The State of the Art of Cryptocurrencies

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Abstract
This article intention was to set up the big picture of all 1,639 cryptocurrencies up and give a policy recommendation for Thai government. Hence, there were three following objectives as follows: 1) to investigate the state of the art of all cryptocurencies in the source of Code / Forking due to limitation of number of pages 2) to identify the best practice of cryptocurrency, and 3) to study the role of General Prayuth Chan-o-cha's government towards cryptocurrency. Documentary research and descriptive statistics like frequency and percentage were used in this study. The findings found that there were twelve groups of qualified cryptocurrencies in CoinMarketCap, led by two well-known giant family of crypto market, Ethereum (35.5%) and Bitcoin (16.1%). Then, the best practices were on the provision of coins or tokens, twelve techniques for managing blokchain (such as Blockchain-as-a Service), blocktime was between 0.03 and 30 minutes with Mean = 1.96, S.D. = 2.29 whereas TPS was between 0 - 1,400,000 with Mean = 1341.87 and S.D. = 36021.52, most of cryptocurrencies had their own Web Site (95.8%) and E-mail (78.8%), coding played a big role in cryptocurrency such as C++. Last, cryptocurrency had both open and hidden-and-dark faces. In the open face, tax, law, people's identification will be useful. In contrary to the open side, setting an autonomous public organization is one and only one solution for all crypto-centric affairs.
Keywords: Cryptocurrency, State of the Art, Thai government

Introduction
In the era of digital economy, everything could be digitalized into bits - only 0 and 1. For example, an orange can be recorded in digital genomic code (Enrique, 2001). Another example, since 2010, Stuxnet and Shamoon virus / W32.Disstrack are two first government-level weapon in the form of software against their targets only. (Gohwong, 2017b). However, since 2009, money has become one of hottest issue for all governments with the emerging of Bitcoin, the first cryptocurrency due to two reasons. First, crytocurrencies are decentralized financial systems in the hands of people whereas conventional fiat currencies (such as Thai Baht, Euro, US Dollar), are centralized systems for both cash and cashless (such as credit cards, PayPal - both Web Site and App, PromptPay), controlled by governments, national banks, and World Bank. (Gohwong, 2017e; Lee and Low, 2018) Therefore, the emerging of cryptocurrency is the clearest signal for the end of absolute control by state and inter-organization. Though it is a good time for people to manage money by themselves due to distrust from economic problems from governments and private agents such as subprime crisis or hamburger crisis in 2008. It is also a golden era of illegal affairs via cryptocurrency such as money laundering, terrorism financing, human trafficking, arms trade, and so on. Latter, since 2009, there are 1,639 cryptocurrencies now, according to the data of CoinMarketCap on June 4, 2018 with untraceable transactions in many of them (CoinMarketCap, 2018; Gohwong, 2018a).
From all I mentioned above, every country needs a long-term plan for preparing all sectors - government, private, and people sector - for being ready with the emerging of cryptocurrency, including Thailand. Nowadays General Prayuth Chan-o-cha's government has adopted and implemented "Thailand 4.0" that cashless society is a mean of this policy.

However, Thai government does not have long plan for cryptocurrencies in the draft of Thailand-20-year-national-strategy (2017-2036). Furthermore, the Office of the Securities and Exchange Commission (SEC), responsible for Thai capital market and Thai cryptocurrencies and tokens, has only three-years strategic plan (from 2018 to 2020) without any concrete goal and key initiative or solution for preparing the readiness of retail and instructional investors in Thai digital capital market or cryptocurrencies-and-tokens-centric market. (SEC, 2018l) In addition, there are a lots of books and researches about cryptocurrency in Thailand. For example, my two studies are about top 20 Cryptocurrencies and 46 privacy-based cryptocurrencies (Gohwong, 2018a, 2018b). However, there is no comprehensive investigation for setting the big picture of all 1,639 cryptocurrencies up and give a policy recommendation for Thai government. Therefore, the objectives of this research are as follows: (1) to investigate the state of the art of all cryptocurencies in the followings: Symbol / Ticker, Source of Code / Fork, Development Status, Rank in giant web site for cryptocurrency trade, Type of Coin, Type of blockchain, Protocol / Algorithm and Strength(s), Block interval / Blocktime min / Time for block processing / Confirmations, Programs / languages of currency, Transactions per second, Consensus Method, Total coin supply, Market Capitalization, Price, Circulating Supply, Founder, Initial Year, Responsible Organization, Country of headquarter / Location, Source Model, Web Site, E-mail, number of links from google search, (2) to identify the best practice of cryptocurrency, and (3) to study the role of General Prayuth Chan-o-cha's government towards cryptocurrency.

Methodology

Documentary research and descriptive statistics (such as frequency, percentage, and range) were employed for 1,639 cryptocurrencies in this study. (CoinMarketCap, 2018)

Reviews of Literature

All of the followings will be employed in the analysis part, including cryptocurrency, e-Public administration, four Emerging Models for Governing's B. Guy Peters, starfish and ant organization.

