing much-needed transparency.³¹ Also, intermediaries such as banks would no longer be necessary for the distribution of loans, resulting in streamlined loans.

Even non-bank lenders could provide loan applications as smart contracts, which could automatically verify document authenticity, streamline a credit prediction based on user activity and data across a network, facilitate collateralization of assets through real-time asset tracking, and disburse funds if qualifications are met.³²

Current Applications in Financial Services

Private companies in the U.S. are already providing alternative financial services to support access to capital through blockchain and cryptocurrency use. For example, Figure is a platform that records, shares, and exchanges loan data using blockchain.³³ Finclusive uses both traditional and

²⁹ *Building Blocks of Change*, 6.

³⁰ “Public Trust in Government: 1958-2021,” Pew Research Center, May 17, 2021, <https://www.pewresearch.org/politics/2021/05/17/public-trust-in-government-1958-2021/>.

³¹ Don Tapscott and Anthony D. Williams, *New Directions for Government in the Second Era of the Digital Age*, Blockchain Research Institute, February 5, 2021, <https://www.blockchainresearchinstitute.org/new-directions-for-government-in-the-second-era-of-the-digital-age/>.

³² ConsenSys. “Blockchain in Finance & Fintech: The Future of Financial Services.” Accessed April 9, 2022. <https://consensys.net/blockchain-use-cases/finance/>.

³³ “Get a Personal Loan,” Figure Personal Loan, accessed May 31, 2021, <https://www.figure.com/personal-loan/>.

blockchain-enabled access to accounts to provide secure banking to the financially-excluded through a hybrid regulatory, and financial technology platform³⁴

Entrepreneurs can also look to Initial Coin Offerings (ICOs) as a form of blockchain-based crowdfunding to access capital. Instead of purchasing equity in the company as in Initial Public Offerings (IPOs), buyers receive a token that will have future utility on the project being funded. The immensely popular blockchain-based platform Ethereum was initially funded through an ICO.³⁵ The success of ICOs extends beyond Ethereum as well, with more than \$10 billion having been raised from 2,000 unique token sales between 2017 and 2018.³⁶

BlockFi is a centralized platform that provides different financial services, such as interest payments on cryptocurrency holdings, credit card services, and a coin trading service.³⁷ Presently, conventional banks will not allow a loan applicant to use crypto assets as collateral for traditional loans and that is one of the pluses that BlockFi offers, it is an option to access capital called a “collateralized crypto business loan” or CCBL. This type of loan is for businesses that already have crypto assets, like ICOs, or that accept cryptocurrency as payment. When borrowing with BlockFi, businesses can use crypto assets as collateral for loans in U.S. dollars or stablecoins (USD Coins, or USDC). BlockFi boasts that “collateralized loans do not put as much weight on profitability,” and that the company “does not require business clients to provide tax documents when applying for a loan under \$250k. This makes it significantly easier for growing companies to

³⁴ “As many as 3.5 billion people worldwide are underserved by, or excluded from, the financial system,” *FinClusive*, accessed June 1, 2021, <https://finclusive.com/why-finclusive#Not-a-Risk>.

³⁵ Gemini. “Initial Coin Offerings: The Ethereum ICO Boom.” Accessed March 19, 2022, <https://www.gemini.com/cryptopedia/initial-coinoffering-explained-ethereum-ico>.

³⁶ Gemini, “Initial Coin Offerings.”

³⁷ “BlockFi Mission,” BlockFi, accessed August 10, 2021, <https://blockfi.com/mission/>.

access capital.”³⁸ Credit scores, which BlockFi claims are inherently exclusionary, are also not necessary for the loan, allowing for greater access by demographics currently excluded from typical financial Institutions.³⁹

Another alternative to traditional lending without a centralized entity is the company SALT. It is a lender that accepts digital assets and cryptocurrencies as collateral.⁴⁰ Members can use their cryptocurrency or combination of cryptocurrencies as their line of credit to get a loan and receive funds in USD or Stablecoin. Once the loan is paid, the assets are returned to the borrower. One of the main benefits of this type of loan is that credit scores and financial history are not considered when determining creditworthiness. Only the crypto assets owned by a borrower are considered, which also means that a SALT user does not need to borrow against future income.⁴¹ Another benefit is opting into the StackWise program, users currently have and can grow their crypto assets, similar to a reward program. SALT users receive a portion of their monthly payment back into their wallet in Bitcoin, Ether, or USD Coin.⁴²

Current non-capital raising applications for Business Growth and Expansion

Currently, large corporations are exploring blockchain’s potential. An important example is Walmart, which has been developing a food traceability system that capitalizes on the public ledger technology of blockchain. Apart from blockchain-based loans, small businesses have

³⁸ “Collateralized Crypto Backed Business Loans,” BlockFi, accessed August 10, 2021, <https://blockfi.com/collateralized-crypto-backed-business-loans>.

