REPORT

BLOCKCHAIN ADOPTION BY THE WORLDS TOP 100 PUBLIC COMPANIES

BY

BLOCKDATA

A CB INSIGHTS COMPANY

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EXECUTIVE SUMMARY

Since 2014, the top 100 public companies have been getting heavily involved in blockchain technology in various ways:

Technology: 81 companies are using blockchain technology, and are using 30 different technologies for their solutions

Adoption: 27 companies currently have a live product, and 24 are currently in development. Only 19 are inactive with adopting blockchain.

People: 46 of the top 100 public companies have a total of 787 employees in blockchain-related roles. This excludes third parties.

Investment: 36 of these companies have invested (directly or through subsidiaries) in a total of 101 blockchain companies through 140 investment rounds worth \$3.5 billion.

Tech and Financial companies are leading the way in terms of # rounds (Alphabet, Citigroup, Mastercard, Goldman Sachs, and Samsung).

The most popular out of 83 identified use cases are focused on integrating blockchain (infrastructure), payment solutions, trading & exchanges, post-trade and custody solutions.

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INTRODUCTION



Ever since 2014, companies have been exploring ways to use blockchain technology for different use cases.

Beyond the hype, Blockdata did extensive research into how far the adoption of this technology has come in 2021.

We looked into how the top 100 biggest public companies in the world are using blockchain technology, which blockchain companies they have invested in, how many blockchain-related employees they have and what their public stance on cryptocurrency is.

One thing is clear, blockchain adoption is accelerating.



WHY THE TOP 100 PUBLIC COMPANIES?

From Blockdata's perspective in mapping out the blockchain ecosystem, the vast majority of the activity is happening beyond the top 100 public companies. This will come as no surprise to people active in the blockchain space.

Not only that, there are also serious challenges in using the technology at large scale.

- Corporations have up to hundreds of millions or billions of users/customers/clients and up to hundreds of partners.
- Innovation in the blockchain space moves at an incredible pace due to its open source nature, which can be difficult to keep up with.

So then why focus on these companies?

If public companies are able to overcome these challenges, it is a huge proof point that the technology is maturing and solving problems.

Many blockchain-related initiatives are not at the level yet where they are simple enough to use for hundreds of millions or billions of people. Cryptocurrency in general is used by ~300 million people today, but many specific applications will still need a lot of work before widespread adoption can happen.

We therefore advise to not take the top 100 public companies as an indicator of where blockchain innovation stands, but rather how far it has come to be taken seriously by so many large organizations.



BLOCKCHAIN TECHNOLOGY ADOPTION

BY THE TOP 100 PUBLIC COMPANIES



OUT OF THE TOP 100 PUBLIC COMPANIES RESEARCHED

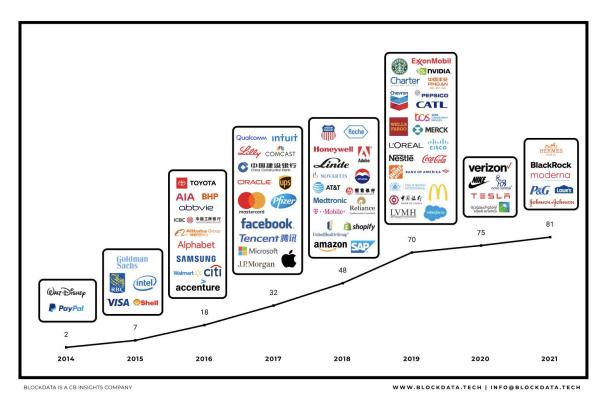
81 companies are currently working with blockchain technology

27 of them have a fully functioning live product

30 unique blockchain technologies are currently being used across a variety of use cases

В

YEAR OF BLOCKCHAIN ENTRY FOR THE TOP 100 PUBLIC COMPANIES



Some top institutions began engaging in blockchain as early as **2014,** with PayPal and Walt Disney being the earliest entrants.