First, Cryptocurrency is a decentralized digital money created by software. Bitcoin is the first cryptocurrency of the world on January 2009. However, it is not the first generation of digital money. Before it, there was DigiCash, the first generation of digital money during 1990 - 1998 with centralized management by its founder, David Chaum (Extance, 2015). In opposite to DigiCash, cryptocurrency as the second generation of government-free-centric digital money is a decentralized digital money without third parties like government, national bank, commercial bank. It uses blockchain for payment, smart contracts, and decentralized applications (dApps) in the trustless network. Money in this system can be both fiat currency and cryptocurrency. In addition, crypto money comprises coin (money) and token (asset and "crowdfunding (formerly ICO)"). However, crypto money and data are not with the owner. Each owner get only address of money and data with private password. If owner lose password or transfer to the wrong person. All processes are irreversible. All data (such as money, transactions, and personal data) in this system are recorded and securely kept in blocks that are linked together as a chain. Therefore, blockchain is a ledger of the system. As I mentioned earlier, without third party for data verification, blockchain, in general, will use proof-in-a-consensus (such as Proof-of-work (PoW), Proof-of-Stack (PoS), and hybrid consensus of PoW and PoS (Proof-of-Activity). In addition, forking and cloning are two common activities for this kind of money. Cloning and adapting code of big names like Bitcoin and Ethereum are the easiest way to develop a new digital currency. Forking is another situation. Forking means separation of some group of people from the old currency in order to set up a new one with their own regulation. (Ammous, 2018; Burniske and Tatar,

2018; Casey and Vigna, 2016, 2018; Franco, 2015; Gohwong, 2018a, 2018b; Campbell-Verduyn, 2018; Lee and Low, 2018; Mougayar, 2016; Swan, 2015).

However, though cryptocurrency, in nature, is an anti-fiat currency because it needs freedom from government by creating decentralized money by people or private firms, many of Bitcoin-based and Ethereum-based digital money unintentionally make government more convenient for monitoring all movement of all transactions in these blockchains due to its public-based characteristics. This phenomenon is coincident with Gohwong (2017d) and Matthew O'Donnell (O'Donnell, 2018). According to Gohwong, cryptocurrency is a modern invisible jail via blockchain that the administrators can trace almost of transfer of money, except privacy-based cryptocurrencies, whereas cryptocurrency is an easy way for controlling the movement of transactions by government according to O'Donnell's perspective.

Second, e-Public Administration is the Neo-Public Administration which employed IT (such as AI, Dynamic CGE Model, MIS) to support old-Public Administration or analog-centric Public Administration in both studying and policy implementation in three areas of IT application (Planning and computation (such as public policy analysis), Directing, and Benchmarking. (Gohwong, 2017c)

Third, four Emerging Models for Governing's B. Guy Peters, he clearly pointed in 1996 that there were one main model (traditional model) with bureaucracy and four alternatives for providing public goods and services - market model (market mechanism), participative model (flatter organization, TQM, participative management and citizen participation), flexible government (virtual organization), and deregulated model (entrepreneurial spirit) (Peters, 1996).

Last, starfish and ant organization is another concept from Ori Brafman and Rod A. Beckstrom in 2006 on starfish organization and me on ant organization. For organization in the digital economy era, general organizations are ant organizations, not spider organization according to Brafman and Beckstrom, because ant organizations and digital firms have the same three key characteristics - (1) centralization by Internet, computer network, database and The Stack, (2) connectivity and communication via TCP/IP, FTTH, ADSL modems, DB, and threats from enemies or pirate organizations that will steal, destroy data and lessen CIA standard - confidentiality, integrity, and availability - for compromising performance of organization. However, many pirate organizations are now starfish organizations. For every real starfish, if it is cut a starfish into 5 pieces, they will become 5 starfishes. For pirate organizations, they are decentralized small independent group of people. They are highly independent in decision-making. For example, BitTorrent for download illegal materials such as songs, movies are done in peer-to-peer networks. There are too many people for filing a lawsuit. (Brafman and Beckstrom, 2006; Bratton, 2015; Durand and Vergne, 2013; Gohwong, 2017a; Whitman and Mattord, 2012)

Research Findings

The findings were shown by order in the followings - classification of 1,639 cryptocurrencies by source of code / forking, benchmarking of 1,639 cryptocurrencies, and the role of General Prayuth Chan-o-cha's government towards cryptocurrency. (CoinCheckup, 2018; CoinMarketCap, 2018; CryptoSlate, 2018; GitHub, 2018; Map of coins, 2018a, 2018b, 2018c, 2018d).

Classification by source of code / forking

The classifications of cryptocurrency by source of code / forking were shown in Table 1 - 3.

Table 1 Classification of all cryptocurrencies according to source of code / forking