³⁹ Micki Wagner, “How BlockFi Is Making Financial Services More Inclusive,” *Worth*, November 15, 2021, <https://www.worth.com/worthy100-flori-marquez/>.

⁴⁰ Jake Frankenfield, “Is SALT Blockchain-Based Lending the Future of All Personal Loans?,” *Investopedia*, accessed May 31, 2021, <https://www.investopedia.com/tech/salt-secured-automated-lending-technology-blockchain/>.

⁴¹ SALT Lending | USD or Stablecoin Crypto & Blockchain Loans. “Home Page.” Accessed April 9, 2022. <https://saltlending.com/>.

⁴² SALT Lending | USD or Stablecoin Crypto & Blockchain Loans. “SALT Introduces StackWise, Offers Crypto Rewards to Loan Holders,” January 11, 2022. <https://saltlending.com/salt-introduces-stackwise/>.

several other options for using blockchain technology to improve business operations.

Entrepreneurs also have many opportunities to develop their projects by exploiting blockchain technology.⁴³ To make the process transparent and traceable, a new block is uploaded to the chain for each entity that handles the products on their way to the store. Furthermore, the benefits are numerous, but one prime advantage is tracing an infected, recalled batch faster and easier than before.⁴⁴ While a common retailer spends an average of approximately 6.5 days to find out the origin of an infected or defective batch of product, Walmart can do the same process in 2.2 seconds with the help of blockchain.⁴⁵ Therefore, it would be a big advantage for small businesses to utilize blockchain in order to be more efficient within their supply chains.

Another important fact is that decentralized applications are growing more and more every day. There are many interesting apps running on the market under Ethereum that use blockchain in different areas of daily life. Below is a list of methods of engagement with Ethereum that can be advantageous for small businesses, including browsers, wallets, and must-have utilities.⁴⁶

- SelfKey provides users with their own digital identity to provide secure access to investments, smart contracts, fintech (financial technology) products, company incorporation, coin exchanges, token sales, and other services.
- MetaMask, a web browser that connects devices with the Ethereum network, offers the option to make transfers through peer-to-peer sharing and swap tokens.

⁴³ “How Walmart used blockchain to increase supply chain transparency,” the Leadership Network, accessed July 12, 2021, <https://theleadershipnetwork.com/article/how-walmart-used-blockchain-to-increase-supply-chain-transparency>.

⁴⁴ “How Walmart used blockchain.”

⁴⁵ “How the Blockchain Can Transform Government,” Knowledge@Wharton, accessed July 12, 2021, <https://knowledge.wharton.upenn.edu/article/blockchain-can-transform-government/>.

⁴⁶ “90+ #Ethereum Apps You Can Use Right Now (blog),” Consensys, accessed August 13, 2021, <https://consensys.net/blog/news/90-ethereum-apps-you-can-use-right-now/>.

- Brave is increasingly popular software that allows individuals to earn money by simply watching content.
- Ethereum Name Service creates a personalized and straightforward Ethereum wallet address by mapping human-readable names to machine-readable identifiers such as Ethereum addresses, other cryptocurrency addresses, content hashes, and metadata.
- 3Box is a cloud storage platform that uses Ethereum.
- Civic is an app used to manage an organization's information to prevent data breaches and scams.
- MyEtherWallet is a free, open-source, client-side interface that can create Ethereum wallets and interact with smart contracts.
- MyCryptoWallet is a wallet that can swap and send the cryptocurrency between different platforms.