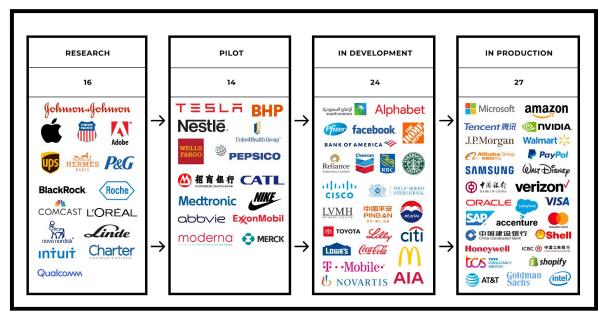
2016 saw **16** of the top companies enter the blockchain space.

2019 saw the most entrants with **22** companies.

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81 OF THE TOP 100 PUBLIC COMPANIES ARE CURRENTLY USING BLOCKCHAIN TECHNOLOGY



27 of the top 100 public companies have a fully functioning, live service that is using blockchain technology in 2021.

Research - 16
Pilot - 14
In development - 24
In production - 27

19 companies have either ceased their blockchain operations or never started and are therefore inactive.

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Research has also been included when defining the term "using" blockchain technology. This includes researching and selecting the appropriate technology for Proof-of-Concepts, and other validation scenarios before pilot-testing begins.



ADOPTION STAGE BREAKDOWN - CATEGORIZATION

When measuring adoption we decided to categorize each company into one of five stages.

This is to ensure the simplicity but also accuracy of each companies development cycle, by widening the scope of each phase.

How so? For example, there are a number of more "technical" such as alpha, beta, testing which you may read online or via a companies website. But this can cause roadmaps and tracking to become a little more complex.

To your right you will find a basic breakdown for adoption stage we used for this report.

Research - understanding how blockchain can impact their business. Selecting the right blockchain/DLT infrastructure, finding potential partners and developing PoC's, before the start of any actual developments.

Pilot - preliminary testing of the blockchain solution to see if it could work for their business. This is limited to a small group of professionals before scaling up to further, more serious developments.

In development - currently developing a near-production ready service. This phase comes after successful pilots and involves alpha and/or beta testing.

In production - they have a product or service that is currently live and used by their users/clients/business partners.

Inactive - initially got involved in blockchain technology but is no longer active/or never started.



MOST POPULAR INDUSTRIES AND USE CASES PER ADOPTION STAGE

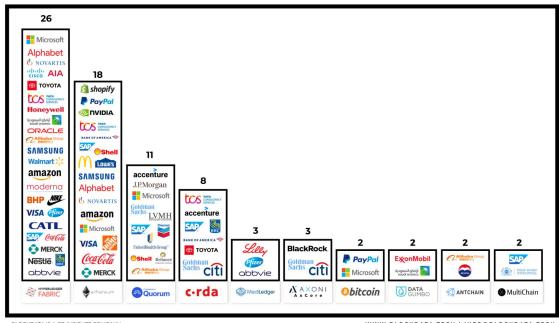
ADOPTION STAGE	COMPANIES	POPULAR INDUSTRIES	POPULAR USE CASES	KEY EXAMPLES
In Production	27	Payments Identity & Reputation Trade Finance Finance & Banking Supply Chain & Logistics	Blockchain-as-a-Service Identity Management & Verification Infrastructure Interbank Transactions Traceability	Tencent Blockchain-as-a-Service (TBaaS) Microsoft's ION Digital ID Network Salesforce Blockchain CCB's BCTrade2.0 Samsung's Cello Trust
In Development	24	Supply Chain & Logistics Payments Capital Markets Identity & Reputation	Anti-Counterfeiting (Pharma) Digital Currencies Clearing & Settlement Identity Management & Verification	Chronicled's Mediledger Facebook's Diem BoA Paxos Settlement Network Google's Identity Management Tools
Pilot	14	Health Tech Supply Chain & Logistics	Tracking & Record Keeping Traceability Supply Chain Management	Moderna's Covid-19 Vaccine Tracking Tesla's pilot with RelSource PepsiCo's Project Proton
Research	16	Investments Transportation Payments	Asset Management Traceability Wallets & Digital Currencies	Blackrock's Alladin Blockchain In Transport Alliance (BiTA) Apple's Alternative Payment Research



TECHNOLOGIES USED

BY THE TOP 100 PUBLIC COMPANIES

TOP 10 TECHNOLOGIES USED BY THE TOP 100 PUBLIC COMPANIES



Hyperledger Fabric is the most preferred DLT of choice by the top 100, with **26%** of them currently using the technology.