No.	Group by code	Title of cryptocurrencies
1	Code by itself	Bitcoin (Bitcoin-core), Ethereum, Ripple, EOS (EOS.IO), Cardano, Stellar, IOTA, NEO (former: Antshares), NEM, BitShares, Nano (formerly called Raiblocks), RChain, DigiByte, MaidSafeCoin, Cryptonex, Nuls, Nxt, Blocknet, Stakenet, XTRABYTES, Pascal Coin, Bismuth, VeriCoin
2	Bitcoin	Bitcoin Cash, Litecoin, Monero (Bitmonero), Dash (former Darkcoin/ Xcoin), Tether (Former Realcoin), Bytecoin, Zcash / Zerocash, Bitcoin Gold, Decred, Bytom, Verge, Siacoin / Sia, Bitcoin Diamond, Komodo, Syscoin, Skycoin, Factom, Electroneum, Zcoin (Zerocoin), Byteball Bytes, BitcoinDark, Particl, Groestlcoin (Grøstl), GameCredits, DigitalNote (DuckNote/DarkNote), BOScoin, NavCoin, Peercoin (PPCoin), Bitcore, Primecoin, CloakCoin, BitBay, Viacoin, MinexCoin, Ravencoin, Litecoin Cash, Experience Points, Counterparty, LBRY Credits, ION / ionomy, Zoin, FairCoin, Unobtanium, SelfSell, ODEM, DECENT, Sentinel, Namecoin, Feathercoin, Triggers, ECC / E-Currency Coin, Elastic, Shift, Phore, ColossusXT, Bitcoin Green, Bitcoin Atom, Boolberry, Omni, BitSend, NeosCoin, Loki, Nimiq Exchange Token, Energycoin, Curecoin, Aeon, Dero, BitcoinZ, Sumokoin, Karbo (Karbowanec; karbovanets), Riecoin, Terracoin, Ixcoin, HunterCoin, Magi, IntenseCoin / Intense, Zetacoin, Dinastycoin, Bitcoin sCrypt, Leviar (LeviarCoin), Bitcoin Private, Dogecoin, PIVX / Private Instant Verified Transaction, MonaCoin, ReddCoin, Emercoin, ZenCash, SmartCash, Vertcoin, ZClassic, Red Pulse, Einsteinium, Safe Exchange Coin, Gulden, NoLimitCoin, Pura, PotCoin, Pepe Cash, Bean Cash, Dimecoin, BlackCoin, Crown, Linda / LindaCoin, Diamond, FlorinCoin, Mooncoin, StrongHands, SIBCoin, SolarCoin, Flash, LoMoCoin, Global Currency Reserve, OKCash, Bulwark, Novacoin, FoldingCoin, GoldCoin, Spectrecoin / Spectre, FedoraCoin, Bitcrystals, Mintcoin, Auroracoin, GoByte, Pandacoin, Tokes, Pure, vTorrent, Quark, Zeitcoin, ExclusiveCoin, Anoncoin, CryptoPing, Altcoin, Sexcoin, EverGreenCoin, ChainCoin, Rupee, Photon, TrustPlus, The Cypherfunks, NobleCoin, BunnyCoin, Magnet, DigitalPrice, 42-coin, Digitalcoin, Megacoin, MarteXcoin, MAZA, Advanced Technology Coin, Happycoin, FujiCoin, Nyancoin, AdCoin, Regalcoin, Garlicoin, CannaCoin, RedCoin, QuazarCoin, ZetaMicron, Eurocoin, HomeBlockCoin, BitCoal, CrowdCoin, LiteBitcoin, BipCoin (Makjak), Interzone, PRCoin, Royal Kingdom Coin, Lykke, Guaranteed Ethurance Token Extra, CHIPS, AurumCoin, RussiaCoin, Starta, Argentum, Vsync, WorldCoin, Fantomcoin, Woodcoin, I0Coin, MetalCoin, NetCoin, Cashcoin (CryptoCash /DigitalCash), Piggycoin, Skeincoin, ShadowCash, Fastcoin, Phoenixcoin, Bitgem, VoteCoin, TagCoin, Joulecoin, Blakecoin, Dashcoin, Ultimate Secure Cash, Freicoin, PayCoin, Granite, Tigercoin, Escroco, Datacoin, LiteBar, SecureCoin, Philosopher Stones, TEKcoin, SmartCoin, Rimbit, GoldBlocks, Emerald Crypto, iCoin, AmberCoin, Kurrent, Coin2.1, Polcoin,

Table 1 (Con.)

No.	Group by code	Title of cryptocurrencies
		SixEleven, GlobalCoin, Catcoin, Zurcoin, HempCoin, EcoCoin, Acoin, Bitcoin 21, Firecoin, SoonCoin, Mincoin, Digital Rupees, BitQuark, SongCoin, Bitcoin Planet, PoSToken, CacheCoin, Steps, Dollar Online, Bitvolt, Cthulhu Offerings, StarChain, Acute Angle Cloud, Lightning Bitcoin, BitcoinX, Monero Classic, ValueChain, TraDove B2BCoin, Super Bitcoin, Eximchain, Pixie Coin, Bitcoin Interest, Monero Original, Infinitecoin, Nectar, Animecoin, Bitcoin God, Swisscoin, ACChain, Madcoin, StrikeBitClub, Cloud, GrandCoin, TopCoin, BetaCoin, Superior Coin, BestChain, Alphabit, Macro
3	Ethereum	VeChain, Binance Coin, Ethereum Classic, OmiseGO, ICON, Zilliqa, Aeternity, 0x, Golem, Wanchain, Maker, Populous, Augur, IOST / Internet of Services Token, Waltonchain, Status, Aion, Nebulas, WaykiChain, Loopring, Basic Attention Token, DigixDAO, aelf, Huobi Token, CyberMiles, MOAC / Mother Of All Chains, Bancor, GXChain, Dentacoin, Kyber Network, Cortex, Polymath, Mithril, Veritaseum, QASH, Ethos, Fusion, Theta Token, FunFair, Substratum, Dragonchain, Kin, Nexus, Enigma, Centrality, Storm, MyBit Token, All Sports, BnkToTheFuture, Holo / Holochain, Bibox Token, Dropil, Gifto, iExec RLC, WAX, Power Ledger, Scry.info, ChainLink, Matrix AI Network, SALT, DeepBrain Chain, Monaco (former - CRYPTO.com), Storj, Civic, Decentraland, Quantstamp, Nexo, High Performance Blockchain, Nucleus Vision, TenX, Request Network, Dent, SingularityNET Iconomi, Delphy, Time New Bank, Cindicator, Ruff /Ruffchain, Bottos, Revain, Arcblock, IHT Real Estate Protocol (I-House Token), Lympo, Aragon, Game.com, Gnosis, Storiqa, Enjin Coin, Santiment Network Token, Bluzelle, POA Network, SmartMesh, SONM (Supercomputer organized by network mining), Genaro Network, SIRIN LABS Token, Docademic, SophiaTX, Credits, Metal, Raiden Network Token (µRaiden), Po.et, MediShares, IoT Chain, DEW, Pillar, Ubiq, Dynamic Trading Rights (Tokens.net), DATA, Streamr DATAcoin, BLOCKv, Ambrosus, Genesis Vision, OriginTrail, Crypterium, Jibrel Network, EDUCare, Cube, IoTeX, CRYPTO20, Republic Protocol, ETHLend, Bread, Telcoin, DAEX, OST (Open Simple Token), TomoChain, BridgeCoin, Zebi, AdEx, Rock / Rock Token, AirSwap, BABB, Eidoo, Edgeless, TrueUSD, Ripio Credit Network (formerly BitPagos), Banca, Paypex, SpankChain, PayPie, Dai, Quantum Resistant Ledger, SwftCoin, Hydro Protocol, SingularDTV, district0x, Odyssey, UTRUST, Wings, INS Ecosystem, Havven, DecentBet, WePower, Internet

Table 1 (Con.)