The reality is that all these applications are only the beginning. DeFi, for example, is already being applied to virtual worlds and games and has great potential; the demand will only increase during the next few years. At first, decentralized games were slow, expensive, and rudimentary. They have since evolved to be immersive and complex. DeFi applications are increasing and playing an important role as the global system looks toward accelerating and improving legal and lending processes, ID verification, crowdfunding, derivatives, gambling, insurance, and other activities. By utilizing DeFi, the need for intermediaries will diminish, reducing administrative costs. Not only that, but each transaction will also require less time, leading to instant transfers that also reduce costs and fees. Finally, by utilizing the internet, individuals can transact and trade from anywhere in the world.

A significant trend of the virtual worlds likely to use DeFi is the metaverse; where a network of rendered worlds and simulations use augmented reality.⁴⁷ Explained simply, it is the internet, but in 3D. Though still in development, this is an increasingly popular concept within the video game sphere, with a world of possibilities beyond gaming. Blockchain technology can be applied to the metaverse with cryptocurrency transactions to create its own functioning economy. Mark Zuckerberg even declared to investors that the metaverse will be the “successor to the internet.”⁴⁸ Though it does not directly impact access to capital, entrepreneurs should be mindful of the metaverse’s potential and increasing presence, for it is likely to affect the future of business operations as the market continues to shift toward digital services.

Other opportunities for blockchain use by entrepreneurs and small businesses include fully automated legal agreements through smart contracts, more efficient fundraising, increased transparency and accountability in shipping logistics, and the elimination of the need for background checks.⁴⁹ For the government, smart contracts can allow for more efficient regulation. Auditing functions can be embedded in the code of a smart contract. As such, the government would not need to rely on records provided by a separate company to audit transactions because the records would be visible on the blockchain.⁵⁰

⁴⁷ Brian Koerber, “What Is the Metaverse? A (Kind of) Simple Explainer,” Mashable, November 10, 2021, <https://mashable.com/article/what-is-the-metaverse-explainer>.

⁴⁸ Howard, “Entrepreneurs & Investors.”

⁴⁹ Rakesh Kumar, “Entrepreneurial Opportunities in Blockchain” (blog), *Medium*, March 12, 2020, <https://medium.com/the-capital/entrepreneurial-opportunities-in-blockchain-75ee180b7993>.

⁵⁰ “How the Blockchain Can Transform Government.”

How a Business Can Implement Blockchain

Since there are a lot of ways businesses can implement blockchain, the difficulty and duration of implementation can vary from case to case. Among the simplest ways to adopt blockchain technology is to accept cryptocurrencies as payment. To do so, business owners must invest in a digital wallet, a merchant gateway, or a combination of the two.⁵¹ A great example of accepting cryptocurrency as a way of payment is an online platform called Menufy. Menufy works with restaurants around the U.S.A by offering both a platform where the restaurants can be advertised, and a food delivery service provided by Menufy. More specifically, Menufy allows customers to order food and pay using cryptocurrency, and as customers do so, Menufy charges customers in two ways: 2.5% + \$0.30 as a processing fee and a \$1.50 fee per order. In other words, the restaurants do not have to pay anything, but their customers will be charged directly by Menufy. Many restaurants accept that because customers will have many options for payments, including cryptocurrencies. Therefore, the advantage for restaurants is that customers can pay them with cryptocurrency without the restaurant having to build any infrastructure to accomplish that.

A business wanting to implement blockchain in a more sophisticated manner does not have to create a new app but rather can use a customizable, predesigned blockchain. In this way, time is saved in the implementation process, as entrepreneurs and business owners do not have to spend time on the development of the infrastructure and can instead focus on adjusting the blockchain to fit the business's needs. Amazon Web Services (AWS), Microsoft's Azure, and Oracle offer such predesigned blockchains. For example, AWS offers various templates, and many businesses, with

⁵¹ Drew Giventer, "4 Ways Your Small Business Can Benefit From Blockchain," *Entrepreneur*, March 23, 2021, <https://www.entrepreneur.com/article/365984>.

the option to choose between the Ethereum and Hyperledger Fabric platforms, can find the one that fits their needs.⁵²