This is followed by:

- Ethereum with 18%,
- Quorum with 11%
- Corda with 8%.

A total of **30 different DLT** technologies are currently being used by the top 100.

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See next slide of the remaining 20 technologies.

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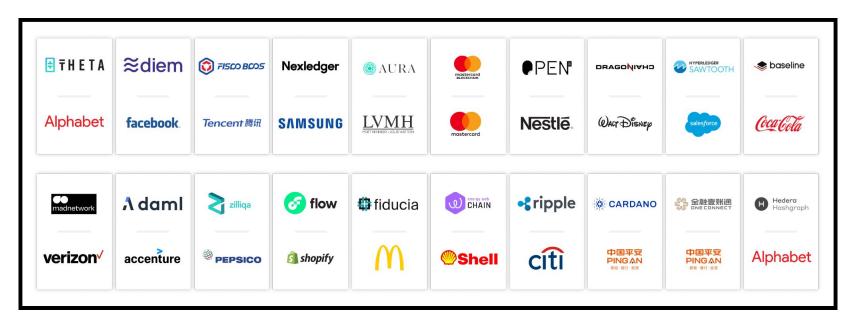
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Technologies selected are either blockchain networks, DLT Frameworks or unique contract languages/software frameworks that have been adopted by the examined companies for this research*



A TOTAL OF <u>30 DIFFERENT DLT</u> TECHNOLOGIES ARE CURRENTLY BEING USED BY THE TOP 100.

Below are the remaining 20 technologies (top of each card) used by one of the institutions (bottom of each card).



Technologies selected are either blockchain networks, DLT Frameworks or unique contract languages/software frameworks that have been adopted by the examined companies for this research*



CASE STUDY: SAMSUNG SDS

BLOCKCHAIN SOLUTION	ТҮРЕ	TECHNOLOGY USED	DESCRIPTION
NEXLEDGER	DLT	Nexledger, Hyperledger Fabric, Ethereum	Nexledger is a blockchain platform built for enterprise, empowering your organization to take control of distributed transactions securely and conveniently.
SAMSUNG DIGITAL WALLET	Wallet	Cryptocurrencies*	Samsung Blockchain Wallet is a non-custodial cryptocurrency wallet service that allows you to send cryptocurrency to others and enjoy recommended DApps.
ACCELERATOR	Scaling Solution	Hyperledger Fabric	Accelerator is a software component designed to improve the performance of a blockchain network, e.g. Hyperledger Fabric, in terms of transaction throughput.
CELLO TRUST	Platform	Nexledger	Integrated with Samsung's logistics platform Cello, Cello Trust ensures a blockchain-based tamper-proof, secure information syste across all stages of a supply chain.
SAMSUNG BLOCKCHAIN PLATFORM SDK	Developer Tools	Ethereum, Tron	Allows developers to manage blockchian accounts. It also offers a cryptocurrency payment solution with its UI.
NEXFINANCE	Platform	Nexledger	Nexfinance can be used to integrate and monitor financial data fro different companies, offer product recommendations, claim insurance and operate loyalty programs.

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Samsung's tech and security subsidiary

Samsung SDS is known for its
blockchain initiatives in the space.

It is a great example of a large institution providing a variety of solutions across industries.

Known for their distributed ledger technology Nexledger, Samsung SDS also provide solutions such as a scaling solution (increases Hyperledger throughput by 10x), supply chain solutions such as Cello Trust, and a non-custodial wallet for Galaxy phone users.