No.	Group by code	Title of cryptocurrencies
		Node Token, KuCoin Shares, Trade Token, TokenCard, AppCoins, WaBi, NANJCOIN, FuzeX, DATx, Tierion, Legolas Exchange, Tokenomy, NAGA, VIBE, YEE, Oyster / Oyster Protocol / Oyster Pearl, TokenClub, Primas KickCoin, Metaverse ETP, Soarcoin, Electrify.Asia, Modum, U Network, CPChain / Cyber Physical Chain, BitRent, Blox (formerly known as CoinDash), Datawallet, Presearch, Dock, Etherparty, Lunyr, Universa, YOYOW / You Own Your Own Words, QunQun, TaaS / Token-as-a-Service, Cashaa, Refereum, XinFin Network, Melon, COSS / Crypto One-Stop Solution, Cobinhood, Aurora DAO, Viberate, Datum, Blockmason Credit Protocol, Humaniq, Propy, Medicalchain, Unikoin Gold, STK (STACK), FirstBlood, Hive Project (Hive), Bloom, Bankex, Proxeus, ugChain, Mothership, Zeusshield, Lamden, Fortuna, Neurotoken, Decision Token, Cofound.it, Swarm, SunContract, Everex, Morpheus Network, adToken, Chronobank, Sentinel Chain, DMarket, Unibright, Aeron, Matchpool, Monetha, DADI, Agrello, ProChain, AICHAIN, Polybius, UpToken, Measurable Data Token, BitClave, Moeda Loyalty Points, bitqy, DAOstack, Ormeus Coin, Blocktix, Nework, AI Doctor, Incent, Grid+, Hi Mutual Society, Restart Energy MWAT, OAX, Cappasity, ATMChain, BrahmaOS, Blockport, carVertical, LALA World, Covesting, Envion, OneRoot Network, Selfkey, Maecenas, Numeraire, Quantum, EchoLink, Rialto, LATOKEN, Uquid Coin, PolicyPal Network, Neumark, indaHash, Blackmoon, SwissBorg, Oxycoin, Zap, CoinPoker, TE-FOOD, Hacken, Remme, Sakura Bloom, HeroNode, Olympus Labs, PeepCoin, Bezop, Divi, Pareto Network, ShareX, Matryx, Rivetz, Hydrogen, Playkey, Paragon, aXpire, EXRNchain, GET Protocol, Banyan Network, Friendz, MARK.SPACE, REBL, PolySwarm, Nebula AI, LockTrip, Fluz Fluz, Rentberry, Etheroll, Fidelium, DomRaider, ShipChain, Everus, Aditus, Flixxo, Swarm City, Nexium, The ChampCoin, Patientory, Musicoin, Morpheus Labs, ICOS, Bee Token, Elixir, BitDegree, Devery, NPER XPA, ATN, U.CASH (UNIVERSAL CASH), adbank, WeTrust, EZToken, Leverj, NaPoleonX, Snovio, CoinFi, MktCoin, Debitum, VouchForMe (InsurePal), CargoX, Digitex Futures, Lendingblock, Block Array, Hubii Network, InvestFeed, Bounty0x, CanYaCoin, Mysterium, Leadcoin, IDEX Membership, Xaurum, IP Exchange, Change, Spectiv, EncrypGen, Helbiz, Sphere, ConnectJob, Ink Protocol, Zilla, Worldcore, AidCoin, Aventus, Zippie, Pluton, Pirl, Eroscoin, AdShares, LIFE, AirToken, Gladius Token, Target Coin, ALIS, Waves Community Token, SportyCo, Dovu, Linker Coin, CommerceBlock, B2BX, Peculium, Blue Protocol, REAL, TrueFlip, LatiumX, Oyster

Table 1 (Con.)