Nonetheless, an entrepreneur would prefer to be completely innovative and develop a blockchain entirely from scratch. For a small business owner or entrepreneur, developing and implementing a blockchain ecosystem from the beginning can be a lengthy and expensive process in comparison to using platforms or templates already created. According to software development company LeewayHertz, a project begins with a proof of concept (PoC), or design prototype, that typically takes two to three weeks, depending on the application's requirements^{53, 54} Blockchain PoC is a process through which a project idea is probed to determine if the project would be workable in a real blockchain environment situation. It is an ordinary type of consensus algorithm for blockchain,⁵⁵ which is essential to prove that the project's vision is ready to work in the real world.⁵⁶ After the PoC process is done, it takes four to five weeks to create a minimum applicable product with the necessary minimum features. Starting an application on the network takes approximately two to three months, considering that the time frame depends on the prerequisites of a client. There are various blockchain development companies willing to assist; If a small business owner or entrepreneur is interested in developing their own blockchain ecosystems, such as LeewayHertz, Somish Blockchain Labs, SoluLab, Venture Aviator, and SoftwareMill.

⁵² "How to Implement Blockchain To Empower Your Business?," 101 Blockchains, December 29, 2020, <https://101blockchains.com/implement-blockchain/>.

⁵³ "A Complete Guide to Blockchain Development," LeewayHertz, October 22, 2019, <https://www.leewayhertz.com/blockchain-development/>.

⁵⁴ "Blockchain Proof of Concept: Enterprise POC Guide," 101 Blockchains, April 30, 2019, <https://101blockchains.com/blockchain-proof-of-concept/>.

⁵⁵ "Consensus Algorithms: The Root of Blockchain Technology," 101 Blockchains, August 25, 2018, <https://101blockchains.com/consensus-algorithms-blockchain/>.

⁵⁶ Wunsche, *Business Licensing*.

Blockchain Solutions Moving Forward

As entrepreneurs continue to find new methods of exploiting blockchain, blockchain-based technologies will continue to evolve, presenting new methods of improving efficiency, usability, and opportunities. One of the sources of the access to capital problem is an unequal distribution of wealth. Many individuals or businesses looking to innovate don't have the financial resources necessary, however, even those that do have the capital are always interested in ways to increase their profits. Initial coin offerings, crypto lending platforms, and other such applications create new methods of sharing wealth and promoting entrepreneurial advancement while creating additional wealth for the investor with returns and interest.

An initial coin offering (ICO) is essentially an initial public offering (IPO), but with cryptocurrency. A business or entrepreneur can launch an ICO and interested investors can buy into it to receive a new cryptocurrency token. The token could represent a stake in the company, or it can also have significance within the company in the form of a related product or service offered by the company. Similarly, a company can launch an initial DEX offering (IDO) to receive financing from investors. It, too, is like venture capital but does not provide investors with equity.

Like Aave or compound, other investment platforms provide additional options for businesses raising capital and investors looking to supplement their assets. Aave is a non-custodial liquidity market protocol, essentially a platform in which those with different assets can deposit them to earn a passive income. Borrowers then borrow these assets, launch their project, and eventually pay off the loan with the advantage of the additional capital from the project. Borrowers can choose to borrow in an overcollateralized (perpetually) or undercollateralized (one-block liquidity) manner. This app is low risk for both lenders and borrowers alike. The lender's assets are allocated

in a smart contract with a public and open-source code that is formally verified and audited by third-party auditors. Funds can be withdrawn on-demand as fiat currency or as tokens, the tokenized version of the lender's position, which is treated the same as any other crypto asset.

The compound is a similar platform but is based on the Ethereum blockchain and boasts algorithmically derived interest rates based on the supply and demand for the asset. The Compound Protocol works through a c-token contract, a smart contract for supplying or borrowing assets. The c-Token contracts track balances between the accounts that supply and those that borrow assets and algorithmically set interest rates.⁵⁷ In this way, both investors and borrowers do not have to negotiate terms such as maturity, interest rate, or collateral with a peer or counterparty. Since Compound was launched, there has yet to be any report of a security threat, despite the smart contracts on this platform having multiple security audits made by firms like Open Zeppelin and Trails of Bits.⁵⁸ To reinforce security, Compound gives insurance coverage for users from different products like Nexus Mutual and Oryn.⁵⁹

Blockchain Internationally

Governments around the world are looking to take advantage of the innovative applications of blockchain technology. A considerable number of them have begun a transformational process to implement blockchain technology in various institutions in order to expand access to credit for their people and their businesses. Though many applications are still in the research and

⁵⁷ "Compound | Docs - Security." Accessed March 9, 2022. <https://compound.finance>.