TOP 100 PUBLIC COMPANIES USING MULTIPLE DLT TECHNOLOGIES

COMPANY	TECHNOLOGIES US	SED (Blockchain nei	tworks/DLT framewo	orks / SC language	/software)
Microsoft	[®] bitcoin	ethereum .	Quorum	∆ daml	
Alphabet	₹ Ħ E T A	HYPERLEDGER FABRIC	ethereum •	Hedera Hashgraph	
CAlibaba Group 阿里巴里東河	ANTCHAIN	HYPERLEDGER FABRIC	Quorum		
Coca Cola	HYPERLEDGER FABRIC	s baseline	ethereum •		
accenture	HYPERLEDGER FABRIC	c∙rda	Quorum	∧ daml	
TATA CONSULTANCY SERVICES	HYPERLEDGER FABRIC	ethereum •	c ∙rda		
SAP	Quorum	ethereum .	MultiChain	c∙rda	FABRIC HYPERLEDGER
© Shell	energy web CHAIN	Quorum	ethereum		
cîtî	c∙rda	W AXONI	- ₹ripple		
Goldman Sachs	c∙rda	CONSENSYS Quorum	N AXONI		
SAMSUNG	Nexledger	ethereum •	HYPERLEDGER FABRIC		

11 of the top 100 public companies are working with multiple distributed ledger technologies for their solutions.

These technologies may include:

- Public permissionless networks (Ethereum, Theta).
- Private permissioned frameworks (Hyperledger Fabric, AxCore).
- Custom SC language and software frameworks (DAML).

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INVESTMENTS IN BLOCKCHAIN COMPANIES

BY THE TOP 100 PUBLIC COMPANIES



36 of the top 100 public companies have invested in a total of 101 blockchain companies

through **140** investment rounds.

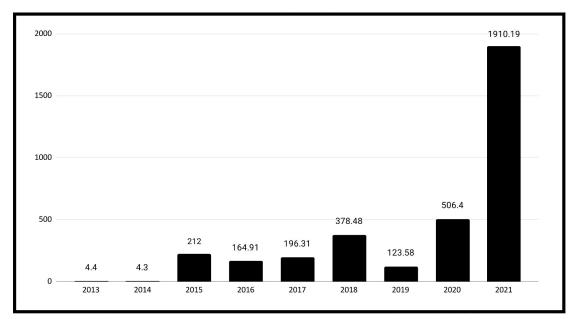
These 140 rounds add up to a total value of **\$3.5 billion**.

These 101 companies are active across **29** industries and **83** unique use cases.

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BLOCKCHAIN COMPANY FUNDING BY YEAR FROM TOP 100 PUBLIC COMPANIES



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Investing into a blockchain project does not mean the institution is now active in blockchain. I.e. Alphabet's investment subsidiary's first investment in a blockchain company was in 2013, but did not start their own blockchain solutions until 2016.

Blockchain investments have happened as early as 2013 from the top 100 companies.

Corporate involved funding rounds has seen a sharp rise between 2019 and 2021 - where funding totals have increased by **14x**.

Largest contributed round:

- Bakkt \$300 mil 16/03/2020 Latest contributed round:
 - Dapper Labs \$250 mil 23/09/21