No.	Group by code	Title of cryptocurrencies
		Shell, JET8, FidentiaX, Vice Industry Token, FundRequest, BitDice, Publica, ClearPoll, Colu Local Network, FintruX Network, Payfair, DAO.Casino, AdHive, Privatix, BitStation, GeoCoin, Voise, Viuly, ClearCoin, 1World, Qwark, Dether, AMLT (AMLT Token), HelloGold, Auctus, HOQU, Hackspace Capital, Internxt, Sharpe Platform Token, Astro, Spectre.ai Utility Token, Cryptopay, ATLANT, Open Trading Network, Gatcoin, HEROcoin, Education Ecosystem, Sether, Upfiring, Sharechain, Starbase, Lampix, Opus, Experty, Iungo, Autonio, DigiPulse, LOCIcoin, Hush (Hash Rush), Invacio, Goodomy, BlockCAT, Tokenbox, Own (formerly Chainium), COPYTRACK, vSlice, Ethbits, Parkgene, MyWish, Aigang, SyncFab, Indorse Token, RefToken, Daneel, Vezt, Creditbit, VeriME, Mercury Protocol, Ethorse, Maverick Chain, Tracto, Fabric Token, Bonpay, Verify, Authorship, Coinlancer, MicroMoney, Commodity Ad Network, BlitzPredict, Signals Network, Ace (TokenStars), eBitcoin, Pylon Network, TrakInvest, Hade Platform, EventChain, TokenStars, TokenDesk, HireMatch, Chronologic, Datarius Credit, Live Stars, Emphy, EtherSportz, Hat.Exchange, GoldMint, CryCash, Transcodium, SkinCoin, Qvolta, Fitrova, Origami, FLiK, Speed Mining Service, Biotron, Earth Token, Tigereum, PHI Token, bitJob, WandX, Blocklancer, BoutsPro, Wild Crypto, BelugaPay, Soma, Nitro, FundYourselfNow, Farad, More Coin (formerly Legends Room), RouletteToken, Elcoin, Embers, Equal, ProCurrency, Suretly, GreenMed, MCAP, WhaleCoin, ELTCOIN, Minereum, DCORP Utility (Formerly DRP Utility), PiplCoin, Veros, ArbitrageCT, Bitair, PlusCoin, Sugar Exchange, Intelligent Trading Foundation, Jetcoin, Billionaire Token, Accelerator Network, CryptoCarbon, EBCH (eBitcoinCash), Kubera Coin, Wawllet (formerly WCOIN), Stox, Callisto Network, Fujinto, Bitcoin Fast, CarTaxi Token, Nekonium, Ccore, DigitalDevelopersFund, Peerguess, EagleCoin, SOILcoin, ExchangeN, Coimatic 3.0, FuturXe, Credo, Hedge, Rise, Gambit, SRCOIN, APX, Sociall, E-coin, imbrex, FlypMe, DCORP, Ties.DB, Jesus Coin, Ethereum Movie Venture, NEVERDIE, Centra, Titanium BAR, Musiconomi, FlutterCoin, Etheriya, Global Jobcoin, StarCredits, Bitpark Coin, Newbium, Ethereum Cash, EthBet, iEthereum, Crystal Clear, Ammo Reloaded, Senderon, Bitcoin Red, Ethereum Gold, CryptoInsight, ERC20, 300 Token, Network Token, Ethereum Dark, Dalecoin, Trident Group, JavaScript Token, BitAsean, BROTHER, Useless Ethereum Token, EncryptoTel [ETH]

Table 1 (Con.)

No.	Group by code	Title of cryptocurrencies
4	Ripple	CasinoCoin
5	NEO	Ontology, Gas / NeoGas, THEKEY, Apex, NKN (New Kind of Network), Trinity Network Credit, Zeepin, QLINK, Alphacat, Switcheo, Aphelion, Effect.AI, Travala
6.	EOS	eosDAC, OracleChain, Insights Network, Xenon
7.	BitShares	Karma, Peerplays, bitUSD, CVCoin, Zephyr, bitBTC, Sovereign Hero, ICO OpenLedger, Bit20, bitSilver, bitGold, bitEUR
8.	Stellar	Mobius, SureRemit, Smartlands
9.	Nxt	Burst, PRIZM, Bitswift, Dix Asset
10.	NEM	DIMCOIN, Ecobit
11.	Others	GridCoin (Gridcoin-Classic, its source is not in coinmarketcap.com), Cryptojacks (Asiadigicoin (ADCN) - its source has no data of source code.
12.	Mixed data	Qtum, Qbao, Profile Utility Token, Steem, Steem Dollars, Golos, Waves, Hshare, Ark, Ardor, Loom Network, Elastos, Ignis, Ink, TokenPay, MediBloc, bitCNY, HTMLCOIN, Bodhi, MobileGo, Spectre.ai Dividend Token, Energo, Mercury, SpaceChain, I/O Coin, MaxCoin, ZrCoin, Primalbase Token, Ergo, SoMee.Social (formly onG.social), Darcrus, Miners' Reward Token, Kolion, Oceanlab, Octanox, InPay, Bowhead, Monster Byte, EncryptoTel [WAVES], WavesGo, Shadow Token

Note: The data here excluded the other 688 unknown source code or forking of cryptocurrencies.
Source: CoinCheckup (2018); CoinMarketCap (2018); CryptoSlate (2018); GitHub (2018); Map of coins (2018a, 2018b, 2018c, 2018d)

Table 2 Frequency and percentage of all classified group of cryptocurrencies in CoinMarketCap on 4 June 2018

Crypto money	Frequency	Percentage
Unknown	688	42
Ethereum	582	35.5
Bitcoin	264	16.1
Mix	41	2.5
Itself	23	1.4
NEO	13	0.8
BitShares	9	0.5
EOS	4	0.2
Nxt	4	0.2
Bitshares	3	0.2
Stellar	3	0.2
NEM	2	0.1
Others	2	0.1
Ripple	1	0.1
Total	**1639**	**100**

Table 3 Frequency and percentage of all cryptocurrencies according to privacy-concern in the CoinMarketCap on 4 June 2018

Type	Frequency	Percentage
Public-based crypto	1485	90.6
Privacy-based crypto	140	8.5
Hybrid crypto - both public and private	14	0.9
Total	**1639**	**100**

Table 4 Frequency and percentage of all cryptocurrencies according to coin and token in the CoinMarketCap on 4 June 2018

Type	Frequency	Percentage
Coin	856	49.2
Token	780	44.9
Unknown	3	0.2
Total	**1639**	**100**

Table 5 Frequency and percentage of all cryptocurrencies according to proofing or consensus method in the CoinMarketCap on 4 June 2018