⁵⁸ "Compound Finance Review 2022: All About You Need to Know!," April 7, 2022. <https://www.cryptonews.com/lending/compound-finance-review/>.

⁵⁹ CriptoNoticias - Noticias de Bitcoin, Ethereum y criptomonedas. "Compound, una plataforma de Ethereum especializada en préstamos," May 4, 2019. <https://www.criptonoticias.com/tutoriales-guias/compound-plataforma-ethereum-especializada-prestamos/>.

development stage, governments are expecting to facilitate and expedite the processes of services and policies for their citizens through various blockchain applications.

Blockchain technology is not affiliated with a political party or stance. Recently, with the conflict in Ukraine, there is an increase in the number of transactions using BTC and other alternatives.⁶⁰

The media has highlighted two main uses of crypto transactions in this Russia-Ukraine conflict.

One use is that of assistance to and from the Ukrainian government with financial support in the

form of digital donations to buy petrol, supplies, and military equipment.⁶¹ Non-profit digital

wallets set up to aid Ukraine have seen immense crypto flows, with one wallet set up on the Friday

after Russia's invasion having raised over \$8 million in donations in just two days.⁶² On the

Russian front of this conflict, there has been an immense surge in the volume of Russian ruble-

denominated bitcoin, likely to avoid sanctions through cryptocurrency after being blocked by the

swift mechanism.

Social movements also need access to capital to be successful. An example is the 2022 trucker

protests in Canada. The Canadian government decided to block and follow financial transactions

of the group to disrupt the financial support of Canadian trucker's Freedom Convoy as they protest

against COVID-19 vaccine mandates and restrictions. This move blocked many crypto wallets to

disrupt blanket donations; despite this, the group is still receiving crypto transactions.⁶³

⁶⁰“Ruble-Denominated Bitcoin Volume Surges as Russia-Ukraine Conflict Endures.” Accessed April 9, 2022.

<https://www.coindesk.com/video/recent-videos/ruble-denominated-bitcoin-volume-surges-as-russia-ukraine-conflict-endures/>.

⁶¹ “Ukraine Government Is Using Crypto Aid to Purchase Critical Supplies.” Accessed April 9, 2022.

<https://www.coindesk.com/policy/2022/02/28/ukraine-government-is-using-crypto-aid-to-purchase-critical-supplies/>.

⁶² “Ukraine Government Is Using Crypto Aid to Purchase Critical Supplies.” Accessed April 9, 2022.

<https://www.coindesk.com/policy/2022/02/28/ukraine-government-is-using-crypto-aid-to-purchase-critical-supplies/>.

⁶³“Canada Sanctions 34 Crypto Wallets Tied to Trucker ‘Freedom Convoy.’” Accessed April 9, 2022.

<https://finance.yahoo.com/news/canada-sanctions-34-crypto-wallets-173517687.html>.

Some countries, including Estonia and Georgia, are experimenting with blockchain-based land registries. As such, multiple parties hold copies, allowing for the quick resolution of property disputes or the prevention of them altogether.⁶⁴ Other governments, like that of Sweden, are looking to blockchain for some citizen services that could allow for independent verification of legal claims.⁶⁵

Blockchain in Developing Countries

Developing countries also have much to gain from implementing blockchain technology and cryptocurrencies. For nations with struggling economies and devalued currencies, cryptocurrencies could provide an opportunity for stability if made legal tender. Public blockchain platforms can also provide transparency of spending and transactions in corrupt governments. The table below features many of the least developed countries, like Togo and Afghanistan,⁶⁶ as being amongst the top 20 countries in global crypto adoption.⁶⁷ With cryptocurrencies, all that an individual needs is a phone—which nowadays can be found in even the poorest countries—to access the global market.

⁶⁴ “3 Potential Benefits of Blockchain for Government,” Booz Allen, accessed June 13, 2021, <https://www.boozallen.com/s/insight/blog/3-potential-benefits-of-government-blockchain.html>.

⁶⁵ Joon Ian Wong, “Sweden’s Blockchain-Powered Land Registry Is Inching towards Reality,” *Quartz*, April 3, 2017, <https://qz.com/947064/sweden-is-turning-a-blockchain-powered-land-registry-into-a-reality/>.