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MOST ACTIVE TOP 100 COMPANIES WHO HAVE INVESTED IN BLOCKCHAIN

	COMPANY	VALUATION	# OF ROUNDS	SIZE OF KNOWN FUNDING ROUNDS	BLOCKCHAIN COMPANIES INVESTED IN
Alphabet	Alphabet	\$1,923B	23	\$601.4M	Alchemy, Blockchain.com, BloomX, Celo, Dapper Labs, Eversend, GiveDirectly, Helium, Kiva, LedgerX, Rentberry, Ripio, Ripple, Smartcoin, Signzy, Talenta, Veem [17]
citigroup	Citigroup	\$148B	15	\$394.5M	Chain, Cobalt, Symbiont, Axoni, R3, Digital Asset, SETL, HQLAx, Komgo [9]
mastercard	Mastercard	\$351B	13	\$71.9M	AID:Tech, Civic, ConsenSys, Digital Currency Group, Endor, Everledger, Hanzo, Moeda Loyalty Points, SendFriend, Signzy, Silot, Trust Stamp, Uphold [13]
Goldman Sachs	Goldman Sachs	\$142B	13	\$488.5M	AiLink, Axoni, Blockdaemon, BiUP, BitGo, Circle, Coin Metrics, Digital Asset, HQLAx , R3, Veem [12]
SAMSUNG	Samsung	\$432B	11	\$79.24M	Alchemy, Blocko, Dapper Labs, Digital Asset, Filament, Ledger, Theta Labs, ZenGo, ZenGold [8]
VISA	Visa	\$459B	9	\$70M	Anchorage, CelCoin, Chain, Cred, Earthport, IRIS, Ripio, Silot, Unbanked, Wyre [10]
Microsoft	Microsoft	\$2,253B	8	\$482.5M	Bakkt, BigChainDB, Conflux Network, Diginex, Guardtime Blockchain, KrypC, Nivaura [7]
JPMORGAN Chase & Co.	JPMorgan Chase	\$487B	8	\$223.5M	Axoni, ConsenSys, Digital Asset, HQLAx, R3 [5]
PayPal	Paypal	\$327B	8	\$763.7	Cambridge Blockchain, Chynge, Curv, Paxos, Taxbit, TRM Labs [6]
(intel)	Intel	\$219B	6	\$178M	Animoca Brands, Axoni, dfuse, StarkWare Industries, R3, Valid Network [6]

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MOST POPULAR BLOCKCHAIN USE CASES INVESTED IN

# OF COMPANIES	USE CASE
25	Infrastructure & Development Platforms
22	Payment Solutions
17	Blockchain Services
12 Trading & Exchanges	
12 Post-trade & Settlement Solutions	
10	Custody Solutions

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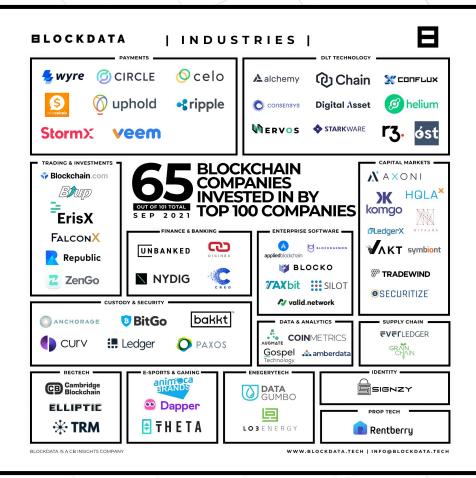
There are no surprises in this list of top use cases that have been invested in. Companies believe in the potential of the technology and thus want good **infrastructure** to make use of it.

They are helping to fund further development of the technology to enable more possibilities to solve specific problems.

Other popular use cases include:

- payments (*b2b payments*, stablecoins)
- exchanges (trading, security exchanges)
- post-trade (clearing & settlement)
- custody (storage of assets).







BLOCKCHAIN TEAMS & PEOPLE

WORKING AT THE TOP 100 PUBLIC COMPANIES



46 of the top 100 public companies

have a total of **787 employees**

in blockchain-related roles.



BLOCKCHAIN-RELATED EMPLOYEES - RESEARCH METHODOLOGY

To find out how many employees in blockchain-related roles each of the top 100 public companies has employed, we primarily made use of LinkedIn search as a source of information.

While we recognise the limitations of relying on this one platform, it at least gave us a minimum number of people currently employed across the top 100 public companies and their subsidiaries.

The downsides of this methodology are:

 Not every person in a blockchain-related role uses LinkedIn. This is especially apparent in some countries where users prefer different professional networks.