Cryptocurrencies	Frequency	Percentage
Ethereum consensus (currently Proof-of-Work (PoW), will be Proof-of-Stake (PoS) later on)	448	27.3
Proof-of-Work (PoW)	334	20.4
Proof-of-Activity (PoA) [Proof-of-Work (PoW) and Proof-of-Stake (PoS)]	254	15.5
Proof-of-Stake (PoS)	237	14.5
Unknown	183	11.2
Delegated Proof-of-Stake (DPoS)	39	2.4
Delegated Byzantine Fault Tolerant (dBFT)	6	0.4
Proof-of-Stake (PoS) and Masternodes	3	0.2
Proof-of-Work (PoW) and Masternodes	3	0.2
ZeeProof / Zero-knowledge proof	3	0.2
delegated Proof-of-Work (dPoW)	2	0.1
Directed Acyclic Graph (DAG)	2	0.1
Proof-of-Activity (PoA) [Proof-of-Work (PoW) and Proof-of-Stake (PoS)]; ZeeProof / Zero-knowledge proof (ZKP)	2	0.1
Others	123	7.4
Total	**1639**	**100**

Table 6 Frequency and percentage of Algorithm of all cryptocurrencies in the CoinMarketCap on 4 June 2018

Algorithm	Frequency	Percent
N/A	1293	78.9
Scrypt	97	5.9
X11	57	3.5
SHA256	33	2
CryptoNight	23	1.4
Others	136	8.3
Total	**1639**	**100**

Table 7 Frequency and percentage of Whitepaper of all cryptocurrencies in the CoinMarketCap on 4 June 2018

Whitepaper	**Frequency**	**Percent**
Yes	1024	62.5
No	614	37.5
N/A	1	0.1
Total	**1639**	**100**

Table 8 Frequency and percentage of Algorithm of all cryptocurrencies in the CoinMarketCap on 4 June 2018

Development status	**Frequency**	**Percent**
Active	813	49.6
N/A	273	16.7
Beta	168	10.3
Inactive / Defunct / Just an Idea	125	7.6
Prototype / MVP (Minimum Viable Product)	138	8.4
Alpha	80	4.9
Demo	42	2.6
Total	**1639**	**100**

Table 9 Frequency and percentage of Algorithm of all cryptocurrencies in the CoinMarketCap on 4 June 2018

Year	**Frequency**	**Percent**
Unknown	484	29.5
2009	1	0.1
2011	2	0.1
2012	2	0.1
2013	31	1.9
2014	125	7.6
2015	81	4.9
2016	140	8.5
2017	669	40.8
2018	104	6.3
Total	**1639**	**100**

Table 10 Frequency and percentage of Algorithm of all cryptocurrencies in the CoinMarketCap on 4 June 2018

Continent of Headquarter of crypto money	**Frequency**	**Percent**
N/A	772	47.10
Europe	313	19.10
Asia	256	15.62
North America	242	14.77
Oceania	21	1.28
Africa	11	0.67
Cyberspace	5	0.31
South America	5	0.31
Western Caribbean and Central America	5	0.31

Table 10 (Con.)

Continent of Headquarter of crypto money	Frequency	Percent
Asia and North America	2	0.12
Europe and North America	2	0.12
Southwest Asia	2	0.12
Central America	1	0.06
Northpole	1	0.06
Oceania and North America	1	0.06
Total	**1639**	**100.00**

According to the above findings, first of all, there were twelve groups of qualified cryptocurrencies in CoinMarketCap in Table 1 because the existence of any digital money in this market revealed that the money was good enough. However, almost half of cryptocurrecies developed their products two well-known giant family of crypto market, Ethereum (35.5%) and Bitcoin (16.1%) in Table 2. That was why many investors on ICO or Token focused on these two big families. However, there were 688 currencies with unknown source of code or forking. In addition, mix-centric model was still functional for creating new cryto money. Second, according to Table 3, privacy in cryptocurrencies had embedded their roots for private-affairs. Though they were less than 10% of the market, they were good ways to conduct all illegal affairs (such as money laundering, human trafficking, drug trafficking) with Virtual Private Network (VPN), CryptoNote and CrytpNight, Zero-knowledge proof, and secret-centric Web Site like TOR and I2P. Third, the application of cryptocurrencies for payment with coin (49.2%) was highest, followed by investment or crowdfunding with token (44.9%). Fourth, key proofing or consensus method was Proof-of-Work (PoW) with 47.7%, followed by Proof-of-Activity (PoA) [Proof-of-Work (PoW) and Proof-of-Stake (PoS)] with 15.5%, Proof-of-Stake (PoS) with 14.5%, and Directed Acyclic Graph (DAG) or non-blockchain, used in public-based cryptocurrecies like Byteball Bytes (a fork of Bitcoin) and TrustNote, with 0.1%. Fifth, Key algorithm in Table 6 with data availability were Scrypt, X11, SHA256, and CryptoNight. Sixth, more than half of all cryptocurrencies had their own whitepapers, shown in Table 7. Seventh, almost half of all cyptocurrencies was active, shown in Table 8. Eighth, the year of 2017 was the highest rate of new born cryptocurrencies, shown in Table 9. Last, almost half of all cryptocurrencies did not reveal the location of their headquarter (47.10%), followed by Europe (19.10%), Asia (15.62%), North America (14.77%).

Benchmarking of 1,639 cryptocurrencies

All qualified cryptocurrency for CoinMarketCap had the following qualifications. CoinCheckup (2018); CoinMarketCap (2018); CryptoSlate (2018);
GitHub (2018); Map of coins (2018a, 2018b, 2018c, 2018d)

First, crypto money had its coins for payment or tokens (second version of ICO) on Bitcoin (BTC) and Ethereum (ETH).