⁶⁶ Oluwole, Victor. “Mapped: The 25 Poorest Countries in the World.” *Business Insider Africa*, 29:05 200AD. <https://africa.businessinsider.com/local/markets/mapped-the-25-poorest-countries-in-the-world/f2tg0wr>.

⁶⁷ Chainalysis. “The 2021 Global Crypto Adoption Index: Worldwide Adoption Jumps Over 880% With P2P Platforms Driving Cryptocurrency Usage in Emerging Markets,” October 14, 2021. <https://blog.chainalysis.com/reports/2021-global-crypto-adoption-index/>.

Table 2: Global Crypto Adoption Index

Country	Index score	Overall index ranking	Ranking for individual weighted metrics feeding into Global Crypto Adoption Index		
			On-chain value received	On-chain retail value received	P2P exchange trade volume
Vietnam	1.00	1	4	2	3
India	0.37	2	2	3	72
Pakistan	0.36	3	11	12	8
Ukraine	0.29	4	6	5	40
Kenya	0.28	5	41	28	1
Nigeria	0.26	6	15	10	18
Venezuela	0.25	7	29	22	6
United States	0.22	8	3	4	109
Togo	0.19	9	47	42	2
Argentina	0.19	10	14	17	33
Colombia	0.19	11	27	23	12
Thailand	0.17	12	7	11	76
China	0.16	13	1	1	155
Brazil	0.16	14	5	7	113
Philippines	0.16	15	10	9	80
South Africa	0.14	16	18	16	62
Ghana	0.14	17	32	37	10
Russian Federation	0.14	18	8	6	122
Tanzania	0.13	19	60	45	4
Afghanistan	0.13	20	53	38	7

Source: Chainalysis <https://blog.chainalysis.com/reports/2021-global-crypto-adoption-index/>

One such country that seeks to take advantage of this disruptive technology is Venezuela. Hyperinflation of the Venezuelan bolivar has forced Venezuelans to seek other forms of currency for transactions. The Venezuelan government has moved toward experimenting with cryptocurrencies, with some army buildings turned into bitcoin mining centers.⁶⁸ In 2018, Venezuelan President Nicolás Maduro launched a government-issued cryptocurrency known as the Petromoneda, or petroPetro, in an effort to stabilize the economy and circumvent U.S.-imposed sanctions.⁶⁹ The petroPetro is built on a private blockchain, meaning it is subject to the regime's control; however, there is little evidence to support that transactions are being made in petroPetro. Instead, many citizens and businesses are using bitcoin or other decentralized and public cryptocurrencies to preserve the value of their savings or conduct transactions.

⁶⁸ “¡MÍRENLOS! Filtran imágenes de militares operando máquinas de criptomonedas en Fuerte Tiuna (+Fotos),” *Maduradas*, November 29, 2020, <https://maduradas.com/mirelos-filtran-imagenes-militares-operando-maquinas-criptomonedas-fuerte-tiuna-fotos/>.

⁶⁹ Moises Rendon, “How Open and Public Cryptocurrencies Can Help Venezuelans,” Center for Strategic & International Studies, April 13, 2021, <https://www.csis.org/analysis/how-open-and-public-cryptocurrencies-can-help-venezuelans>.

Zimbabwe also faces hyperinflation of the Zimbabwean dollar (ZBD), but is not looking to cryptocurrencies as a solution. The Reserve Bank of Zimbabwe issued a warning against cryptocurrencies in 2017 and moved to ban them altogether. Notwithstanding, Zimbabwe is still pushing for the advancement of the financial services sector and has introduced a fintech regulatory sandbox to encourage innovation with blockchain within a regulated environment before deployment.⁷⁰

Another way that blockchain technology can help developing countries is by facilitating the process of sending money. For immigrants who seek employment abroad, sending money to relatives in the home country is typical. By removing intermediaries in the form of money-transferring services, blockchain reduces costs, lessens transaction times, and makes the process easier overall.⁷¹ Humanitarian aid can also be sent with greater ease as cryptocurrency through blockchain, compared to traditional banking transactions. Notably, this allows for transparency in the distribution of funds.

Challenges

The decentralized nature of blockchain makes it much harder to regulate and therefore more difficult to harness for public programs like SBA lending. Blockchain use, specifically with cryptocurrencies, is increasing at a rate that exceeds the implementation of laws and regulations for such new developments. Fraudulent and illegal activities are facilitated through cryptocurrencies, while the current outdated regulations only exacerbate the problem.