- Not everyone listed may actually currently be employed. To combat this we filtered out accounts without a clear role or that had very incomplete information.
- Not everyone in a blockchain-related role may indicate this as such on their profile. Some people may focus on emerging technologies in general, or simply not update their profile.
- We do not consider companies making use of external teams or partners that are developing their solutions. This is a common occurrence, so it may give a skewed perception of how many people are truly involved.



COMPANIES WITH THE MOST BLOCKCHAIN-RELATED EMPLOYEES AND THEIR PROJECTS

	EMPLOYEES	BLOCKCHAIN PROJECTS
facebook.	252	Novi Financial, Diem
accenture	105	Blockchain Integration Framework
CONSULTANCY SERVICES	91	TCS Blockchain QE Services, Quartz DevKit, Quartz Smart Solution, Blockchain Loyalty Platform
JPMorgan Chase & Co.	44	Onyx, JPM Coin
ORACLE	38	Oracle Blockchain
P PayPal	35	Paypal crypto
amazon	30	Amazon Managed Blockchain
Calibaba Group 阿里巴巴東西	24	Alibaba Cloud's Blockchain as a Service
mastercard.	24	Mastercard Provenance, Mastercard Track™, Mastercard's Crypto Card Program

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BLOCKCHAIN-RELATED EMPLOYEES – BREAKDOWN

EMPLOYEES	# OF COS	COMPANY NAMES	
51+	3	Facebook, Accenture, Tata Consultancy Services	
21-50	7	JPMorgan Chase & Co., Oracle, Paypal, Amazon.com, Alibaba Group, Mastercard, SAP	
6-20	5	Microsoft, Samsung, Citigroup, Shell, Royal Bank of Canada	
1-5	31	Alphabet, Walmart, Tencent, Shopify, Bank of America, Roche, Novartis, Wells Fargo, Ping An, Saudi Aramco, Cisco, Verizon, Merck, Charter Communications, Blackrock, Johnson & Johnson, LVMH, Pfizer, Salesforce.com, Coca-Cola, Exxon Mobil, Abbott, Intel, Abbvie, AT&T, Morgan Stanley, Reliance Industries, Honeywell, AstraZeneca, Lowe's, Goldman Sachs	
0	54	Apple, Tesla, Berkshire Hathaway, NVIDIA, TSMC, Visa, UnitedHealth Group, Nestle, Procter & Gamble, Home Depot, ASiML, Walt Disney, Adobe, Kweichow Moutai, Comcast, Nike, L'Oreal, Industrial and Commercial Bank of China, Eli Lilly and Company, Netflix, Toyota, Novo Nordisk, Danaher, China Construction Bank, Thermo Fisher Scientific, Pepsico, Broadcom, Costco Wijuholesale, China Merchants Bank, Chevron, CATL, Medtronic, Mcdonald's, Texas Instruments, T-Mobile, Meituan, UPS, BHP Group, NextEra Energy, Qualcomm, Linde, Philip Morris International, Agricultural Bank Of China, Intuit, Moderna, Hermes International, Bristol-Myers Squibb, AIA Group, Union Pacific, Charles Schwab, Keyence, Bank of China, Prosus, Starbucks	



PUBLIC STANCE ON CRYPTOCURRENCY

BY THE TOP 100 PUBLIC COMPANIES



32 companies have a positive stance of cryptocurrency

61 companies are considered neutral

7 companies have a negative stance



CRYPTOCURRENCY PERCEPTION – RESEARCH METHODOLOGY

To clarify what we mean by perception of cryptocurrency:

We're not including Central Bank Digital Currencies (CBDCs), or vague descriptions of "virtual currencies" where the company refers to a fully regulated and compliant currency that may not exist or has no adoption.

In essence, Bitcoin is the standard for us here: an open, global and neutral protocol. How does a company feel about that?

We're also not including what these companies think about "blockchain" or specific applications of the technology beyond cryptocurrency.

For a positive stance on cryptocurrency, a company matches one or more of the following criteria:

- Accepts it as a payment method.
- Offers cryptocurrency-related products or services.
- Is hiring to build these products or services.
- Holds cryptocurrency in its treasury.
- Has key executives who spoke out positively.