Second, crypto money had its own Proof / Consensus method in the blockchain with single technique or multiple techniques. The Proof techniques were on blockchain with moderate security (such as Proof-of-Work (PoW), Proof-of-Stake (PoS), Hybrid Proof like Proof-of-Activity (PoA) [Proof-of-Work (PoW) and Proof-of-Stake (PoS)], Delegated Proof-of-Stake (DPoS)), high security (such as Stellar Consensus Protocol / Federated Byzantine Agreement, Delegated Byzantine Fault Tolerant (dBFT), Zero Knowledge Proof (ZKP)), and hybrid method such as Proof-of-Stake (PoS) with a modified Federated Byzantine Agreement (mFBA) - originally from Federated Byzantine Agreement System(FBAS)) and non-

blockchain (such as Quantum Resistant Directed Acyllic Graph, Z-DAG (Zero-Confirmation Directed Acyclic Graph).

Third, all transactions in payment, smart contracts, and decentralized applications (dApps) were usually done on blockchain, called on-chain. However, in order to increase scalability or transactions per second (TPS) and / or privacy-centric affairs, there were at least eleven techniques such as (1) On-chain and Blockless / Non-blockchain / Directed Acyclic Graph (DAG), (2) Directed Acyclic Graph (DAG), (3) On-chain and Off-chain / Cross chain / Interchain / Sidechain / Subchain / Child chain / Interplanetary File System (IPFS), (4) Multi-chain OS that Main-chain with Delegated Proof-of-Stake (DPoS) for increasing TPS and N sidechain for voting in smartcontracts, (5) Combination of Side-chain, Multi-chain, and On-chain, (6) Blockchain-as-a-Service (BaaS), (7) Bridge with one chain for one scenario, (8) Modular-based Blockchain in which all modules were connected together for running any services by service bus and event bus, and managed by microkernel, (9) Factom consensus (FCT) that its sidechain moved non-BTC off the blockchain, (10) Chainpoint that provided anchoring for linking a hash of users' data with blockchain and gave a timestamp proof for only BTC-centric cryptocurrency. It differed from Off-chain's focus on transaction transfer, (11) Mini-blockchain that old transactions would be forgotten by the network for faster TPS, and (12) Dual blockchain or Binary chain that one chain for Proof-of-Stack-Time (PoST) and One chain for Proof-of-Work-Time (PoWT).

Fourth, the block time was between 0.03 - 30 minutes with Mean = 1.96 and S.D. = 2.29 (N = 369). The TPS or scalability was between 0 - 1,400,000 with Mean = 1341.87 and S.D. = 36021.52.

Fifth, most of cryptocurrencies had their own Web Site (95.8%) and E-mail (78.8%).

Last, key code or programming for cryptocurrencies were as follows: C++, Go, Python, Java, Rust, Solidity, WebAssembly, C, Haskell, Javascript / Node.js, Ruby, Shell, Scala, Turing complete language, C#, SCORE, PHP, BASH, CMake, Xamarin, QML, HTML, Markdown, GCC, Boost, MSVC / Microsoft Visual C++, Emacs Lisp, Objective-C, Perl, CSS, TeX, TypeScript, Kotlin, HCL, Clojure, PLpgSQL, ASP, PLSQL, Makefile, Assembly, Makefile, CoffeeScript, and M4.

The role of General Prayuth Chan-o-cha's government towards cryptocurrency

Cryptocurrency started legalization in Thailand since the first attempt of Bitcoin Co. Ltd. in the year of 2013 to legally sell and buy cryptocurrency though Thai policy windows of Bank of Thailand (BOT) in Yingluck Shinawatra's government did not open in that year (Gohwong, 2017e; Kingdon, 1995). However, legalization of buying and selling of cryptocurrency has finally adopted by General Prayuth Chan-o-cha's government with one of her important policy for digital economy, called Thailand 4.0. Unfortunately, Thai government still does not have long-term strategies for cryptocurrencies, especially in the Thailand-20-year-national-strategy (2017-2036). By the way, along with this policy, there are three key public agencies for supervising and enabling cryptocurrency - Bank of Thailand (BOT), Office of the Securities and Exchange Commission (SEC), and Ministry of Finance (MOC). A set of measures for cryptocurrency were conducted by Thai government as follows: (1) BOT strongly prohibiting all banks and financial institutions of Thailand from investing in cryptocurrencies on 12 February 2018, (2) Electronic Transactions Development Agency (ETDA) under Ministry of Digital Economy and Society collaborated with Omise, an Ethereum Blockchain Startup, and Thai Government for developing the Know Your Customer (KYC) solution on 20 February 2018, (3) BOT formally announced "Inthanon or TokenBaht" - the first cryptocurrency by Thai government for using among BOT and eight giant banks (Bangkok Bank Public Company Limited, Krungthai bank, Bank of Ayudhya Public Company Limited, Kasikornbank Public Company Limited, Siam Commercial Bank Public Company Limited, Thanachart Bank Public Company Limited, Standard Chartered

(Thai) Public Company Limited, and Hongkong and Shanghai Banking Corporation Limited, HSBC) - on 20 March 2018. It has developed by R3 company in the Corda platform - not in https://coinmarketcap.com, (4) "the Emergency Decree on the Digital Asset Businesses B.E. 2561 (A.D. 2018)", responsible by SEC and MOC, and "the Emergency Decree on the Amendment of the Revenue Code (No.19) B.E. 2561 (A.D 2018)", responsible by the Revenue Department under MOC, were announced in Royal Thai Government Gazette on 13 May 2018, and (5) SEC announced her eleven regulations in Royal Thai Government Gazette on 16 July 2018 for setting procedure of Initial Coin Offerings according to the Emergency Decree on the Digital Asset Businesses B.E. 2561 (A.D. 2018) and the Emergency Decree on the Amendment of the Revenue Code (No.19) B.E. 2561 (A.D 2018) as follows: criteria of algorithm, Accountant's agreement of issuers, criteria for investment design, portfolio management, license fee for offering of Digital Tokens to the public, offering of Digital Tokens to the public, criteria-condition-agreement of ICO Portal, license fee for Digital Asset Businesses, Prohibitions of provider in Digital Asset Businesses, criteria-condition-agreement of Digital Asset Businesses, and criteria of persons in the secondary market. (Suksena, 2017; BakerMaKenzie, 2018; Bank of Thailand, 2018; CoinMarketCap, 2018; Gohwong, 2018b; SEC, 2018a, 2018b, 2018c, 2018d, 2018e, 2018f, 2018g, 2018h, 2018i, 2018j, 2018k)

For the application of cryptocurrencies in Thailand, "the Emergency Decree on the Digital Asset Businesses B.E. 2561 (A.D. 2018)", "the Emergency Decree on the Amendment of the Revenue Code (No.19) B.E. 2561 (A.D 2018)", and eleven SEC's regulations for Initial Coin Offerings will be discussed here.