⁷⁰ “Fintech Regulatory Sandbox Guidelines” (Reserve Bank of Zimbabwe, 2021), <https://www.rbz.co.zw/documents/BLSS/Fintech/FINTECH-REGULATORY-SANDBOX-GUIDELINES.pdf>.

⁷¹ Nir Kshetri, “Could Blockchain Technology Help The World’s Poorest?,” *GE News*, July 11, 2021, <https://www.ge.com/news/reports/blockchain-technology-help-worlds-poorest>.

“What makes cryptocurrency dangerous is that users have the ability to remain anonymous,” Sen. Chuck Grassley (R-Iowa) said.⁷² He claimed that half of bitcoin transactions every year, totaling around \$76 billion, are illicit. On the other hand, the company Chainalysis has claimed that they identified only \$10 billion in illicit transactions in 2020, representing 1% of all transactions.⁷³

Creating and implementing governmental regulations has already proven to be a lengthy process. Taking into account that the government will have to implement new protocols and vocabulary, including smart contracts, cryptography, private and public keys, and multi-signature wallets, this will bring about a new set of terminology, processes, and considerations. It is also still relatively unclear which government entities will implement and enforce regulations, with jurisdiction potentially being shared between the Securities and Exchange Commission (SEC), the Commodity Futures Trading Commission (CFTC), the U.S. Department of the Treasury (USDT), the Internal Revenue Services (IRS), and other agencies.

Despite these challenges, blockchain technology’s positive contributions, especially to small businesses and the free market, will make its implementation worth it.

Policy Recommendations

As a relatively new technology, there is uncertainty that surrounds blockchain with many opponents claiming it isn’t trustworthy. The current lack of legal legitimacy of crypto assets exacerbates the lack of public trust in the platform, limiting its innovative potential. However, too much regulation will affect the operability and decentralized nature of the blockchain, limiting many of the

⁷² Danny Nelson, “Republican Senator Highlights Bitcoin’s Battle in Shedding Criminal Baggage,” *CoinDesk*, July 15, 2021, <https://www.coindesk.com/republican-senator-highlights-bitcoins-battle-in-shedding-criminal-baggage>.

⁷³ Nelson, “Republican Senator.”

technology's best attributes. As such, defining crypto law while maintaining only truly necessary regulation of crypto transactions seems ideal to promote entrepreneurial growth on the blockchain platform.

The pseudonymity afforded by cryptocurrency transactions and the global reach of blockchain makes cooperation a necessity between international governments to identify and address security concerns on the platform. Isolated regulations present only in the U.S. will not be enough to ensure the necessary financial privacy and security. Cooperation between blockchain companies is also necessary to standardize arbitration and audit language in users contracts.

Governments and blockchain companies will need to work together to fight hackers and create an insurance product to cover lost or stolen crypto assets in case someone is legitimately hacked. Insurance is regularly regulated by states in the U.S. However, given that cryptocurrency is not considered legal tender because it is not backed by the government, it is not subject to the protections afforded by the Federal Deposit Insurance Corporation (FDIC) or Securities Investor Protection Corporation.⁷⁴ Governments could create crypto-friendly laws to recognize its legitimacy and make crypto-insurance no different than home or auto insurance.

The blockchain platform is also experiencing a lack of software developers in crypto companies. As blockchain is decentralized, software developers can create their own company, token, or blockchain product without working for an established company. Though this is great for innovation, many companies are left with positions needing to be filled. Cryptocurrency

⁷⁴ Stasha. "What Is Crypto Insurance, and How Does It Work?" Accessed April 9, 2022. <https://policyadvice.net/insurance/guides/crypto-insurance/>.

companies could invest in developer training workshops in universities to increase knowledge about blockchain and promote careers in the field.

Conclusion

This past year has seen the rise of many innovative technological applications, and blockchain has been key to many of them. People are talking about cryptocurrencies including Bitcoin, Ethereum, and others, but these comprise only a small percentage of the possible uses of blockchain technology.

Blockchain applications for entrepreneurs and small businesses, including those already in place to help them advance in their business or build an entirely new start-up, are seemingly endless. Those who use a creative mindset to develop more access to capital would take advantage of blockchain technology and encounter a world of new possibilities in this era.