Companies with a negative stance have:

- Negative publications on cryptocurrency.
- Publicly stated disbelief in cryptocurrency.
- Key executives who spoke out negatively.
- Restricted customer activity in any way related to cryptocurrency.

Neutral companies have done none of the above.



PUBLIC STANCE ON CRYPTOCURRENCY BY THE TOP 100 PUBLIC COMPANIES

POSITIVE		NEUTRAL			NEGATIVE	
32		61			7	
facebook T = 5 L TOYOTA	Meituan Qualco citigroup BLACKROCK prosus shopify COMCAST	Microsoft Alphabet Microsoft Alphabet METELIX METELIX	Mectronic Private Pri	AMES AMES	Goldman Sachs Berkshire Hathaway ise. Intuit. charles Schwab	accenture (学) 中国农业银行 ACCENTAGE AND OF CITES (中国旅行 MANN OF CITES

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CRYPTOCURRENCY PERCEPTION – "NEGATIVE" COMPANIES EXPLAINED

In our research we found 7 companies with an arguably negative stance towards cryptocurrency.

We realise this is a somewhat subjective and potentially contentious topic, so below we aim to clarify through a summary and sources why we have labeled these companies as such.

Berkshire Hathaway: Berkshire Hathaway's Warren Buffett and Charlie Munger have been some of the most <u>negatively</u> <u>outspoken</u> billionaires in the world about cryptocurrency.

Agricultural Bank of China: In August 2021 it <u>reiterated its ban on cryptocurrency transactions</u> for clients, threatening to close their accounts.

Bank of China: In August 2021, the People's Bank of China announced a further crackdown against cryptocurrency, claiming it has no value.

Accenture: Based on various messages over the years, Accenture appears very positive on CBDCs, but sees immutability as a design flaw in public blockchains/cryptocurrencies and wants to be able to edit a blockchain. The company is primarily interested in what central banks and traditional financial players can do in the blockchain space.

Charles Schwab: While the company offers indirect exposure to cryptocurrencies, its <u>own web page</u> downplays the potential of cryptocurrency and primarily warns users about risks and perceived shortcomings. The company states it does not believe cryptocurrency will become a global success.

Goldman Sachs: While Goldman Sachs is considering to offer cryptocurrency products to its clients, its <u>published opinion</u> is that cryptocurrency is not a viable investment for diversified portfolios.

Intuit: Back in 2019, Intuit was <u>restricting the accounts of users</u> that accepted cryptocurrency for services. There have been no statements since.



KEY TAKEAWAYS / FURTHER RESEARCH

All in all we believe that this is positive sign that the technology is here to stay. Our data is signaling that there is not only a rising interest in blockchain technology, but blockchain integration efforts are also maturing.

Some key takeaways from the top 100 public companies are:

- 81 are using blockchain in some capacity
- 46 of them have dedicated blockchain personal who are looking into the technology
- 36 have invested in the technology and the amounts are rising during 2021.
- Only 7 have a negative stance on cryptocurrency

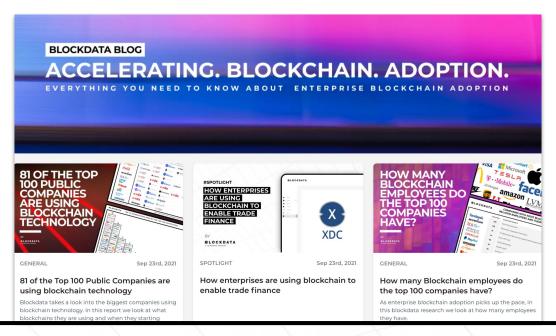
Moving forward, Blockdata aims to continue researching SME blockchain adoption while keeping a keen eye on what is going on in the enterprise space.

We understand that the top 100 institutions does not encompass the blockchain ecosystem, but it is definitely a great metric to show maturity and growth over time.



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