First, the first two decrees give a big picture of legalized cryptocurrencies in Thailand whereas the eleven regulations give all of necessary procedures according to two decrees. With these thirteen laws, there are only seven legalized cryptocurrencies from 1,639 currencies in https://coinmarketcap.com, or 0.43%, as follows: Bitcoin (Bitcoin-core, BTC), Ethereum (ETH), Ripple (XRP), Bitcoin Cash (BCH), Litecoin (LTC), Stellar (XLM), and Ethereum Classic (ETC) (BakerMaKenzie, 2018; CoinMarketCap, 2018; Gohwong, 2018b; Rosen, 2018). The similarity of these currencies is public-based cryptocurrency. Furthermore, their source codes are open source type, which can be classified in three sources only - Bitcoin (Bitcoin-core, Bitcoin Cash, Litecoin, and Stellar), Ethereum (Ethereum and Ethereum Classic), and Opencoin (Ripple). Therefore, according to their mentioned characteristics, their users' transactions are easy for tracking and monitoring by government. This finding is the same as work of Gohwong (2017d) and Matthew O'Donnell (O'Donnell, 2018).

Latter, Cryptocurrencies and Digital Tokens (ICOs) under two decrees and eleven regulations could be elaborate more as follows: (1) Cryptocurrencies and Digital Tokens are considered by SEC as electronic data units. The difference is that electronic data units in Cryptocurrencies are for payment like cash whereas electronic data units in Digital Tokens are for investment and crowdfunding, (2) the regulatory coverage area are two activities - offering of Digital Tokens to the public in primary market, and operation of Digital Asset Business in secondary market. For the first activity, all issuer, established in Thailand only, must offer Digital Tokens to the public via ICO Portal or providers for selling Digital Token, established in Thailand only and approved by SEC. There are two type of investors. The first set with no limitation of investment are institutional investors, ultra high net worth individuals, private equity funds, venture capitalists, and qualified investors. The latter type is retailed investor with 300,000 Baht/person/offering. For the second activity, all providers of Digital Asset Businesses, established in Thailand only and approved by MOC through SEC, can do digital businesses in three types - Digital Asset Exchange (with Fund reserve - not less than 50 million Baht), Digital Asset Broker (with Fund reserve - not less than 25 million Baht), and Digital Asset Dealer (with Fund reserve - not less than 5 million Baht), and (3) the

tax rate is 15% withholding tax on capital gains and benefits from digital asset. However, it is not a final tax. The individual investors, both Thai and non-Thai tax residents, must include these income in their personal income tax return filing (BakerMaKenzie, 2018; Gohwong, 2018b; Rosen, 2018).

Discussion

This part would firstly be dedicated for policy recommendation for Thai government. All policies that government did are not enough for coping with the emerging of cryptocurrency because all mentioned-above measures are old-fashion for modern technology like cryptocurrency and blockchain. People's Identification, law, and tax collection on digital money are ineffective tools of fiscal policy in traditional model. It is the same as fighting between "ant-organization-based Thai government" and "smarter starfish-based organization of crypto money's users". Tax and people's identification will be useless if users use privacy-based techniques like TOR, I2P, CryptoNote and CryptoNight, Zero-knowledge Proof. In addition, users can keep their money in the crypto form for avoiding tax payment. In addition, since a survey by Siam Blockchain in 2017, Thai people has already started using BTC for their everyday life and investment. Though it is not a high number of users in Thailand, with the emerging of mentioned privacy-centric blockchain technology with approximately 9.3% according to Table 3. It has a way for people to disobey the state by against two new laws of Thai government, called civil disobedience. (Rawls, 1969)

The solutions is based on my Neo-Pubic Administration with AI and public policy analysis, market model, participatory model and flexible model - all of B. Guy Peters, and starfish organization of Brafman and Beckstrom. The point of the problem is Cryptocurrency has two faces - open and hidden-and-dark. In the open face, all Thai government have conducted in tax, law, people's identification will be effective. However, these ancient tools are ineffective for another face, hidden-and-dark side. An autonomous public organization must be found by government for being responsible for all crypto-centric affairs. In addition, this new agency should set up a group of virtual organizations with temporary workers and volunteers for acting like starfish organization against hidden-and-dark side of ceryptocurrency. (Brafman and Beckstrom, 2006; Peters, 1996; Gohwong, 2017a, 2017e, 2018a, 2018b)

Conclusion

The finding of this paper is a beginning of unstoppable change and my study in Neo-Public Administration - both its NPM-based management and its finance under decentralized Thailand. It is a challenge for both government and scholars to stay with the world of decentralization because this state has been familiar with centralization since 1932.

Limitation of the Study

Due to time limitation and fast change in the cryptocurrency market, the population here were 1,639 cryptocurrencies on June 4, 2018 (CoinMarketCap, 2018). In addition, the first research objective will present here only classification by source code or forking, frequency and percentage of all classified group of cryptocurrencies, and frequency and percentage of all cryptocurrencies according to privacy-concern.

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